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Par
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The implementation of quality policies at nurses' activity level: the example of certification procedures in French hospitals

The Integrative Framework for the Implementation of change In Nursing Practice (IFINP)

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Titre : L'implémentation des politiques qualité au niveau de l'activité des infirmières : l'exemple des procédures de certification dans les hôpitaux français.

Mots clés: implémentation, procédures de certification, pratique infirmière, framework, facteurs systématiques, facteurs contextuels locaux.

Résumé : L'implémentation des mesures qualité dans la pratique des professionnels constitue un enjeu essentiel de management des organisations de santé. Des recherches identifient des freins et des facilitateurs à l'intégration des mesures qualité à l'hôpital. On manque cependant de connaissance concernant leur intégration dans la pratique clinique. Cette thèse étudie la mise en œuvre de procédures de certification au niveau de l'activité infirmière en France. Elle suit une démarche en trois phases. Dans une première phase, nous avons réalisé une revue de littérature sur l'implémentation du changement dans la pratique infirmière. Cette revue a montré l'importance des recherches sur les facteurs systématiques qui favorisent l'implémentation des changements. Elle a montré aussi l'émergence en parallèle de recherches interrogeant l'impact du contexte local sur ce processus d'implémentation. Dans une deuxième phase, nous avons alors élaboré un cadre d'analyse qui intègre ces deux dimensions. Pour ce faire, nous avons d'abord mené une étude de cas exploratoire dans un CHU français entre avril et décembre 2019 combinant des observations (83h) et des entretiens semi directifs (n=16) auprès des managers et des infirmières. Les thèmes qui ont émergé de ce terrain ont ensuite été codés à l'aide du Quality Implementation Tool puis de la translational mobilisation theory. Nous avons procédé à une analyse combinée permettant d'élaborer un cadre intégrant les deux approches : integrated framework for implementation of change in nursing practices (IFINP). Dans un troisième temps, pour évaluer la généralisabilité et la pertinence de l'IFINP nous l'avons appliqué pour analyser les résultats de trois études de cas comparatives (n=33 entretiens) réalisées dans des hôpitaux de types et de tailles différents, dans des secteurs d'activité différents. Le cadre s'est avéré assez flexible pour capturer l'ensemble des actions liées à l'implémentation de la certification. Les résultats ont montré une forte interférence des composants de l'IFINP. Ces interférences nous aident à caractériser le contenu des facteurs systématiques repérés dans la littérature. C'est le cas notamment du leadership et du rôle joué par les managers sur le terrain. Ainsi, notre thèse contribue au développement des connaissances sur la mise en œuvre des procédures de qualité et des innovations au niveau du travail des infirmiers. Le cadre d'analyse offre aux managers une vision plus large des facteurs influençant les processus d'implémentation et un outil pratique pour les accompagner au quotidien.

Title: The implementation of quality policies at nurses' activity level: the example of certification procedures in French hospitals

Keywords: Implementation, certification procedure, nursing practice, framework, systematic factors local context factors.

Abstract: Implementing quality measures is essential to improve the performance of healthcare organizations. The integration of these measures, particularly certification, into professionals' practice is a pivotal issue for managers and the management of healthcare organizations. However, research on the implementation of these quality procedures into routine practices remains limited. In this thesis, we studied the implementation of certification procedures at the level of nurses' activity following an abductive approach. First, we reviewed the literature on the implementation of evidence-based changes in the nursing practice. This review showed that despite the importance of previous research on implementation factors, the impact of local context on implementation processes was poorly understood. Therefore, we developed an integrative framework in two stages. The first was inductive and consisted of a qualitative case study conducted between April and December 2019. Here, we analyzed the implementation of certification procedures in a French teaching hospital. Data were collected using 16 semi-structured interviews with managers and nurses and 83 hours of observations. The second was deductive in which we analyzed the emerged themes using the Quality Implementation Tool (QIT) and Translational Mobilization Theory (TMT). The analyses were combined to construct the integrative framework for the implementation of change in nursing practice (IFINP). Then, to assess the generalizability of IFINP in multiple organizational settings, we conducted comparative case studies. Data were collected using 33 semi-structured with relevant actors in the implementation of the certification procedures from three hospitals different in type and size and within three sectors. The framework was flexible to capture the different actions and elements that emerged during the implementation processes. These were helpful to characterize the leadership factors and managers' role and showed a strong interference of the IFINP components. This thesis contributes to the development of knowledge relevant to the implementation of certification procedures at nurse's level and offers a framework for managers with broader vision elements that influence the implementation processes at the organizational and professionals' activity levels.

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Dedication

Most of all, thanks to God the Divine who continues to make the impossible possible.

To the precious peoples without whom this thesis might not have been written, and to whom I am greatly indebted.

To the soul of my grandparents…

To my dear Dad, Muhamed, who represented to me 'living proof' of a person's ability to redefine and recreate his live, and who was always and still supporting me and encouraging me to dream big. To my Dad who as the main reason for me to take the decision and start this journey!

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'Details create the big picture'

- Sanford I. Weill.

Before my PhD, I used to admire adventure, challenges, and discover new things. I was always very ambitious to be a person who makes a difference in this world, and probably, this drove me to adore research and sciences. Personally, I always appreciated the people who knew exactly what they wanted in life, who not only have the conviction but also have the persistence and dedication to focus all their energy to reach their goal. And, the older I became the more I get concerned about my own future and life decisions, and the more I started to compare myself to those people. At times I thought that my achievements are meaningless to them, and I think at this moment, and I knew what I really want. I was convinced that by traveling and working around the world, I and my life's purpose would be bound to eventually cross paths, believing that I'd surely become as dedicated as them. And the journey started…

During my PhD, I've learned how researcher's pathway is embedded by ups and downs, good and tough days, and a lot of unpredictable. And what might be in my interest at moments can become not. I learned how to embrace every conditions, and adapt to the reality of work progress. And, despite those stressful times I always kept in my mind the need to pursue and never give up, even when everything seems to be wrong or blocked. And I realized that, what I was considering waste of time was just the normal process in researcher way. Over the past three years, probably one of the main challenges that impacted my work progress and timeline, was the Covid-19 health crisis. Like many others everywhere, this period has been one of the very difficult moments that I went through. At times, I felt that the whole world stopped and there is no solution! But, because nothing last forever, this pandemic started to be manageable in some ways benefit of research and knowledge again!

After my PhD, looking back now, I realized that all the little steps I've made and the little details, was the matter! And a research is not one big piece to fill the void, but a puzzle in which every progress even the smallest took place to build the big

picture. This PhD taught me that filling my void is a process of growth. And what I used to think of as failures were actually valuable pieces of lessons and knowledge that I only gained by the experience. These experiences may have been positive or sometimes negative, but either way they always resulted in new skills and knowledge, shaping me into who I am.

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General introduction

'Research means that you don't know, but are willing to find out'

- Charles F. Kettering

The first insight of this thesis was to study the impact of quality policies on professionals' practices by studying certification procedures and its impact on the daily practices of nurses; however, the reality of research sometimes imposes changes and adaptations according to what a researcher confronts. In our case, the primary objective of our thesis was modified as well as the research methodology. After the first observations, the preliminary analysis has shown the need to understand how the certification procedures are implemented and anchored in professionals' daily practices. Thus, the objective has been changed to study the implementation of quality policies at the level of nurses' activity, using the example of certification procedures in French hospitals. In addition, the research methodology was also changed following the COVID-19 health crisis. The research methodology was initially based on interviews and observations by shadowing in two sectors within two French hospitals of different types e.g. teaching hospitals center and a hospital center. However, given the health sanitary crisis and the national regulations, hospitals have imposed restrictions and limited the access to sectors. For that reason, we had to limit the method of data collection to only semi-structured interviews and expand our field of study to three types of hospitals and three different sectors. A research path is guided and shaped all over the research progress.

General introduction

Healthcare systems are known by the enormous technological and dynamic environment, with the regular emergence of new interventions and procedures to organize work and guarantee the quality and safety of provided care (Allen, 2015). Accordingly, professionals are increasingly faced with a proliferation of tools and policies such as checklists and protocols. In addition to a continuous change in practices required to manage and reduce the risks caused by the complexity of delivery processes (Allen, 2019). This can impact professionals' workload, particularly for nurses (Allen, 2014). Adopting these changes associated with quality initiatives and measures into routine practices is challenging and difficult, and its outcome can be uncertain (McArthur et al., 2021). For that reason, there is a need to study and understand how effectively implementing such an innovation or change into professionals' routine practice (Beauchemin et al., 2019).

The subject of implementation has been studied from different perspectives, such as the implementation of evidence based practices (Alatawi et al., 2020; Palinkas & Soydan, 2011; Qin et al., 2020; Renolen et al., 2019; Ubbink et al., 2013), clinical practice guidelines (Burgers et al., 2020; Correa et al., 2020; Lin et al., 2019; Oliveira et al., 2018) and informatics systems (Ahmadian et al., 2014; Farzandipur et al., 2016; Khalifa, 2013; Malik & Khan, 2009) and others. It has also been studied by developing models and theories and frameworks to support implementation purposes (Breimaier et al., 2015; May et al., 2016; Rogers, 2010; Rycroft-Malone, 2004). Despite these efforts, there is a lack in reseach regarding the implementation of quality policies and measures in professional practices. Therefore, this research project focuses on the subject of quality measures implementation at the level of professionals' activity.

1. Thesis theoretical framework

1.1. The implementation of quality policies in French healthcare system

Over the past few decades, the concern toward accountability and transparency in patient care has increased alongside the rising of New Public Management (NPM) in healthcare systems (Heaton, 2000; Shaw, 2001). Accordingly, the new policies aimed to define a national health policy at the expense of policy development and implementation at the local level (Simonet, 2014). Care quality policies are often decided by decision makers and hospital managers with less involvement of stakeholders. This might create an 'accountability gap' between healthcare providers from one side and patients, financers and governments on other side (Klazinga, 2000). Many European countries have implemented quality control mechanisms to ensure the safety of care processes and patients (Greenfield & Braithwaite, 2008). Ranging from Quality Management systems (QMS) to external evaluation for healthcare organization, such as accreditation, and certification which is based on the International Organization for Standardization (ISO 9000 series) (Wagner et al., 2006). In France, quality regulations emerged slowly before they were accentuated with hospital evaluation law in 1991 (Minvielle, 2013). The French law reforming public and private hospitalization imposed an external evaluation named "accreditation" for private and public hospitals to promote continuously care quality and safety (Daucourt & Michel, 2003; Minvielle, 2013). This external evaluation procedure was conducted by the National Agency for Accreditation and Evaluation in Health (ANAES) (Holcman, 2015). Accreditation came to pose an equivalence between quality improvement by mobilizing staff towards new behaviors and recognizing work (Douguet et al., 2005), and disseminating quality language in the form of continuous self-assessment "talk about quality'' (Fraisse et al., 2003). Subsequently, accreditation is transformed into certification by the law of 13 August 2004 relative to health insurance (Holcman, 2015). This is considered one of the main "peer evaluation techniques" in Europe (Shaw et al., 2010) alongside the French Health Authority (HAS) which was created as an extension of the ANAES was

in charge of certification. This “peer evaluation technique” is compulsory for all healthcare facilities whether public or private (Holcman, 2015) and carried out every 4 or 6 years (HAS, 2016). The goal set of certifications is to assess quality and safety of all delivered services in the regard of internal organization and patient satisfaction. This mandatory procedure is considered as a development tool (Piperini, 2006), which relies on standards, benchmarks involving care processes, and best clinical practices (Holcman, 2015), and associated to quality and safety indicators (Bertillot, 2016) including certification and accreditation programs results (Saintoyant et al., 2012). These results are important not only for promoting and regulating quality and safety of health services, but by also playing a service marketing role through the public display and the use of results by regional agencies (Minvielle, 2013; Shaw et al., 2010). Multiple certification iterations were carried out over the past years. In each iteration the HAS imposed new objectives to improve healthcare organizations performance (HAS, 2017).

The approach of quality evaluation imposes a proliferation of measurement tools, care processes, and protocols to manage care and continuously improve care quality and other excessive demands (Alkhenizan & Shaw, 2012; Kakemam et al., 2020; Rooney, 1999). This heavy bureaucracy impacts professionals workloads particularly nurses (Myny et al., 2012), who are the largest providers of continuous patient care (Asmirajanti et al., 2019). They are considering these demands as a source of distraction from patient (Allen, 2014; Prang et al., 2018). In addition, previous research showed hospitals concerns regarding the appropriateness of standards of international accreditation organizations for specific local circumstances (Brouwers et al., 2021). At the same time, professionals often feel disconnected to decisions and quality initiatives imposed upon their heads (Robert et al., 2020) which creates an increasing gap between the reality of clinical practice and paper-based initiatives which puts the continuation of certain initiatives in question (de Bree & Stoopendaal, 2020; Leistikow & Bal, 2020). Therefore, implementing such quality policies or initiatives as certification procedures continues to be a pivotal managerial issue. This is in terms of obligations and preparations, as well as the implementation and sustainability of these requirements into professionals’ routine practices (Duval, 2017).

Proposition I: There is an increasing awareness that quality policies do not succeed or fail on their own merits; rather their progress is dependent upon the process of implementation (Hill & Hupe 2015). We need to understand how these policies are implemented within healthcare organizations and how they are integrated into professionals' routine practices in order to generate more practical managerial recommendations useful to support implementation initiatives.

1.2. Concerns in implementation initiatives

Implementation is defined by the period following adoption during which employees ideally become proficient and consistent in their use of an innovation (Klein & Sorra, 1996). Implementing even the simplest healthcare innovations has proven to be challenging (Alexander, 2008). One of the main objectives for implementation sciences is bridging this gap between research findings and professional practices. It is crucial to 'the scientific study of methods to promote the systematic uptake of clinical research findings and other evidence-based practice into routine practice, and hence improve the quality of healthcare' (Eccles et al., 2009). Implementation science extends beyond methods typically used in efficacy or effectiveness studies. Implementation science is supported by theoretical frameworks, requires contextual analysis, builds on patient and stakeholder involvement, applies implementation strategies, and focuses on both clinical and implementation outcomes (Zullig et al., 2020).

Healthcare systems are witnessing a constant growing number of innovations, practice guidelines, and quality improvement (QI) initiatives (Rycroft-Malone et al., 2012). The development and use of these innovations is thought to be a necessary component for the improvement of patients care quality and outcome (Cidoncha-Moreno, 2017). Despite that, implementing such a change into professional practices is considered difficult and the results are often unpredictable, especially where work-field reality defers from expectations (McArthur et al., 2021). Considerable research has sought to identify elements and factors impacting implementation processes and define the most effective ways and strategies to earn successful

implementation (Jun et al., 2016; Qin et al., 2020). This was done by developing models and change management theories to design effective implementation processes (Jabbour et al., 2018). These promising approaches identify a wide range of key attributes, facilitators, and barriers and how they come together to promote implementation outcomes (Meyers et al., 2012) of this dynamic process (Pfadenhauer et al., 2017). They can be divided under three major aims (Nilsen et al., 2015): the 'process model' which described and guided the translation of research into practice (Meyers et al., 2012; Wilson et al., 2011); 'determinant framework' which explained and attempted to understand what influenced implementation outcomes (Damschroder et al., 2009; Rycroft-Malone, 2004), and 'evaluation frameworks' which evaluated implementation efforts (Dabbagh et al., 1991; Glasgow et al., 1999). These approaches generally emphasized essential factors such as leadership, resources, culture, knowledge, and others (Colson et al., 2019; Wolak et al., 2020). These are common elements which can be useful in multiple organizational contexts and at different management levels. However, their content differs according to the specificity of the local context (May et al., 2016). Thereby, other researchers came in parallel to shed light on the factors related to the local socio-material context and their impact on implementation processes (Allen, 2013, Waelli et al., 2016).

Besides, it is acknowledged that implementing changes into clinical practices imposes an alteration of professional previous behaviors to develop a new behavior or changing it to current requirements (Holleman et al., 2009). In nursing, Renolen et al., (2018) explained the challenges in order to integrate new scientific knowledge into daily practices resumed by the primary concern of nurses in patient care, which is "keep on track". This grounded theory implied the different behavioral patterns reflecting nurses' efforts to maintain optimal workflows and patient safety. This included sustaining control and efficiently completing tasks. Thus, it exemplified the nurses' experiences and outlined the challenges when attempting to adopt new changes related to their daily practices. This involves complex care processes that consist of logical series of related interventions of actions that incorporate multiple professionals (Grol & van Weel, 2009) as recognized by Aveling et al., "work of many hands"(2016).

Proposition II: Despite the recognition of its importance, the literature on healthcare innovation implementation, more specifically in terms of its integration into nurses' routine practices, remains limited. We need to conduct more studies to expand knowledge about elements and interventions contributors to an effective implementation at the activity level of nurses.

1.3. The role of local management in implementation processes

A leadership is an integral part of the role of clinical managers and leaders and has been shown to influence organizational relationships, communication, teamwork, and productivity positively or negatively as well as risk management and healthcare safety and high-quality. Additionally, job satisfaction, turnover, and intention to leave the workplace are strongly associated with the quality of relationships between nurses and their supervisors (Hofmeyer, 2013). It is acknowledged that a strong nursing leadership at the top is essential to create a positive culture in the health care system. It empowers nurses to change when they see that these improvements are benefiting patients and other staff (Blackmore, 2016). Despite its importance, other studies speak of a potential risk of failure in the implementation of such innovation in care processes by top management. This is given the existing gaps between strategic and operational levels in hospitals (Andreasson et al., 2016). Bridging the gaps between strategic and activity levels depends primarily on the role of clinical or middle managers in translating and adapting intended changes to local contexts (Birken and Currie, 2021). According to Birken et al., (2018), middle managers who supervise frontline and are supervised by an organization's top managers (e.g., project managers, nurse managers, team managers) are in a unique position to promote the implementation of such evidence into practices within healthcare organizations. Their role has been questioned previously and acknowledged as valuable mediators in implementation processes (Waelli et al., 2016). However, there is a lack in information about the content and activities of

managers' role, and the determinants (e.g., individual, organizational, and system-level factors) which influence their role (Birken et al., 2018).

To effectively implement health care innovations, actors must have information regarding what to do, how and when to do it, and why they must do it (Ackerman & Kyllonen, 1991). Failure to provide such information can make it challenging for actors to achieve a shared sense of efficacy to implement innovations. Birken et al., (2013) suggests that the middle managers' commitment influences implementation effectiveness when middle managers are proactive. They can influence the implementation of innovation by bridging informational gaps between top managers and frontline employees (Birken et al., 2016). To date, middle managers are largely overlooked, instead, there is extant research on health care innovation implementation that focused on investigating the roles of executives and physicians (Birken et al., 2013).

Proposition III: Because of their strategic location between executives and frontline employees, middle managers bridge informational gaps when they commit to innovation implementation. Also, a leadership has been always cited as a vital part impacting implementation processes. However, little is known about the activities under the leadership cap involved in such processes. More research is needed concerning the possible role of middle managers in implementation processes.

2. Statement of problem

Thus, to bridge the gap between research findings and real-world of practices settings, nursing should fully adopt implementation science as a paradigm to improve its impact and the outcomes (Zullig et al., 2020). Despite previous efforts and existing knowledge in implementation science, there is a lack in research addressing the implementation subject from multiple organizational perspectives and information on the integration of quality policies and measures into routine practices and precisely in nursing practices. Allen, (2014) argued how the

contemporary nursing mandate is centered on organizational rather than therapeutic relationships. Nurses undertake a wide range of activities not captured by the predominant professional image (Allen, 2014). There is a growing concern about the implementation of these activities in nurses' daily practices, since, they are considered out of nurses' professional identity and as workload. Thus, identifying what factors impacting implementation of such change could be insufficient. We need to understand how these factors are operationalized on the local level as well what actors and action are involved in implementation processes. Therefore, in this thesis we are interested in studying how the work generated by quality policies is implemented in French healthcare organizations and particularly at the nurses' level. Drawing on the example of certification procedures implementation in French hospitals, we studied the various elements incorporated into its implementation processes at the activity level. Also, we seek to investigate 'how' and 'what' the most effective ways to integrate these quality requirements into routine practices are in order to generate more pragmatic recommendations for managers. In addition, this study intends to help managers and researchers to develop their knowledge regarding the potential reasons leading to the gap between certification requirements specifically and quality polices generally, and professional practices.

3. Research questions:

- To what extent are the processes of implementing quality policies and evidence-based measures operated in French hospitals? How do professionals in French hospitals incorporate the work generated by these quality measures and reforms in their daily practices?
- What factors can potentially have an impact on the implementation processes of such quality policies or initiatives in nursing practices? What elements are incorporated in the implementation of these innovations at Macro, Meso, and Micro level?

- What is the role of the management, both higher and local, in the implementation of quality policies and initiatives in healthcare organizations and precisely at nurses' activity level?
- How can a local context of implementation determine implementation outcomes? What are the most effective ways and strategies to integrate such change or innovation into routine practices?

4. Thesis' objectives

In this thesis we decided on the certification procedures as an empirical subject to respond to research questions especially where an innovation could be a managerial innovation such as certification procedures. We set the following objectives accordingly:

1- The first step is to identify what factors, previously identified, impact the implementation processes of innovation or evidence-based changes into routine nursing practices. This is in order to understand the barriers and facilitators that may impede or support the integration of certification procedures into nursing practices.

2- To study and analyze the implementation of certification procedures in French hospitals and at the level of nurses' activity.

3- To understand how a local management can impact the implementation of certification procedures into nurses' activities.

4- To seek differences between multiple organizational contexts following the implementation of certification in different types and sizes of healthcare organizations, and different types of services

5. General methodological design and reasoning approach of thesis

In this thesis, we elaborate under each chapter its methodology. The following section presents the general methodological design and the followed reasoning approach.

We chose a qualitative design adopting an abductive reasoning approach to respond on thesis' objectives. First, a qualitative design is recommended to understand a

social phenomenon in natural settings. It emphasizes on the meanings, experiences, position and thoughts of participants (Mays & Pope, 1995). Thereby a qualitative design might be helpful to investigate the subject of certification procedures implementation by seeking different elements, actions and interactions incorporated in implementation processes. Also, to understand from different perspectives, what barriers and facilitators can impede and support respectively an implementation of innovations in general, and certification procedures in particular. A qualitative design will provide an insight into participants' perspective based on their experiences to develop knowledge on the implementation subject from the reality of healthcare organization work. Second, multiple studies have proposed abductive ways of thinking as forms of reasoning and important step as part of qualitative data analysis for increasing and developing nursing research further (Lipscomb, 2012; Mirza et al., 2014; Råholm, 2010). The intention of abduction is to recognize and create a context of meaning by involving the integration and justification of ideas to develop new knowledge. It is a process of generating hypotheses, theories or explanations and precedes deductive and inductive inferences (Mirza et al., 2014). According to Råholm, (2010), abductive reasoning is important and may form the basis for scientific knowledge in nursing research. She describes abduction as the first stage of inquiry where hypotheses are invented, explicated through deduction, and verified through induction. Whereas induction can produce a general truth from several data and deduction does the opposite, that explain something from a general rule, abduction allows to conceive ideas from vague and possible phenomena (Mirza et al., 2014). An abductive reasoning can be helpful to import an in depth understanding of inquiries in nursing studies (Karlsen et al., 2021). Giving these, an abductive approach might support the main objectives of our thesis. Through a mixture of inductive and deductive data analysis, we seek to give answers and meaning for the appropriation of nurses to certification procedures and build knowledge on the implementation of quality initiatives in nursing activities.

6. Thesis outline

Our thesis follows a 'thesis by articles' format. It consists of three main chapters divided according to the articles generated by this research project. Each chapter consists of a preamble; an article; and ends by a box highlighting the principal findings and a passage to the next chapter. Finally, a report which consists of a general summary of results, general discussion and conclusion with recommendations and perspectives is provided.

To respond on the objectives of the thesis, the work was articulated following the three major chapters:

Chapter I: outlines article I, which is a scoping review for the implementation of innovations based on evidence in nursing practices. Through this scoping review we mapped out the different types of factors that may impact the implementation processes. This involves barriers and facilitators at different organizational levels. We also investigated the different implementation strategies and the different theoretical approaches developed to support implementation initiatives in nursing practices. This helped to understand 'what' may impact and 'how' is the implementation of the certification procedures. This scoping review showed a lack in previous work and framework which concerns the local socio-material factors and its impact on implementation processes. This review suggested the need for a framework that integrates between strategic and local activity perspectives of factors incorporated in implementation processes.

There is a need to develop an integrative framework allowing to simultaneously focus on the different types of factors impacting implementation processes.

Chapter II: outlines article II, which represents the development of a framework for the implementation of certification procedures at nurses' level based on a mixed reasoning approach study, combining between the inductive and deductive approaches. Through this article we studied the process of implementation for

certification procedures at the level of activity in particular. Thus, we understood the implementation of such quality initiatives into routine practices. The methodology was based on a qualitative case study in a teaching hospital center. This inductive step was completed by a hypotheco-deductive analysis, both steps led to the construction of an integrative framework. This framework contributes to address research gap in terms of the factors related to socio-material factors. This framework gives insights on the different strategic factors and elements related to activity level and involved in implementation processes at the multiple organizational levels. Thus, it supports managers and decisions makers in implementation initiatives for such innovation in nursing practices.

Meanwhile, just developing the framework will not guarantee its usefulness and generalizability; it needs to be tested in other settings.

The next chapter represents an assessment of the Integrative Framework for the Implementation of change in Nursing Practice (IFINP)

Chapter III: outlines article III, which presents an assessment of the developed framework, named as Integrative Framework for the Implementation of change in Nursing Practices (IFINP). This article is based on comparative qualitative studies in three French hospitals of different types and sizes and within three different sectors. This article helped to confirm the flexibility of IFINP to capture all the emerged elements and interactions during the implementation of certification procedures in the multiple studied settings.

We advocate the use IFINP for managers and implementers for implementation initiatives in nursing practices in multiple contextual settings

General summary of results, general discussion, and conclusion: here we presented a summary diagram of the thesis output according to the main objectives. In the second part, we discussed the main findings in terms of previous work, and we

ended this section with recommendations. Finally, the general conclusion and contributions of this thesis to the literature on nursing management are provided as well as future research perspectives.

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"If you want to understand today, you have to search yesterday."

- Pearl Buck

Chapter I: Mapping research findings on change implementation in nursing practice: a scoping literature review

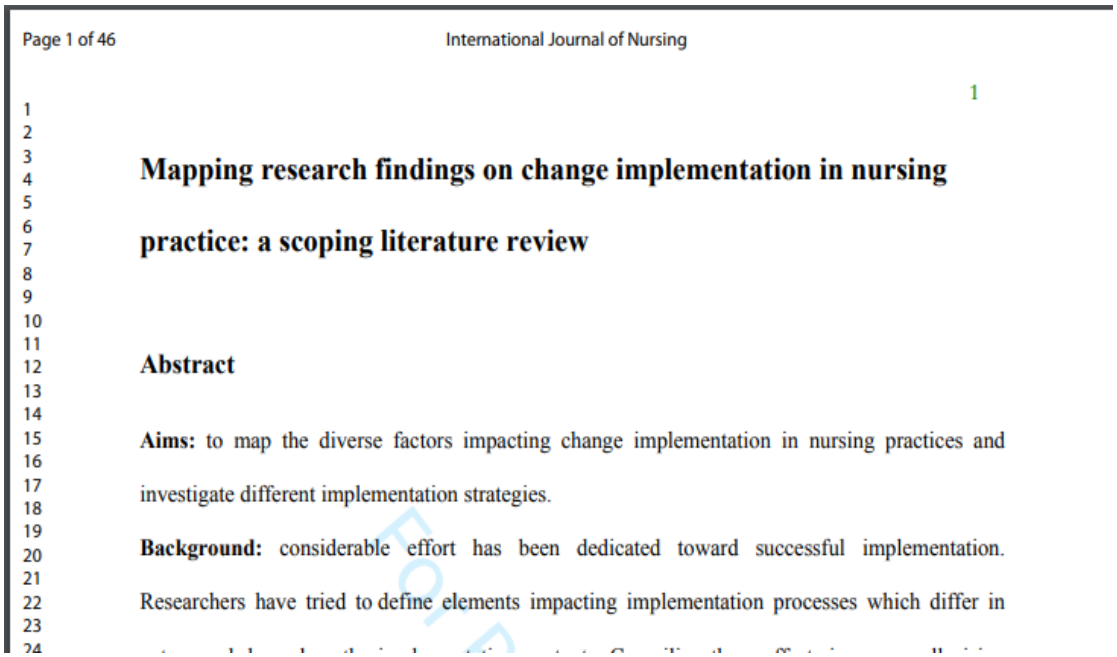
Preamble

In healthcare systems, gaps between research findings and nursing practices often exist. Considerable research has been conducted to successfully integrate changes in these areas. Researchers have also sought to define elements that impact the implementation processes. These elements can differ in nature and depend on the implementation context. There is a need to compile these efforts into a global vision and explore effective ways to convert such changes into practice. In this chapter we present “article I” which is a scoping review. In this review we mapped out the different factors impacting the innovation implementation in nursing practices, identified how these factors were interrelated during an implementation process in terms of their different types, and also investigated different implementation strategies.

In this article we addressed the implementation of change based on evidence in nursing practices in general. This was due to a dearth in research focusing on the subject of quality measures implementation in nursing practices and especially, whether such quality initiatives e.g. certification procedures can be considered as innovation or a leading to change in practice based on evidence. This review helped to outline the different types of factors that may impact implementation processes in the nursing practice from different perspectives and internationally. Thereby, what is identified internationally is acceptable and applicable at the national and local level of our thesis. As a result, we identified what may impact implementation processes of certification procedures in French healthcare context, and we outlined the most effective way in terms of implementation strategies.

This scoping review was conducted in parallel with the first investigations of the first field. We note that the following article is presented according to the submission journal format.

Article I



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Mapping research findings on change implementation in nursing practice: a scoping literature review

Abstract

Aims: to map the diverse factors impacting change implementation in nursing practices and investigate different implementation strategies.

Background: considerable effort has been dedicated toward successful implementation. Researchers have tried to define elements impacting implementation processes which differ in

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Mapping Research Findings on Change Implementation in Nursing Practice: a Scoping Literature Review

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Conflict of interest:

The authors declare no competing interests.

Declarations

Ethical approval and consent to participate

Ethical approval was not required given the documentary nature of this study and the lack of human participants (see www.ucd.i.e/researchethics).

Consent for publication

Not applicable.

Availability of data and materials

Datasets used and/or analyzed during this study (i.e., the study database and extracted data) are available from the corresponding author upon reasonable request

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Author authorship contributions

IS and MW conceived the idea. IS, with the help of MW designed the study. IS performed data collection and selection according to inclusion and exclusion criteria. All steps were reviewed and verified by MW. Selected studies were approved by MW. IS wrote the first draft and collaborated with MW to generate the final draft. MW verified the analytical methods, proposed corrections, and supervised the overall research. Both authors provided critical feedback and helped shape the research, analyses, and manuscript. Both approved the final version.

Additional files

Supplementary material 1: Preferred Reporting Items for Systematic Reviews and Meta-Analysis Extension for Scoping review (PRISMA-ScR).

Supplementary material 2: Study quality appraisal

Supplementary material 3: Identified implementation strategies and interventions

Supplementary material 4: Identified factors, barriers, and facilitators

Mapping research findings on change implementation in nursing practice: a scoping literature review

Abstract

In literature, considerable research has been conducted to successfully integrate changes in nursing practice. Researchers have sought to define elements that impact implementation processes, which differ in type and nature. In this review, we mapped the different factors impacting the implementation of change in nursing practices, identified how these factors were interrelated in terms of their different types, and investigated different implementation strategies. Following PRISMA guidelines extension PubMed, Ebsco, Scopus, and Science Direct databases were searched from 1990 onwards. English peer reviewed studies reporting an implementation of change in nursing practice were included, but not those evaluating an impact, or reporting educational programs or a nursing role implementation. Of 9954 studies, 425 abstracts were scanned and 98 full-text articles were screened. Finally, 28 studies were selected. Results showed that most of included studies relied on qualitative design. A multifaceted approach, with a tailored intervention, was the most effective implementation strategy. The most identified factors were considered systematic, which means commonly used across organizations, such as resource availability, leadership, knowledge. However, fewer studies have focused on other factors related to social and material local context. Which seems to be operational elements for implementation process e.g., novel technology-use depended on availability and team dynamics which described behavioral relationships between group members. Thus, systematic factors were related to contextual factors. Both must be considered by managers to ensure successful implementation. We advocate the development of

theoretical frameworks including systematic factors and which capture flexibility of local context.

Keywords: implementation, nursing practices, systematic factors, implementation strategies, social material factors.

What is known on this topic.

- The integration of change into professional practice routines is reported as difficult, complex, and unpredictable.
- Effective implementation strategies require a thoughtful consideration of anticipated barriers and/or facilitators which promote and hinder implementation processes.
- An overall vision is required to better support implementation processes in different contexts

What this study adds.

- This review summarizes the different type of factors and interventions which must be considered for implementing change based on evidence into nursing practice.
- This study shows that factors related to the local socio-material context at the level of professional activities are poorly addressed in the previous implementation studies.
- Integrated approaches must be developed allowing for a simultaneous focus on systematic and local context factors which impact change implementation processes.

I. Background

In the last decades, practice guidelines and quality improvements (QI) initiatives for nursing practices have increased importantly (Rycroft-Malone et al., 2012) to improve patient care quality and outcomes (Margonary et al., 2017; Singh et al., 2021). However, the integration of these into routine practice is reported as difficult, complex, and unpredictable (McArthur et al., 2021; Rycroft-Malone et al., 2012). They require an alteration of professionals' behavior, the development of a new behavior and a change of the current behavior (Holleman et al., 2009). To drive optimal implementation, decision-makers and managers must seek scientific evidenced-based proof on the best ways to carry such implementation processes (Lavis et al., 2005). Which incorporate strategies from different perspectives across multiple levels, as well as consider multiple factors impacting implementation processes. In the same vein, multiple insights emerged on how the circumstances related to the local context of professional's activity may lead to a successful intervention in one setting and its failure in others (Squires et al., 2019).

Bridging the gap between research findings and professional practice is a major objective of implementation science (Bauer et al., 2015; Rycroft-Malone et al., 2012). The previous literature summarized considerable evidence in terms of interventions for changing such behaviors, applying quality improvement initiatives and research findings to practice (Phelan et al., 2018; Spoon et al., 2020). For example, an interactive educational approach, audit and feedback strategy, reminder systems, involving frontline professionals and opinion leadership were considered useful for successful implementation outcomes (Jeffs et al., 2013; Parsons & Cornett, 2011; Wensing et al., 2020). An effective implementation strategy requires a thoughtful consideration of anticipated barriers (Jabbour et al., 2018) and/or facilitators which promote and hinder implementation processes (Curtis et al., 2017; González-María et al., 2020; Squires et

al., 2019). Barriers such as lack of time, knowledge, skills, support, and resources are commonly identified in literature, as barriers at the professional level (McKee et al., 2017). This approach allows leaders to develop and apply tailored interventions responding to each contextual situation, thereby promoting a successful implementation process (Bauer et al., 2015; Renolen et al., 2018). In addition, several studies advocated the use of models and change management theories to design effective implementation processes (Jabbour et al., 2018). A previous research identified 47 knowledge translation models in nursing which studied the subject of implementation from different perspectives (Mitchell et al., 2010). However, there is a lack of empirical evidence to support only one particular theory or framework in guiding strategy development to influence changes in nursing practices (Davies, 2002). And, there is no clear basis to suggest which specific interventions are useful for which barriers to improve change (Koh et al., 2008).

In nursing, understanding the different elements hindering or supporting innovation integration in practice are primarily based on individual empirical research, and are directed toward specific interventions or innovations. There is a need to compile these efforts in an overall vision in order to identify literature gaps and requirements. Also, to help researchers better understand implementation processes for practice changes initiatives in different contexts. In this study, we use ‘change in nursing practice’ to refer the changes based on scientific evidence.

II. Review Methods

Aims

In this review, we mapped the different factors impacting the implementation of change in nursing practices, identified how these factors were interrelated in terms of their different types, and investigated different implementation strategies

Design

A scoping review of the literature was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) extension checklist *(PRISMA-ScR, 2018*) (Supplementary material 1).

Search methods

Relevant studies were investigated using PubMed (MEDLINE), ScienceDirect (scientific, technical, and medical research), Scopus (Elsevier database of peer-reviewed literature for science, technology, medicine, and the social sciences), and CINHAL Ebsco (cumulative index for nursing and allied health literature) databases from 1990 onwards. This time point was chosen as implementation research in healthcare has grown considerably since the earlier 1990s (Damschroder et al., 2009). Study collection step was conducted by one author (IS) and revised by a second author (MW).

Keywords and eligibility criteria

A structured database search was conducted to identify peer-reviewed articles related to implementation processes or strategies for change based on scientific evidence in nursing. This was including innovations, Evidence Based Practice EBP, and quality procedures (accreditation or certification procedures or QI initiatives) in nurse practices. This was based on predefined keywords and eligibility criteria by both authors, prior to databases search. The following keywords were used to search databases; Implementation, integration, adoption, dissemination, introduction, certification,

accreditation, or quality evaluation mechanisms, quality assurance, professionals, caregivers, and nurse. We used medical subject headings (MeSH) terms with Boolean operators (“OR” and “AND”) to perform searches in PubMed, and similar combinations were used for other databases (Table 1&2).

Table 1: Databases search queries.

Databases source	Search query	Output.
PubMed	(("Implementation Science" [MeSH] OR "Health Plan Implementation" [MeSH] OR "Social Planning" [MeSH] OR "integration" OR "dissemination" OR "introduction" OR "adoption") AND ("Quality of Health Care" [MeSH] OR "Health Care Quality, Access, and Evaluation" [MeSH] OR "Quality Assurance, Health Care" [MeSH]) OR "innovation") AND ("Nurses" [MeSH] OR "caregiver"))	1018
Scopus	(("Implementation" OR "integration" OR "dissemination" OR "introduction" OR "adoption") AND ("Quality of Health Care" OR "certification" OR "accreditation" OR "quality" OR "innovation") AND ("Nurses" OR "caregiver")) **after using additional filters**	4448
Science Direct	(("Implementation OR "integration" OR "dissemination" OR "introduction" OR "adoption") AND ("Quality of Health Care“ OR "innovation“ OR certification OR accreditation) AND ("Nurses" OR "caregiver")) **after using additional filters**	4364
Ebsco	(("Implementation OR "integration" OR "dissemination" OR "introduction" OR "adoption") AND ("Quality of Health Care“ OR "innovation“ OR certification OR accreditation) AND ("Nurses" OR "caregiver")) **after using additional filters**	129
Total		**9950**

Note: Search queries for each database source are aligned with the output of articles. The “after using additional filters” term refers to added selection criteria to the search output, e.g., subject, field, and journal topic.

Table 2: Databases eligibility criteria.

	Eligibility criteria
Inclusion criteria	- Studies which reported the implementation of quality improvement processes and evidence-based practices at nurse levels. - Studies disclosing models, theories, and hypothetical implementation frameworks as well as facilitators and barriers. - Full texts comprising English-language peer-reviewed journal articles (including reviews, experimental studies, observational, and case studies).
Exclusion criteria	- Conference abstracts, abstracts only of published literature, articles in languages other than English (without available translation), and grey (non-peer-reviewed) literature. - Studies which reported the sustainability of change, the evaluation of an impact of an implementation, the implementation of an educational program, or studies which reported on practice quality or quality in general. - Studies focused on implementation processes for other nursing professions and contexts outside hospitals or a nurses' professional position or work organization

Study outcomes

The PRISMA flow diagram was used to aid the study selection process and to minimize risk of bias and enhance (Figure) (Moher et al., 2010). The initial search strategy generated 9950 articles, with 9369 after duplications were removed. After this, a title scan based on predefined terms yielded 425 potentially relevant abstracts. Then, abstract inspection yielded 94 studies for full text assessment. Finally, 28 studies were selected as adhering to inclusion and exclusion criteria and study objectives (Table 3). The final output was discussed and approved by both authors.

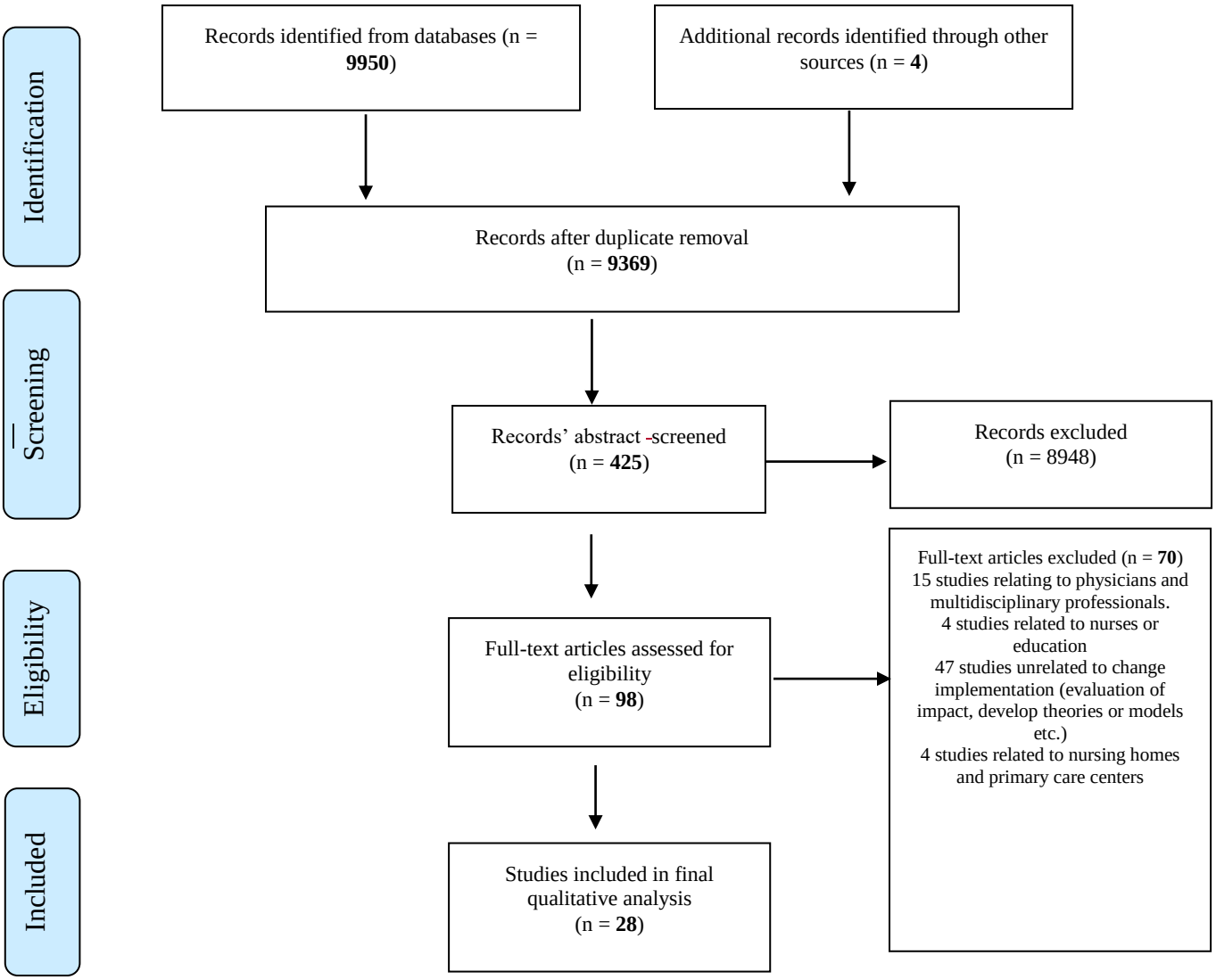

Figure: Study identification, screening, and eligibility based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) protocol (Moher et al., 2010).

Quality appraisal

We used two critical appraisal tools to minimize the risk of bias in evaluating methodologies and results. The quality assessment was conducted by one author (IS) in the first instance, and then discussed and revised by another author (MW) in a second step.

1- The Mixed Methods Appraisal Tool (MMAT) (Hong et al., 2018) was used to assess the methodological quality of different studies. The MMAT was designed for the appraisal stage of reviews with mixed type studies: qualitative research, randomized controlled trials, non-randomized studies, quantitative descriptive studies, and mixed methods studies (Lotfi et al., 2019).

2- To assess the quality of included reviews, we used the Critical Appraisal Skills Program (CASP) checklist for systematic reviews. The appraisal process consisted of three steps; (1) article validity, (2) summary of study results, and (3) determining the usefulness of results (CASP, 2018.). It was useful to critically appraise articles by transparently evaluating study quality and the evidence within. The CASP tool is a user-friendly option for researcher and is endorsed by the Cochrane Library and the World Health Organization for qualitative evidence synthesis (Long et al., 2020).

Both tools, consisted of checklist questions and criteria. Each question was answered with “yes”, “no” and “can’t tell” if the criteria was met, unmet, or partially met, respectively. Summary tables (1, 2, 3, and 4) for the study appraisal checklist are shown (Supplementary material 2). Study quality evaluation was based on total scores following met criteria. To ensure medium and high quality studies were included, we decided for both tools that studies with a score < 50 were excluded.

III. Results

Study characteristics: design, settings, and subjects

The 28 studies were conducted in 11 countries; United States (n = 7), United Kingdom (n = 7), Australia (n = 5), Sweden (n = 1), Japan (n = 1) China (n = 2), Austria (n = 1), Norway (n = 1), Denmark (n = 1), Singapore (n = 1), and Zambia (n = 1). In terms of study topics, those reporting the implementation changes in clinical practice as the Evidence Based Practice (EBP) and Clinical Practice Guidelines (CPG) were over the half (n = 15), whereas only two studies reported on informatics technology implementation. The majority of studies focused on the identification of barriers and facilitators or factors impacting implementation process (n = 25). In terms of study design and methodology, the majority of studies (n = 17) were qualitative in nature (Abbott et al., 2014; Kirk, 2016; Colson et al., 2019; Grealish et al., 2019; Isaac et al., 2019; Jansson et al., 2011; Lam et al., 2016; Lin et al., 2019; Renolen et al., 2019; Yagasaki & Komatsu, 2011). This observation reflected the importance of implementation considerations. Five studies used mixed-methods approaches (Breimaier et al., 2015; Keiffer, 2015; Kite, 1995; Munroe et al., 2018; Robert et al., 2011; Wolak et al., 2020). Three followed a quantitative design, with data collection based on cross sectional surveys (Koh et al., 2008). The four remaining studies were reviews (Dulko, 2007; Jun et al., 2016; May et al., 2014; Solomons & Spross, 2011), comprising integrative and systematic reviews (two each). Studies reporting innovation implementations in critical care units (n = 9) and medical wards (n = 5) were more frequent than other sectors. Twenty-two studies used at least one theoretical model as part of the research methodology (Abbott et al., 2014; Aitken et al., 2011; Barr, 2002; Kirk, 2016; Christensen & Christensen, 2007; Colson et al., 2019; Dulko, 2007; Stewart & Bench, 2018; Grealish et al., 2019; Jansson et al., 2011; Katowa-Mukwato et al.,

2021; Keiffer, 2015; Kite, 1995; Koh et al., 2008; Lin et al., 2019; May et al., 2014; Munroe et al., 2018; Qin et al., 2020; Robert et al., 2011; Solomons & Spross, 2011; Wolak et al., 2020), and these models were used either as a guide for study methodology (n = 15) and/or as guides for change integration (n = 8). Further information is shown (Tables 3 and 4).

In terms of study quality, all studies achieved an overall quality score of ≥ 60 (Table 3), thus they were included. All studies were clear in terms of objectives and research questions. However, some qualitative studies required better justification for design and methodology choice (Aitken et al., 2011; Allen, 2013; Barr, 2002; Christensen & Christensen, 2007; Katowa-Mukwato et al., 2021; Lin et al., 2019; Renolen et al., 2019). In some quantitative studies, we queried whether the selected sample was representative or not, and if confounders were accounted for in the design (Stewart & Bench, 2018). Additionally, in some mixed methods studies, the rationale for a mixed method design approach was unclear (Breimaier et al., 2015; Keiffer, 2015; Robert et al., 2011). For reviews, we observed a lack of quality assessments for studies (Dulko, 2007; May et al., 2014; Solomons & Spross, 2011). In addition, information about results precision were absent, however this could be related to the type of the included reviews.

Table 3: Included studies: A summary of the included studies in the review

Authors/year	Subject	Aim	Country	Methodology /Design	Model	Participant or sample /settings	Type of results	Main findings	Quality score over 100
Kite, (1995)	Changing mouth care practice	To identify the prerequisites for achieving research based mouth care practice in a district general hospital intensive care unit.	UK	qualitative design / Action research approach design Before and after	Rogers' model (1983)	10 Nurses / Intensive care unit (ICU) unit in general hospital	Facilitator and barriers	Facilitators: eliciting the perceptions of nurses (tailored intervention and information); presence of Context relevant information and practical instruction; influence of role models and the availability of suitable brushes. Inhibiting factors: the misconceptions about the risk to patient safety associated with tooth-brushing.	90
Barr, (2002)	Information Systems	To examine the social forces underlying computer technology diffusion into nursing	USA	Qualitative description	Rogers' model (1995)	Perioperative nurses/ acute care facility in the mid-Atlantic region	Factors	Effective communication among individuals, professional culture, and work environment. Innovation acceptance: key determinant in fostering positive attitudes and facilitating successful learning	50
Dulko, (2007)	clinical practice guideline (CPG)/cancer pain	to evaluate available research evidence regarding the effectiveness of audit and feedback as a guideline implementation strategy .	USA	systematic review	Lewin's Change Theory	16 articles are included in this literature review	Recommendations	Educational material combined with A&F† strategy to promote CPG adoption. Lewin's change theory as model for operationalizing interventions	65
Christensen, T & M, (2007)	CPG for patients with a Sengstaken – Blakemore tube	focuses on the application of Lewin's transitional change theory used to introduce a change in nursing practice	UK	Qualitative Description	Lewin's theory of transitional change	Nurses/ general intensive care unit	Effectiveness of the model	Lewin's theory of transitional change : useful for change process, help in the application of logical process through problem identification implementation plan development and clear monitoring and evaluation at all stage	70
Koh et al. (2008)	Fall Prevention CPG	To assess the perceived barriers to implementation of the Fall Prevention CPG in acute care hospitals in Singapore.	Singapore	Quantitative/ survey study	practice change theory	1467 (80.2%) Nurses / acute care general hospitals (n = 5) in Singapore	Barriers/ Interventions	Major barriers: knowledge and motivation, availability of support staff, access to facilities, health status of patients, and education of staff and patients/ A multifaceted strategy, with tailored interventions designed to target the identified perceived barriers for Fall CPG implementation	80
Atiken et al., (2011)	evidence based practice (EBP)	To describe the implementation of a multi-dimensional EBP program and examine the benefits and challenges of each implemented strategies	Australia	Qualitative description	Advancing Research and Clinical practice through close Collaboration (ARCC) model	intensive care unit (ICU) nurses/ in a public, tertiary hospital Australia	Implementation strategies	Successful implementation of the multi-dimensional EBP program Implementation strategies: Development of EBP champions; Use of EBP mentors; Provision of resources such as time and money; Creation of a culture and expectation related to EBP; Use of practical strategies including EBP work groups, journal club and nursing rounds.	70

Jansson et al. (2011)	individual care plans (ICP)	To capture the factors and conditions that impacted on the successful implementation of individual care plans within hospital care	Sweden	qualitative study/ exploratory and retrospective	PARIHS‡ as a guide during the data collection and analysis	15 informants (8 Nurses and 7 managers)/ regional hospital in Western Sweden	Factors	Factors: Clear instructions and objective; clear roles and mandates for those involved; internal facilitators for the continuation of the process. PARIHS framework as guide to capture a complete picture of implementation process	100
Yagasaki & Komatsu (2011)	CPG	To understand oncology nurses' perceptions of guideline implementation and to learn their views on how their experiences affected the implementation.	Japan	Qualitative exploratory study/ grounded theory.	-	11 Oncology nurses university-affiliated, general or cancer hospitals in Japan	Preconditions for successful implementation	consider preconditions at the organizational, multidisciplinary, individual, and guideline levels based on nurses' perceptions Prioritizing strategies to address these preconditions	100
Robert et al., (2011)	quality improvement (QI) program: The Productive Ward (PW) in England	To explore the local adoption, implementation and assimilation of one such innovation into routine nursing practice	UK	Mixed methods	diffusion of innovations in health service organisations framework	5 case studies 389 health service staff	interactions of key factors	The Interactions between several factors contribute to the rapid adoption of the PW program. Particular organizational contexts where both 'formal' and 'informal' adoption decisions are made for implementing and assimilating an innovation into routine practice.	70
Solomons & Spross (2011)	EBP	To examine barriers and facilitators to EBP using Shortell s framework for continuous quality improvement (CQI)	USA	Integrative review	Shortell et al., framework	23 studies	Facilitators and barriers	Barriers and facilitators can occur on the individual and institutional levels Common barriers: lack of time; lack of autonomy to change practice (strategic and cultural dimensions) Tailored Interventions directed to the dimension where the barrier occurs. A multidimensional approaches	70
Allen (2013)	ICP	This paper explores a dimension of context not typically taken into account in the improvement literature: the socio-material infrastructure.	UK	Qualitative case study/ Researches analysis/ ethnography	-	two parallel empirical research projects	concept	Consider the 'affordances' of interventions and how these relate to the socio-material infrastructure into which they are to be implemented	70
Abbott et al., (2014)	health information Technology (IT)	To examine health IT implementation processes, the barriers and facilitators of successful implementation, identification of a beginning set of implementation best practice	Western Australia	Qualitative Descriptive design for two Case studies Theoretical analysis	modified CFIR§	Two case studies Fall tips intervention EHR adoption	Best practice IT implementation	Beginning set of Health IT innovation implementation best practices. CFIR is a good framework for implementation research.	70

May et al., (2014)	CPG	To investigate the dynamics of nurses' work in implementing CPG	UK	systematic review of qualitative studies	Normalization Process Theory (NPT)	Seven studies met the inclusion criteria of the review	Model Propositions	the study suggests dynamic conceptual model of CPG implementation (set of propositions which are related to mechanisms that are already known to be important in contributing to implementation processes and their outcomes)	75
Breimaier et al., (2015)	CPG fall prevention	to evaluate the comprehensiveness, applicability and usefulness of the CFIR in the implementation of a fall-prevention CPG	Austria	Before-and after, mixed-methods study design.	CFIR	graduate and assistant nurses in two Austrian university teaching hospital departments	Model usefulness and applicability	CFIR framework is useful as tool to assess the different states of CPG implementation. It should be supplemented with other important factors and local features.	80
Keiffer, Melanie (2015)	CPG	to seek an understanding of what factors promote or prevent the implementation of evidence-based clinical practice guidelines at the point of care delivery	USA	Non-experimental, cross-sectional, Mixed method descriptive design	social cognitive theory	65 Nurse practitioner and 35 physician's assistant / community hospital	Factors and implementation strategies	3 types of factors: Behavioral beliefs; Environmental Factors and Cognitive Factors Use of multifaceted approach; and identify barriers for clinical practice guidelines usage; set of recommendation.	80
Jun et al. (2016)	CPG	to appraise and synthesize the current literature on barriers to and facilitators in the use of clinical practice guidelines (CPGs) by registered nurses	USA	integrative review	-	16 studies (7 quantitative, 9 qualitative)	Factors	Internal factors: attitudes and perceptions, and knowledge External factors: format and usability of CPGs, resources, leadership, and organizational culture Nurses must have an active role in the development, implementation, and updating of clinical practice guidelines	75
Kirk et al., (2016)	New screening tool in an emergency department (ED)	to identify the factors that were perceived as most important to facilitate or hinder the introduction and intended use of a new screening tool in an ED	Denmark	Qualitative study	Theoretical Domains Framework (TDF) guided data collection and analysis	8 nurses and a geriatric and 5 and managers/ medical section of the ED in Danish university hospital	Factors under emergent theme	3 themes : professional role and identity (expert culture and professional boundaries) Beliefs about consequences (time and threat to professional identity) preconditions for a successful implementation (meaning and making sense and leadership and resources). The importance of understanding the local culture before any implementation strategy	100

Lam et al., (2016)	CPG	To explore the experience of frontline emergency nurses regarding guideline implementation and	China	A qualitative descriptive design	-	12 frontline emergency nurses/ Five local acute care hospital in Hong Kong	emerged key categories	The guideline-practice gaps cases: inadequate provision of corresponding administrative and organizational support, in terms of manpower, facilities and policies; environmental context and top down planning approach. It is important to consider intra and inter-organizational coordination and communication and the nurses' experiences	90
Munroe et al., (2018)	patient-assessment framework	To determine potential facilitators and barriers and tailor interventions to optimize future implementation of a patient-assessment framework into emergency nursing practice.	Australia	A convergent parallel mixed-method study Before and after	The Knowledge to Action (KTA) TDF Change Wheel/ COM-B model	38 emergency nurses from five Australian hospitals participated in an education workshop on the HIRAID assessment framework	Facilitators and barriers Implementation	A multimodal implementation strategy to address facilitators and barriers and tailor intervention, the KTA Cycle recommends identifying barriers to knowledge use in order to tailor interventions the application of behavior change theory recommended to address the facilitators and barriers	90
Stewart, Bench (2018)	confusion assessment method	to implement the use of a delirium assessment tool into three adult critical care units within the same hospital using a QI approach.	UK	Qualitative description	Model for Improvement, which incorporates the Plan, Do, Study, Act (PDSA) framework	nurses doctors and other professionals Critical care unit in a large Central London hospital	Framework usefulness And recommendations	Use of a QI method to address potential barriers prior to project implementation. The importance of ongoing regular compliance monitoring shared with the whole critical care team.	50
Lin et al., (2019)	CPG	To identify the facilitators of and barriers to nurses' adherence to evidence-based wound care CPGs	Australia	exploratory qualitative study used ethnographic data collection techniques	Theoretical Domains Framework	Nurses / Surgical ward in an Australian tertiary hospital	Facilitators and barriers	Facilitators: participants' active information seeking behavior, and a clear understanding of the importance of technique and patient participation in wound care. Barriers: knowledge deficits regarding intervention and lack of resources and administrative support. Evidence based interventions and implementation strategies should be initiated to address barriers	70
Isaac et al., (2019)	aseptic non-touch technique (ANTT)	To gain insight into the challenges faced by clinical staff within NHS¶ child health services when adopting practices in relation to ANTT and intravenous therapy	UK	Qualitative research. Ethnography	-	23 Registered nurse / medical and a surgical ward in the pediatric department on a single hospital site	Barriers	lack of clarity and standardization of intervention; Lack of knowledge; Confused terminology; Lack of skill and knowledge; individual preference; Organizational cultural challenges Organizational culture is a significant modifier of healthcare worker behavior	100

Grealish et al., (2019)	Delirium prevention	to systematically identify the enablers and barriers to delirium prevention for older hospitalized patients in	Australia	Interpretive qualitative ethnography, within a constructivist paradigm	the general theory of implementation social mechanisms: potential and capability	15 nurses, other staff, 11 hospitalized older people and their families; general medical ward/ tertiary hospital Australia	enablers and barriers recommendations	Implementing delirium prevention requires consideration of team practices, review of policy document design and identification of outcomes data, support collaborative reflexive practice in addition standard implementation strategies. Using a systematic assessment approach informed by theory for implementation planning.	100
Colson et al. (2019)	Safe Infant Sleep Recommendations	To identify facilitators and barriers to the implementation of safe sleep recommendations from the perspective of hospital staff	USA	Qualitative design grounded theory	Grol and Wensing (2004) framework	46 who cared for infants on inpatient hospital units nurses and other staff member / 3 medical centers	facilitators and barriers under different levels	facilitators and barriers could be identified at the level of The Innovation Itself, The Individual Health Care Professional, The Patient, The Social Context, The Organizational Context, and The Economic and Political Context	90
Renolen et al., (2019)	EBP	to explore the processes involved in two different strategies applied to integrate EBP in clinical nurses' daily work	Norway	Classical grounded theory methodology Qualitative	-	63 Interviews, 18 nurses/ 4 focus groups in two medical wards. Norwegian hospitals	Framework. Challenges	Multidimensional EBP integration framework Central findings: challenges regarding EBP as a parallel to daily work; use of standardization and routinization to promote EBP at the systems level; and the movement from the systems level to the individual level.	80
Wolak et al. (2020)	QI Activities	Ito design a sustainable process that enable small-scale improvement efforts to be consistently replicated and spread throughout the department of nursing	USA	Qualitative description design	spread of innovation model (SOI) model	medical intermediate care unit & surgical acute care unit/ Medical center USA	Implementation strategies	Effectiveness of SOI model Key aspects: initiative supported by hospital leadership, project was visible, tools and resources availability , multimodal information (communication channels) Shared governance structure was foundational to the development and execution of the interventions. Spread happens when : one is intentional about it/ spread process In place/ dedicated resources to manage the spread process	70
Qin et al., (2020)	EBP Venous thromboembolism (VTE)	To describe how to integrate the "best" evidence into clinical VTE nursing in the ICU under the guidance of the i-PARIHS framework	China	Mixed method Implementation study design	i-PARIHS	Comprehensive ICU (Unit A) and Neurological ICU (Unit B) /Hospital of Kunshan	Implementations step	Evidence implantation (EI): (i) simplify the innovation strategies to promote their operability; (ii) close attention by hospital administrators to the EI can facilitate the EI process effectively; (iii) after the EI program, making the well-integrated evidence part of the standards for routine care to promote sustainability. The updated i-PARIHS framework may provide more instructive guidance for incorporating evidence into practice	70

Katowa-Mukwato et al., (2021)	EBP	To determine if implementation of Evidence-Based Practice interventions using the Plan-Do-Study- Act model would improve the outcomes identified in the hacks.	Zambia	Qualitative Description design	Plan Do Study Act (PDSA) Model	12 Nurses / medical ward Teaching University Hospital	Effectiveness of strategy Enablers and detractor	Enablers: team involvement in the planning process; need for champion (s); need for management support and Ongoing supportive supervision. Detractor: the comfort with status. Lewin's theory of transitional change can be useful in the change process, it aids in the application of logical process	50

Abbreviation: † A&F: Audit and Feedback; ǂ PARIHS: Promoting Action on Research Implementation in Health Service; ❡ CFIR: Consolidated Framework for Implementation Research; ¶ NHS: National Health Services

Table 3: presents a summary of included studies. It compromises the studied subject, the aim of study, the country, the study design and methodology, the used model or framework if presents, the context where the study was carried out, the main results with brief description of main findings, in addition to the quality appraisal score.

Table 4: Different models used across studies.

Methodology and/or model	Methodology	Implementation process	Articles
Rogers' model for diffusion of innovations (1983)/(1995)	2	-	Kite (1995) Barr (2002)
Advancing Research and Clinical practice through close Collaboration (ARCC) model	-	1	Atiken *et al.* (2011)
Consolidated Framework for Implementation Research (CFIR)	-	1	Breimaier *et al.* (2015)
Social cognitive theory	1	-	Keiffer (2015)
Plan Do Study Act (PDSA) Model	-	2	Stewart & Bench (2018) Katowa-Mukwato *et al.* (2021)
Lewin's theory of transitional change	1	1	Christensen (2007) Dulko (2007)
Modified CFIR	1	-	Abbott *et al.* (2014)
Normalization Process Theory (NPT)	1	-	May *et al.* (2014)
Shortell *et al.* framework	1	-	Solomons & Spross (2011)
The Theoretical Domains Framework (TDF)	2	1	Kirk *et al.* (2016), Munroe *et al.* (2018) Lin *et al*. (2019)
Behavior Change Wheel/COM-B model	-	1	Munroe *et al.* (2018)
Adapted diffusion of innovations of health Services in Organizations framework	1	-	Robert *et al.* (2011)
General theory of implementation social mechanisms: potential and capability	1	-	Grealish *et al.* (2019)
Grol and Wensing (2004) framework	1	-	Colson *et al.* (2019)
Practice Change Theory	1	-	Koh *et al.* (2008)
Spread of Innovation Model (SOI)	1	-	Wolak *et al.* (2020)
Promoting Action on Research Implementation in Health Service PARIHS/i-PARHIS	2	-	Jansson *et al.* (2011, Qin *et al.* (2020)

A summary of the different frameworks and/or models in each study. The table shows the frequency of each model according to how it was used.

Analysis of findings

Our review included multiple study designs with different aims and findings. In the following sections, we describe results according to study findings type.

Implementation strategies

Multiple implementations strategies and interventions were identified, underpinning successful process integration. The majority of studies used a multifaceted approaches which combined two or more strategies, and a tailored interventions targeting identified or perceived barriers to promote implementation (Abbott et al., 2014; Breimaier et al., 2015; Grealish et al., 2019; Kite, 1995; Koh et al., 2008; Lam et al., 2016; Lin et al., 2019; Munroe et al., 2018; Qin et al., 2020; Yagasaki & Komatsu, 2011). A multifaceted strategy combined two or more interventions (Foy et al., 2005). Different interventions and implementation strategies from 26 of the 28 studies are shown (Supplementary material 3). The most frequently used or recommended strategies were: training and ongoing education and resource allocation; ongoing communication between different participants; process monitoring; outcome evaluations; providing policies and administrative support; a leadership approach; and participant involvement. Some studies proposed specific interventions, such as partnering with patients or families (Grealish et al., 2019; Lin et al., 2019), the use of role models or opinion leaders (Jansson et al., 2011; Kite, 1995; Munroe et al., 2018; Qin et al., 2020), and pilot schemes to test intended changes (Abbott et al., 2014; Aitken et al., 2011; Christensen & Christensen, 2007; Stewart & Bench, 2018; Grealish et al., 2019; Kite, 1995; Wolak et al., 2020). The use of an appropriate change model was also suggested by more than half of studies (54%), either to guide an implementation process or as a tool to identify and understand what factors could influence a change practice implementation (Abbott et al., 2014; Aitken et al., 2011; Breimaier et al., 2015; Christensen & Christensen, 2007;

Colson et al., 2019; Dulko, 2007; Stewart & Bench, 2018; Grealish et al., 2019; Jansson et al., 2011; Katowa-Mukwato et al., 2021; Koh et al., 2008; Munroe et al., 2018; Qin et al., 2020; Wolak et al., 2020).

Identified factors, their types and interrelationship

The majority of studies (25 of 28) provided a wide range of factors that are considered transversal, as they are seen across the multiple organizational settings and different integrated change types. (Supplementary material 4). The top five recurrent transversal elements were; 1) resource availability, e.g., time, materials, administrative duties, and staff, 2) knowledge and/or education, 3) participant perception, attitude, skills, experiences, and motivation, 4) organizational culture and participant involvement, and 5) leadership and communication, and associated channels. Koh et al. reported that 73.3% of respondents (nurses) perceived a lack of facilities and materials as major barriers to the implementation of all-prevention guidelines (2008). However, the availability of such materials and tools did not guarantee their use (Kite, 1995). Kirk et al., explained that new tools brought change and potentially threatened the daily responsibilities of professionals because these tools affected their relative power, resources, and identities, therefore users tended to resist change (2016). Thus, it was essential to consider not only the organizational level, but also the individual level (Colson et al., 2019). We observed factors that were related to the subject of innovation itself, e.g., credibility in terms of safety and feasibility in practice and its attractiveness for patients and families (Colson et al., 2019). Understanding the meaning and sense of new innovation was identified as an important precondition for successful implementation (Kirk, 2016). Similarly, the implemented changes had to be conducted in the interest of professionals and be seen as valuable agents for care improvement (Allen, 2013). The lowest cited factors were links between external change agencies, developers

and adopters of change (Breimaier et al., 2015; Colson et al., 2019; Robert et al., 2011; Yagasaki & Komatsu, 2011), stakeholder aims and needs (Breimaier et al., 2015; Jansson et al., 2011; Solomons & Spross, 2011; Yagasaki & Komatsu, 2011), and supporting shared objectives (Allen, 2013; Katowa-Mukwato et al., 2021; Wolak et al., 2020; Yagasaki & Komatsu, 2011).

We identified also another type of factors related to activity level, but this was seen in lower number of studies (20%), e.g., socio-material contexts were identified in only three studies (Allen, 2013; Grealish et al., 2019; May et al., 2014). Socio-materiality "arises from the interplay between particular configurations of not only material phenomena, but also material arrangements set up by individuals to discover these phenomena and the knowledge practices established in time" (Parmiggiani & Mikalsen, 2013). Also, team dynamics or approaches were identified in only three studies (Breimaier et al., 2015; May et al., 2014; Yagasaki & Komatsu, 2011). And, the major seen barriers to practice change implementation (by 56 %) were time constraints and increased workloads (McKee et al., 2017). Other barriers were similarly identified; a lack of participant authority to change practices (Keiffer, 2015; May et al., 2014; Renolen et al., 2019; Solomons & Spross, 2011; Wolak et al., 2020; Yagasaki & Komatsu, 2011), professional resistance to change, reduced staffing (Kirk, 2016; Jun et al., 2016; Katowa-Mukwato et al., 2021; Munroe et al., 2018; Yagasaki & Komatsu, 2011). These barriers create an imbalance between the integration of practice innovation and daily professional responsibilities (Aitken et al., 2011; Allen, 2013; Breimaier et al., 2015; Grealish et al., 2019; Isaac et al., 2019; Jun et al., 2016; Katowa-Mukwato et al., 2021; Keiffer, 2015; Lam et al., 2016; Lin et al., 2019; Renolen et al., 2019; Robert et al., 2011; Solomons & Spross, 2011; Wolak et al., 2020; Yagasaki & Komatsu, 2011).

IV. Discussion

In this systematic literature review we mapped previous research on change implementation in nursing practices. This is in order to identify what type of factor impacts implementation processes, how these factors were interrelated in terms of their different types, and investigated different implementation strategies.

Firstly, we showed that previous research on change implementation in nursing practices predominantly followed qualitative design approaches; this could be explained by the type of study subject i.e., 'implementation science', which required consideration of the study context. In addition, research efforts in implementation science have been limited, while improvement guidelines and requirements for nursing practices have been steadily increasing, thus dissemination of desired changes could not guarantee their integration into professional practice (Francke et al., 2008; Spoon et al., 2020; Yagasaki & Komatsu, 2011). It takes approximately 17 years to translate 14% of all evidence-based research into nursing practice (Beauchemin et al., 2019). Additionally, critical care units were the most frequently studied environments when compared with other hospital departments. This may have been related to environmental complexity regarding patient status and care, and also the potentially challenging incorporation of these changes into clinical practice in these specific environments (Phelan et al., 2018). Intensive care units were shown to struggle with the integration of screening and management strategies (Stewart & Bench, 2018). While other contexts were poorly addressed, we suggest further empirical research on change integration in nursing practices to investigate multiple organizational contexts. This will undoubtedly identify challenges and factors impeding or enabling implementation processes.

Secondly, we reported different suggested and used implementation strategies, and mapped different types of factors impacting implementation processes on multiple

organizational levels. As a result, this study contributes a practical outline for implementers and researchers (Table 5) summarizing selected studies output useful to support knowledge in implementation sciences. This approach gives insights on the different elements, barriers or facilitators, and also the most effective implementation interventions to consider when implementing change in nursing practice regardless to multiple change contextual settings.

Table 5: Synthesis of different elements.

	Facilitators	Barriers	Implementation strategies
Macro level	• linkage between external change agency and adopter		
Meso level/ Organizational	• Organization culture • Structural preparedness • Change measurement and supervision • Management and organizational support • Appropriate learning environment mentorship • Resources (time, materials, finances administrative • Supporting shared objectives • Stakeholders aim and needs • Leadership at multilevel • Opinion leader and role model • Champion or facilitator • Communications and its channels	• Lack of resources (human resources, financial, materials) • Lack of administrative support • Lack of managerial support • Lack of policy and guidelines	• Multifaceted approach† • Tailored interventions‡ • Creating organizational structure • Allocation of resources (Time, money equipment) • Presence of policy and administration support • Providing organizational support • Creating a culture/ organizational culture • Stakeholder engagement • Use leadership approach • Opinion leader / role modes • Process evaluation regulatory monitoring and audit and providing feedbacks • Use of change champions. / internal facilitator • Reminder and identification system • Develop an action plan / clear instruction • Consider the existing conditions at the point innovation introduced • Use appropriate change model
Individual level	• Involvement in the change • perception of participants, and attitude • Acceptance and commitment	• Workload and time constraint • Resistance to change	• Pilot scheme (Test and experience the change) • Participants involvements • Ongoing education / information and trainings

	• Experience skills and motivation • Educational , knowledge • Practices / experience the change and feedback	• Lack of authority to change practice	
Innovation level	• Innovations or intervention itself attractiveness • Feasibility / affordance of innovation		• Customize guideline to the need of professionals • Identifies the affordances of innovation
Patient level	• Patient implication	• Patient level (knowledge, status attitude)	• Partnering with patient or family
Activity level socio-material factors	• Socio-material context • team dynamic or approach		• Meaning and sense making in nursing practices • Have dedicated team or multidisciplinary team approach • Consider the socio-material infrastructural features (relations among 1) artifacts, 2) artifacts and their context, and 3) artifacts and professional's action)

Note: †Multifaceted approach intervention: simultaneous use of several implementation strategies two or more[1]
‡Tailored interventions‡ (intervention tailored to the implementation context the existing barriers[2]

A summary of the overall synthesis of previous results in terms of barriers and facilitators as well as the most effective implementation interventions to consider in implementing change in nursing practice.

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2. Kwok EYL, Moodie STF, Cunningham BJ, Oram Cardy JE. Selecting and tailoring implementation interventions: a concept mapping approach. *BMC Health Services Research*. 2020;20(1):385.

In terms of implementation strategies, a multifaceted approach with tailored interventions was identified as the most effective way to generate change (Abbott et al., 2014; Breimaier et al., 2015; Grealish et al., 2019; Kite, 1995; Koh et al., 2008; Lam et al., 2016; Lin et al., 2019; Munroe et al., 2018; Qin et al., 2020; Yagasaki & Komatsu, 2011). Thus, multiple factors were interacting each other, requiring multiple strategies to generate effective implementation and positive results. Prevalent interventions included the allocation of resources (time, staff, and materials), policy allocation and administrative support, knowledge provision, education and training, monitoring and evaluation, frequent and ongoing communications, leadership approaches, participant involvement, organizational culture and support creation, the use of key actors as champions, role models, and opinion leaders (Aitken et al., 2011; Grealish et al., 2019; Jansson et al., 2011; Katowa-Mukwato et al., 2021; Koh et al., 2008; Lam et al., 2016; Lin et al., 2019; Qin et al., 2020; Solomons & Spross, 2011; Wolak et al., 2020). Also, specific interventions were related to contextual implementation, such as partnering with patients and families (Grealish et al., 2019; Lin et al., 2019) and using reminder systems (Aitken et al., 2011; Barr, 2002; Colson et al., 2019; Stewart & Bench, 2018; Katowa-Mukwato et al., 2021; Koh et al., 2008; Lin et al., 2019; Munroe et al., 2018; Solomons & Spross, 2011). These interventions confirmed the implementation strategies identified by Cochrane's Effective Practice and Organization of Care (EPOC) taxonomy guidelines (EPOC, 2015). In addition, the use of appropriate change models was highly promoted, either as supports to operationalize implementation strategies, or to guide implementation processes, or/and as tools to identify what barriers and facilitators could impact an implementation process (Abbott et al., 2014; Breimaier et al., 2015; Christensen & Christensen, 2007; Colson et al., 2019; Dulko, 2007; Stewart & Bench, 2018; Grealish et al., 2019; Jansson et al., 2011; Katowa-Mukwato et al., 2021; Koh et

al., 2008; Munroe et al., 2018; Qin et al., 2020; Wolak et al., 2020). However, we observed potential flaws in some models related to the specificity of local contexts for change implementation (Yagasaki & Komatsu, 2011). For example, Breimaier et al. suggested adding "stakeholder aims and stakeholder wishes/needs" to the Consolidated Framework for Implementation Research, to adapt them to local contexts and identify and manage barriers and facilitators when implementing innovations (Breimaier et al., 2015). This was confirmed by Nilsen et al. who stated there was no grand implementation theory, since implementation was too multifaceted and complex a phenomenon to facilitate universal explanation (Nilsen, 2015). These observations demonstrated a requirement to build integrated approaches while considering robust factors and local implementation contexts.

In terms of the identified factors' types and how they are interrelated; this work showed that the majority of studies adopted a strategic perspective that emphasized transverse elements, these are considered as systematic factors in our review. Although these components were important and generic as they could be useful in multiple contexts and different management levels, they remained outside the parameters of the local implementation context. Among these systematic factors, we identified distinct and robust elements regardless of the implementation context and type of change. These were divided mainly across two levels: 1) the organizational level (resource availability, leadership approaches, organizational culture, effective communications, and managerial and organizational support) and 2) the professional level (knowledge, education and skills, participant perceptions, and involvement) (Aitken et al., 2011; Colson et al., 2019; Keiffer, 2015; Lam et al., 2016; Qin et al., 2020; Robert et al., 2011; Wolak et al., 2020; Yagasaki & Komatsu, 2011). A lack in any of these factors could generate major barriers to effective change integration. For example, organizational cultures were considered as

learning contexts, not only as facilitators for change implementation processes (Kirk, 2016). An absence of leadership support could also induce hesitation in nurses to integrate new or unusual practices; practitioners reported the need for support from nurse leaders, who in turn required support from their leaders (Gifford et al., 2018). However, our findings showed that champions, expert clinicians but with informal leader roles (Mark et al., 2014), were identified in less than half of studies (36%) (Abbott et al., 2014; Aitken et al., 2011; Christensen & Christensen, 2007; Stewart & Bench, 2018; Grealish et al., 2019; Kite, 1995; Wolak et al., 2020). This may be explained by the presence of other actors as role models and/or opinion leaders (Barr, 2002; Kirk, 2016; Breimaier et al., 2015; Colson et al., 2019; Keiffer, 2015; Kite, 1995; Lin et al., 2019; Qin et al., 2020) Opinion leaders are respected, influential, passionate, and competent personnel (Mark et al., 2014) whose decisions and behaviors are generally accepted by other peer professionals (Qin et al., 2020). Additionally, staff engagement in the design and implementation process promoted ownership and made it more likely to be accepted in practice (Lin et al., 2019). This occurred through favorable professional attitudes, perceptions (Jun et al., 2016), motivation, and practice preferences (Colson et al., 2019; Isaac et al., 2019). Staff buy-in generated benefits at the onset of improvement projects in terms of managing and sharing results (Wolak et al., 2020). The widespread participation of professionals in change processes was acknowledged as the most frequently used approach to avoid resistance to change (Nilsen et al., 2020). Also, factors related to the patient and family were observed, including knowledge, attitudes, health status, and ethnicity (Colson et al., 2019; Grealish et al., 2019; Jun et al., 2016; Keiffer, 2015; Koh et al., 2008; Lam et al., 2016; Lin et al., 2019; Munroe et al., 2018). Koh et al. reported that the inability to reconcile patient heath status and ethnicity with guidelines was a barrier to change (Koh et al., 2008). In other contexts, the links between

the adopter of change and an external change agency and/or researcher was essential for the change adoption (Breimaier et al., 2015; Colson et al., 2019; Robert et al., 2011; Yagasaki & Komatsu, 2011). This may have been related to the effects of these external agencies (i.e., the role of accreditation agencies) in imposing such knowledge and requirements into practice, and other healthcare-provider competencies which promoted change adoption and integration (Colson et al., 2019; Yagasaki & Komatsu, 2011).

However, the operationalization of these factors in the local context was challenging, therefore, other researchers investigated the implementation of change in nursing practice from an activity level perspective (Allen, 2013; Grealish et al., 2019; May et al., 2014). These factors highlighted other type of elements related to the local socio-material context. For example, when implementing multidisciplinary guidelines for cancer care, an equal working partnership between multidisciplinary team members was important for effective integration. In a previous study, teamwork factors were essential in creating and supporting a work culture between professionals (Yagasaki & Komatsu, 2011). Another study argued the importance of multiple "affordances" of innovations or technologies in understanding the general mechanisms of an artifact and its unintentional consequences (Allen, 2013). In other words, how innovation affordances were related to the socio-material infrastructures into which they were introduced (Allen, 2013). May et al. suggested that nurses' capability to implement and embed a CPG depended on the degree to which guidelines were workable (May et al., 2014). This way, inter-relations between the implemented change, actor, and context were considered, and importantly, it accounted for how these relationships were reciprocally adapted to generate positive effects for different purposes (Allen, 2013).

To conclude, we indicated two different types of factors, systematic and contextual factors. Generally, these factors were elaborated independently in previous studies.

Systematic factors were identified by the majority of studies, with strategic perspectives identified in terms of elements impacting on change implementation. As well as, these studies were based on cross sectional models, which agreed with the previous literature (May et al., 2016; Melo & Bishop, 2020). Contextual factors were related to social and material interactions. This separation between factors could be problematic for management, especially in terms of manager's roles, where a strategic perspective differs from a nurses' local reality. However, considering both factor types and how they are interrelated could be challenging for managers. Therefore, we suggest the development of an operational framework which considers both implementation approaches; combining both systematic and contextual factors (Salma & Waelli, 2021). Finding the best practices for effectively implementing changes into routine practices is beneficial for healthcare system. Especially, in front of critical situations where we need to implement a change in the best effective way, e.g. pandemic, nursing shortage, increasing cost of care, and other looming factors impacting our health care system.

Limitations

This study had several limitations. Firstly, in terms of research output, we were limited to four research databases which may have contributed to the low number of selected studies. However, to address this and identify maximum, quality studies, a robust three-step study selection method was incepted. Secondly, the subject of change was not specified, potentially leading to diverse and unsynchronized results. However, our interest was to map different factors and interventions, and not compare literature findings. Thus, factors responding to the same perspective were classified together, e.g., mentorship programs, ongoing education, and training were combined as staff skills and information under the factor or element.

V. Conclusion

This scoping review provides a contemporary summary of studies on the implementation of change in nursing practices, therefore it fills an important knowledge gap in the literature. Previous research had focused on the universal concept of systematic components underpinning implementation processes. However, our review helped to identify the importance to contextualize these elements within the local context. By exploring social-material factors combined with systematic factors managers acquire a broader vision for what may impact the implementation of change in nursing practice. Also understand how the local context which involves professionals and their activities, content, and actions are interrelated in implementation process. This, support the importance to create an organizational culture where change implementation and evidence are valued. Furthermore, on the strength of our review, we recommend more comprehensive studies combining these approaches to conduct in the future.

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Supplementary materials article I

Supplementary material 1

Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist.

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			
Title	1	Identify the report as a scoping review.	Page : 1
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	Page:2-3
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	4-5
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	5
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	Not applicable
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	6-7
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	5-6
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	Table 1
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	7
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the	Figure

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
		team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	Page6- 7 and Figure
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	Page 7 and Supplementary Material 2
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	Pages: 6-7
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	Page : 8
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	Pages: 8-9 and table 2, 3
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	Page : 9 and supplementary material 2
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	Pages: 9-11 Supplementary material 3, 4
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	Pages 9-11
DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	Pages: 11-16 And table 4
Limitations	20	Discuss the limitations of the scoping review process.	Page: 16
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	Pages: 16-17
FUNDING			

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	Page: 1

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.
* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.
† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).
‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.
§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).
From: Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMAScR): Checklist and Explanation. Ann Intern Med. 2018;169:467–473. doi: 10.7326/M18-0850.

Supplementary material 2: Quality Appraisal Tools

1-Mixed Methods Appraisal tool MMAT

1. Table 1, 2 and 3 present the quality assessment of included studies, respectively with qualitative, quantitative and mixed methods designs using the MMAT. An overall score accorded for each study based on the met and partially met criteria (ct). Where yes=20, ct=10 and no=0. Studies with a score below 50 will be excluded.

Table 1 : MMAT evaluation for qualitative studies.

		Kite 1995	Barr 2002	Christensen, T; Christensen, M 2007	Jansson et al. 2011	Yagasaki & Komatsu 2011	Atiken et al., 2011	Allen 2013	Abbott et al., 2014	Kirk et al., 2016	Lam et al., 2016	Isaac et al., 2019	Lin et al., 2019	Grealish et al., 2019	Colson et al. 2019	Wolak et al. 2019	Renolen et al., 2019	Katowa-Mukwato et al., 2020
1. Qualitative	1.1. Is the qualitative approach appropriate to answer the research question?	y*	Y	y	y	y	y	y	Y	y	y	y	y	y	y	y	y	y
	1.2. Are the qualitative data collection methods adequate to address the research question?	y	N	y	y	y	ct	ct	Y	y	y	y	ct	y	y	ct	ct	ct
	1.3. Are the findings adequately derived from the data?	ct*	Y	y	y	y	ct	ct	ct	y	y	y	y	y	y	ct	y	Y
	1.4. Is the interpretation of results sufficiently substantiated by data?	y	Y	ct	y	y	y	y	N	y	ct	y	y	y	y	ct	y	n
	1.5. Is there coherence between qualitative data sources, collection, analysis and interpretation?	y	n*	ct	y	y	y	y	ct	y	y	y	y	y	ct	y	y	ct
	Total over 100	**90**	**60**	**80**	**100**	**100**	**80**	**80**	**70**	**100**	**90**	**100**	**90**	**100**	**90**	**70**	**90**	**60**

*y: yes, *n:non *ct : can't tell

Table 2: MMAT evaluation for quantitative non randomized studies

		Koh et al. 2008	Stewart & Bench 2018
3. Quantitative nonrandomized	3.1. Are the participants representative of the target population?	ct*	ct
	3.2. Are measurements appropriate regarding both the outcome and intervention (or exposure)?	Y*	y
	3.3. Are there complete outcome data?	y	ct
	3.4. Are the confounders accounted for in the design and analysis?	y	ct
	3.5. During the study period, is the intervention administered (or exposure occurred) as intended?	ct	ct
	Total over 100	**80**	**60**

*y: yes, *n: non *ct: can't tell

Table 3: MMAT evaluation for Mixed Methods

		Robert et al.,2011	Keiffer 2015	Breimaier et al., 2015	Munroe et al., 2018	Qin te al., 2020
5. Mixed methods	5.1. Is there an adequate rationale for using a mixed methods design to address the research question?	ct*	ct	ct	y	y
	5.2. Are the different components of the study effectively integrated to answer the research question?	y*	y	y	y	y
	5.3. Are the outputs of the integration of qualitative and quantitative components adequately interpreted?	ct	y	y	y	ct
	5.4. Are divergences and inconsistencies between quantitative and qualitative results adequately addressed?	y	y	y	y	y
	5.5. Do the different components of the study adhere to the quality criteria of each tradition of the methods involved?	ct	ct	ct	ct	n*
	Total over 100	**70**	**80**	**80**	**90**	**70**

*y: yes, *n: non *ct: can't tell

2-Critical Appraisal Skills Program (CASP)

Table 4 presents the quality assessment of included reviews studies using the CASP for systematic review. The Tool develop 10 questions with defined criteria. An overall score accorded for each study based on the met and partially met criteria (ct). Where yes=10, ct=5 and no=0. Studies with a score below 50 will be excluded.

Table 4: CASP Checklist for systematic review

	Did the review address a clearly focused question?	Did the authors look for the right type of papers?	Do you think all the important, relevant studies were included?	Did the review's authors do enough to assess quality of the included studies?	If the results of the review have been combined, was it reasonable to do so?	What are the overall results of the review?	How precise are the results?	Can the results be applied to the local population?	Were all important outcomes considered?	Are the benefits worth the harms and costs?	Total 100
Dulko 2007	y*	Y	ct*	n*	ct	y	ct	y	y	ct	**65**
Solomons & Spross, 2011	y	Y	Ct	n	y	y	n	y	y	ct	**70**
May et al., 2014	y	Y	Y	n	y	y	n	y	y	ct	**75**
Jun et al. 2016	y	Y	Ct	ct	y	y	n	y	y	ct	**75**

*y: yes, *n: non *ct: can't tell

Supplementary material 3.

Identified implementation strategies and interventions. A summary of the different used and suggested implementations strategies and interventions each study. The table shows the frequency of each intervention according to study number. Each row represents one study findings in terms of the identified factors. 1= present and - = absent.

Implementation strategies	use leadership approach	Opinion leader / role modes	participants involvements	have dedicated team or team approach	ongoing education / information and trainings	ongoing communications and/or discussion	Pilot scheme. Test and experience the change	creating organizational structure	Process evaluation regulatory monitoring and audit and providing. feedbacks	Use of change champions. / internal facilitator	allocation of resources (Time, money equipment)	presence of policy and administration support	partnering with patient or family	providing organizational support	reminder and identification system	creating a culture/ organizational culture	customize guideline to the need of professionals	stakeholder engagement	develop an action plan / clear instruction	consider the existing conditions at the point innovation introduced	use appropriate change model
kite (1995)	-	1	-	-	1	-	1	-	-	-	1	-	-	1	-	-	-	-	-	1	-
Barr (2002)	1	-	1	-	1	1	-	1	1	-	1	1	-	-	1	1	-	-	1	-	-
Dulko (2007)	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1
Christensen, T & M (2007)	-	-	1	1	1	1	1	-	1	-	-	1	-	1	-	-	-	-	1	1	1
Koh et al. (2008)	1	-	-	-	1	1	-	-	1	1	1	1	-	1	1	-	-	-	-	-	1
Atiken et al., (2011)	1	-	1	1	1	1	1	-	1	1	1	1	-	1	1	1	-	-	-	-	1
Jansson et al. (2011)	**1**	1	1	1	1	1	-	-	1	1	1	1	-	1	-	1	1	1	1	-	1
Robert et al.,(2011)	1	-	1	1	-	1	-	1	-	1	1	1	-	1	-	1	-	-	1	1	-
Solomons et al., (2011)	1	-	1		1	1		1	1	1	1	1	-	1	1	1	-	1	-	-	-
Allen (2013)	1	-	-	-	-	-	-	-	-	-	1	1	-	1	-	1	-	-	-	-	-
Abbott et al., (2014)	-	-	1	-	1	1	1	-	1	1	1	-	-	-	-	1	-	1	1	1	1

May et al., (2014)	-	-	1	-	1	1	-	1	1	1	1	1	-	-	-	1	1	-	-	-		
Keiffer (2015)	1	-	-	1	1	1	-	-	1	1	1	1	-	1	-	1	1	-	-	1	-	
Breimaier et al., (2015)	1	-	1	-	1	1	-	-	1	-	1	-	-	-	-	1	-	1	-	1	1	
Jun et al. (2016)	1	-	1	-	1	1	-	-	1	1	1	-	-	-	-	1	1	-	1	-	-	
Lam et al., (2016)	1	-	1		1	1	-	1	1		1	1	-	1	-	-	1	-	-	1	-	
Stewart & Bench (2018)	1	-	1	1	1	-	1	-	1	1	1	1	-	-	-	-	1	1	1	-	1	
Munroe et al., (2018)	-	1	-	-	1	1	-	1	1	-	1	1	-	1	1	-	-	1	-	1	1	
Isaac et al., (2019)	1	-	-	-	1	1	-	1	1	-	1	-	-	1	-	1	-	-	-	1	-	
Lin et al., (2019)	-	-	1	1	1	-	-	1	1	-	1	1	1	-	1	-	1	-	-	-	-	
Grealish et al., (2019)	1	-	1	1	1	1	1	1	1	-	1	1	1	1	-	-	1	-	1	-	1	
Colson et al. (2019)	-	-	-	1	1	1	-	-	-	-	1	1	-	-	1	1	1	-	-	-	1	
Renolen et al., (2019)	1	-	1	-	1	1	-	1	-	-	1	1	-	-	-	1	1	-	-	-	-	
Wolak et al. (2020)	1	-	1	-	1	1	1	1	1	1	1	1	-	-	-	-	1	1	1	-	1	
Qin te al., (2020)	1	1	-	1	1	1	-	1	1	1	1	1	-	-	-	-	-	1	1	1	1	
Katowa-Mukwato et al., (2021)	-	-	1	1	1	1	-	-	1	1	1	1	-	-	1	-	1	-	-	-	1	
total : 26	17	4	17	11	24	21	7	12	21	13	24	20	2	13	8	14	12	8	10	10	14	

Supplementary material 4.

Identified factors, barriers and facilitators. A summary of the different retreated factors, barriers or facilitators in each study. The table shows the frequency of each elements according to how many times it was used**.** Each row represents one study findings in terms of the identified factors. 1= present and - = absent.

Factors	leadership	communication and its channels	opinion leader/ role models	organisational culture	Socio-material local context.	Structural preparedness	change measurement and supervision	Champion/ or facilitator	management or organisational support lack/ or presence	appropriate learning environment mentorship	resources (time, materials, finances administrative)	supporting shared objectives	stakeholders aim and needs	team dynamic or approach	linkage between external change agency and adopter	patient level (knowledge, status attitude)	meaning and sense making	innovations or intervention itself attractiveness	feasibility / affordance of innovation	involvement in the change	perception of participants, and attitude	acceptance and commitment	experience skills and motivation	educational , knowledge	practices / experience the change and feedback	Workload and time constraint	resistance to change	lack of authority to change practice
kite (1995)	-	-	1	1	-	-	-	-	-	1	1	-	-	-	-	-	1	-	-	-	1	-	1	1	1	-	-	-
Barr (2002)	1	1	1	1	-	1	1	-	-	-	1	-	-	-	-	-	1	-	-	1	1	1	1	1	-	-	-	-
Koh et al. (2008)	-	-	-	-	-	-	1	1	1	1	1	-	-	-	-	1	-	-	-	-	-	-	1	1	-	-	-	-
Atiken et al., (2011)	1	1	-	1	-	-	-	1	1	1	1	-	-	-	-	-	-	-	-	1	1	-	1	1	1	1	-	-
Jansson et al. (2011)	1	1	-	-	-	-	-	1	1	1	1	-	1	-	-	-	-	-	1	1	1	1	1	1	1	-	-	-
Robert et al., (2011)	1	1	1	1	-	1	-	1	1	1	1	-	-	-	1	-	1	1	-	1	1	1	1	-	-	1	-	-
Solomons & Spross, (2011)	1	-	1	1	-	1	-	1	1	1	1	-	1	-	-	-	-	-	-	1	1	-	1	1	-	1	-	1
Yagasaki & Komatsu (2011)	1	1	-	-	-	-	-	1	1	-	1	1	1	1	1	-	-	-	1	1	1	1	1	1	-	1	1	1
Allen (2013)	1	1	-	1	1	-	-	-	-	-	1	1	-	-	-	-	1	1	1	1	1	-	-	-	-	1	-	-
Abbott et al., (2014)	-	1	-	1	-	-	1	1	1	-	1	-	-	-	-	-	-	1	1	-	-	-	-	1	1	-	-	-
May et al., (2014)	-	1	-	1	1	1	1	-	-	-	1	-	-	1	-	-	1	1	1	1	1	1	1	1	1	-	-	1
Keiffer (2015)	1	1	1	1	-	1	-	-	1	-	1	-	-	-	-	1	1	1	1	1	1	1	1	1	1	-	-	1

Breimaier et al., 2015	1	1	1	1	-	-	1	-	1	1	1	-	1	1	1	-	1	1	-	1	1	-	1	1	1	-	-	-
Jun et al. (2016)	1	1	-	1	-	-	-	1	-	-	1	-	-	-	-	1	-	1	1	1	1	1	1	1	-	1	1	-
Kirk et al., (2016)	1	-	1	1	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	1	1	1	1	-	-	1	-
Lam et al., (2016)	1	1	-	1	-	1	-	-	1	-	1	-	-	-	-	1	-	-	1	1	1	1	1	1	1	1	-	-
Munroe et al., (2018)	-	-	-	-	-	1	1	-	-	1	1	-	-	-	-	-	-	-	1	-	1	1	1	1	1	1	1	-
Isaac et al., (2019)	-	-	-	1	-	-	-	-	-	1	1	-	-	-	-	-	1	1	-	1	1	-	1	1	1	-	-	-
Lin et al., (2019)	1	-	1	-	-	-	1	-	-	1	1	-	-	-	-	1	1	1	1	1	1	-	1	1	1	1	-	-
Grealish et al., (2019)	-	-	-	1	1	1	-	-	-	-	1	-	-	-	1	1	1	-	-	1	-	-	1	1	-	1	-	-
Colson et al. (2019)	-	1	1	1	-	-	-	-	1	1	1	-	-	-	1	1	-	1	1	-	1	1	1	1	-	1	-	-
Renolen et al., (2019)	1	1	-	-	-	1	1	-	1	-	1	-	-	-	-	-	1	-	-	1	-	1	-	1	-	1	-	1
Wolak et al. (2020)	1	1	-	1	-	-	-	-	1	1	1	1	-	-	-	-	1	1	-	1	1	1	-	1	-	1	-	1
Qin te al., (2020)	1	1	1	1	-	-	-	-	1	-	1	-	-	-	-	1	1	1	1	-	1	1	1	1	-	-	-	-
Katowa-Mukwato et al., (2021)	-	-	-	-	-	-	1	1	1	1	1	1	-	-	-	-	-	-	1	1	1	-	1	1	-	1	1	-
Total : 25	16	16	10	18	3	9	9	9	15	13	25	4	4	3	4	8	14	12	13	18	21	14	21	23	11	14	5	6

The output of this scoping review is summarized in Box I.

Box I. Principal findings and perspectives**.**

- We identified two types of factors impacting implementation processes: **the systematic** and the **local context factors**.
- The factors related to **local socio-material context** are poorly addressed in the previous implementation studies.
- This review gives an outline to the different types of factors and interventions which must be considered for implementing such change based on evidence into the nursing practice.
- It identifies a l**ack** of an **implementation framework** that simultaneously addresses **organizational and nursing activity** level.

⇨ We need to develop an integrated approach allowing managers and implementers to focus on systematic and local context factors at the same time which impact change implementation processes in nursing practices**.**

"Research is creating new knowledge."

- Neil Armstrong

Chapter II: A framework for the implementation of certification procedures in nurse level: a mixed approach study

Preamble

Bridging the gap between evidence and professional practices has always been a matter of concern. An effective implementation of such quality initiative is associated with positive patient and staff outcomes and improve care cost-effectiveness. Considerable efforts were dedicated to support implementation intitiatives. As identified in chapter I, we need to develop an integrative framework that combines between systematic and local contextual factors.

This chapter outlines “article II” which presents the development of a framework designed for the implementation of innovation at nurses’ level based on a mixed reasoning approach study. Throughout this article, we studied the process of implementation of certification procedures using an inductive analysis of a qualitative case study in a teaching hospital center. The inductive step was completed by a hypotheco-deductive analysis. Both steps led to the elaboration of “Integrative Framework for the Implementation of Nursing Practices (IFINP)”.

This framework contributes to the development of knowledge in terms of the elements involved in the implementation processes at the multiple organizational levels.

Article II

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RESEARCH Open Access

A framework for the implementation of certification procedures in nurse level: a mixed approach study

Israa Salma[1*] and Mathias Waelli[2,3]

Abstract

Background: The implementation of certification procedures across healthcare systems is an essential component of the management process. Several promising approaches were developed toward a successful implementation of such policies; however, a precise adaptation and implementation to each local context was essential. Local activities must be considered in order to generate more pragmatic recommendations for managers. In this study, we built a framework for the implementation of certification procedures at nurse activity level. This was developed using two objectives: the identification of key implementation process components, and the integration of these components into a framework which considered the local socio-material context of nurses' work.

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A framework for the implementation of certification procedures in nurse level: a mixed approach study.

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Abstract

Background: The implementation of certification procedures across healthcare systems is an essential component of the management process. Several promising approaches were developed toward a successful implementation of such policies; however, a precise adaptation and implementation to each local context was essential. Local activities must be considered in order to generate more pragmatic recommendations for managers. In this study, we built a framework for the implementation of certification procedures at nurse activity level. This was developed using two objectives: the identification of key implementation process components, and the integration of these components into a framework which considered the local socio-material context of nurses' work.

Methods: We used a two-step mixed approach. The first was inductive and consisted of a qualitative case study conducted between April and December 2019. Here, we analyzed the implementation of certification procedures in a French teaching hospital. Data were collected using semi-structured interviews and observations. In the second approach, emerging data were deductively analyzed using the Quality Implementation Tool (QIT) and Translational Mobilization Theory (TMT). Analyses were combined to construct an implementation framework.

Results: Sixteen interviews were conducted with participants from different organizational levels, managers, mid-managers, and nurses. Additionally, 83 observational hours were carried out in two different wards. Our results showed that, 1) All retrieved elements during the process were successfully captured by the QIT components, only one component was not applicable. 2) We identified elements related to the local activity context, with the different interrelationships between actors, actions, and contexts using the TMT. 3) Our analyses were integrated and translated into a framework that presents the implementation of certification procedures in healthcare facilities, with a specific interest to the nurse/mid-manager level. By initially using QIT, the framework components took on a transversal aspect which were then adapted by TMT to the local work context.

Conclusions: We successfully generated a framework that supports the implementation of certification procedures at the activity level. Our approach identified a broader vision of the interactions between proximity managers, teams, and contexts during change mobilization, which were not encompassed by transversal framework only, such as QIT. In the future, more empirical studies are needed to test this framework.

Keywords: Implementation, certification, local context, nurse activities, managers, framework, components.

I. Background

Healthcare systems are becoming increasingly complex, where individual patients receive care from multiple providers and a multitude of professionals, within a context of reduced and regulated hospitalization procedures (Allen, 2015). Considerable efforts have been made to improve the care quality and patient safety, as evidenced by the proliferation of checklists, protocols, and attempts to standardize care pathways (Allen, 2019). Unequivocally, these factors impact professionals' workloads, especially nursing groups (Myny et al., 2012), who are the largest providers of continuous patient care (Asmirajanti et al., 2019).

Quality measurement and management approaches play significant roles in reform; however, they constitute a timely consideration for healthcare managers and policy makers in terms of their preparation and implementation in professional daily practices (Minvielle & Kimberly, 2005). Since 2004, quality certification has been a major external quality evaluation procedure in the French healthcare system (Holcman, 2015). It is iterative and mandatory for all public and private healthcare facilities and is conducted every four or six years (HAS, 2017). This "peer evaluation technique" is based on the International Organization for Standardization (ISO) (Shaw et al., 2010) which not only considers the quality and safety of care provision, but also continuously enhances an organization's performance and improves patient satisfaction (Yousefinezhadi et al., 2015). Certification has gradually evolved from promoting and integrating quality improvement initiatives (HAS, 2017; Holcman, 2015), to measuring implementation metrics in line with increased risk management and patient care (HAS, 2017). The most recent certification process was synchronized with each establishment procedures, where it was based more on the quality

monitoring tool, Compte Qualité (CQ), which reflected each institution's commitment to quality and risk management systems and process improvement (HAS, 2017).

Certification evaluation strategies rely on standards and benchmarking and must therefore encompass best clinical practices and care process audits (Holcman, 2015), and be well supported by quality and safety indicators (Indicateur de Qualite et Securite des Soins, IQSS) (Bertillot, 2016; HAS, 2017). Thus, the approach has implemented several care pathways, protocols, and checklist models to manage quality and reduce risk (Allen, 2019). For example, quality and risk management items include - as outlined in the French National Health Authority (Haute Autorite de Sante, HAS) certification manual - a comprehensive criteria list comprising policies governing quality and care safety improvements, professional practice evaluation (Evaluation des Pratiques Profesionnelles, EPP), document management, and adverse event management (HAS, 2017). These high governance exigencies are both prominent and essential in high risk sectors to manage risk and control safety in terms of professional practice (Hesselink et al., 2016). However, these requirements also generate large workloads for nurses (Myny et al., 2012) and are primarily due to the major roles nurses have in daily practice e.g., implementing and monitoring certification procedures. Nurses are familiar with management, leadership and auditing issues given their academic background (Manzo et al., 2012). Thus, certification procedures are major strategic and managerial issues for healthcare organizations in terms of preparation, implementation, and day-to-day sustainability (Duval, 2017).

In terms of implementation, the literature offers several promising approaches (Nilsen, 2015; Wandersman et al., 2008) where key attributes, facilitators, and barriers come together to promote effective implementation strategies (Meyers,

Durlak, et al., 2012; Nilsen, 2015) of this dynamic process (Pfadenhauer et al., 2017). In 2015, Nilsen *et al.* generated a differentiating approach incorporating three main aims (Nilsen, 2015); a *process model* which described and guided the translation of research into practice (Meyers, Durlak, et al., 2012; Wilson et al., 2011); a *determinant framework* which explained and attempted to understand what influenced implementation outcomes (Damschroder et al., 2009; Durlak & DuPre, 2008; Rycroft-Malone, 2004), and *evaluation frameworks* which evaluated implementation efforts (Dabbagh et al., 1991; Glasgow et al., 1999). These approaches generally emphasized systematic and cross sectional factors such as leadership, organizational culture, and the availability of time, materials and resources (Allen, 2013). However, it is also important to define these transversal components at the activity level, to understand how interventions could become embedded into activity systems, and to identify implications for healthcare quality (Allen, 2018). To this end, several recent studies have stressed the importance of local socio-material infrastructures, their effects on change integration (Allen, 2013), and how they are pivotal in generating quality improvement results (Waelli et al., 2016). However, there is a dearth of professional frameworks related to nurses' activities in the literature, specifically nursing mandates in terms of essential roles, either directly in patient care and/or indirectly in coordinating activities and organizational care (Allen, 2019), and the plethora of practice requirements which come under quality assurance perspectives.

In this study, we constructed a framework for the implementation of certification procedures at the nurse activity level. This determinant framework seeks to facilitate implementation endeavors by presenting an extended vision from the generic factors impacting an implementation process to local socio-material factors such as local work dynamics. This was based on a mixed approach design covering two main

objectives; firstly, we identified and framed key implementation components based on a qualitative study and the incorporation of a practical implementation science tool. Secondly, we integrated these components into a framework which considered specific local socio-material contexts. A socio-material context reflects both socio- and material elements which can be interwoven and constitute the local context of the activity, in our case nurse activities (Allen, 2013).

II. Methodology

Study design

This study was conducted based on a mixed two-step approach (Fig. 1). The first inductive step was a qualitative case study which allows researchers to investigate phenomena in natural or 'real life' contexts (Houghton et al., 2013), examine closely how events occur, and understand the implementation of interventions in the healthcare systems (Crowe et al., 2011; Hamilton & Finley, 2019). In a second step, the emergent themes were deductively analyzed using two different theoretical approaches; a practical implementation science tool and a middle range theory. This triangulation process between the different approaches provided the basis for a framework. At the final stage, the combination of results led to the construction of framework.

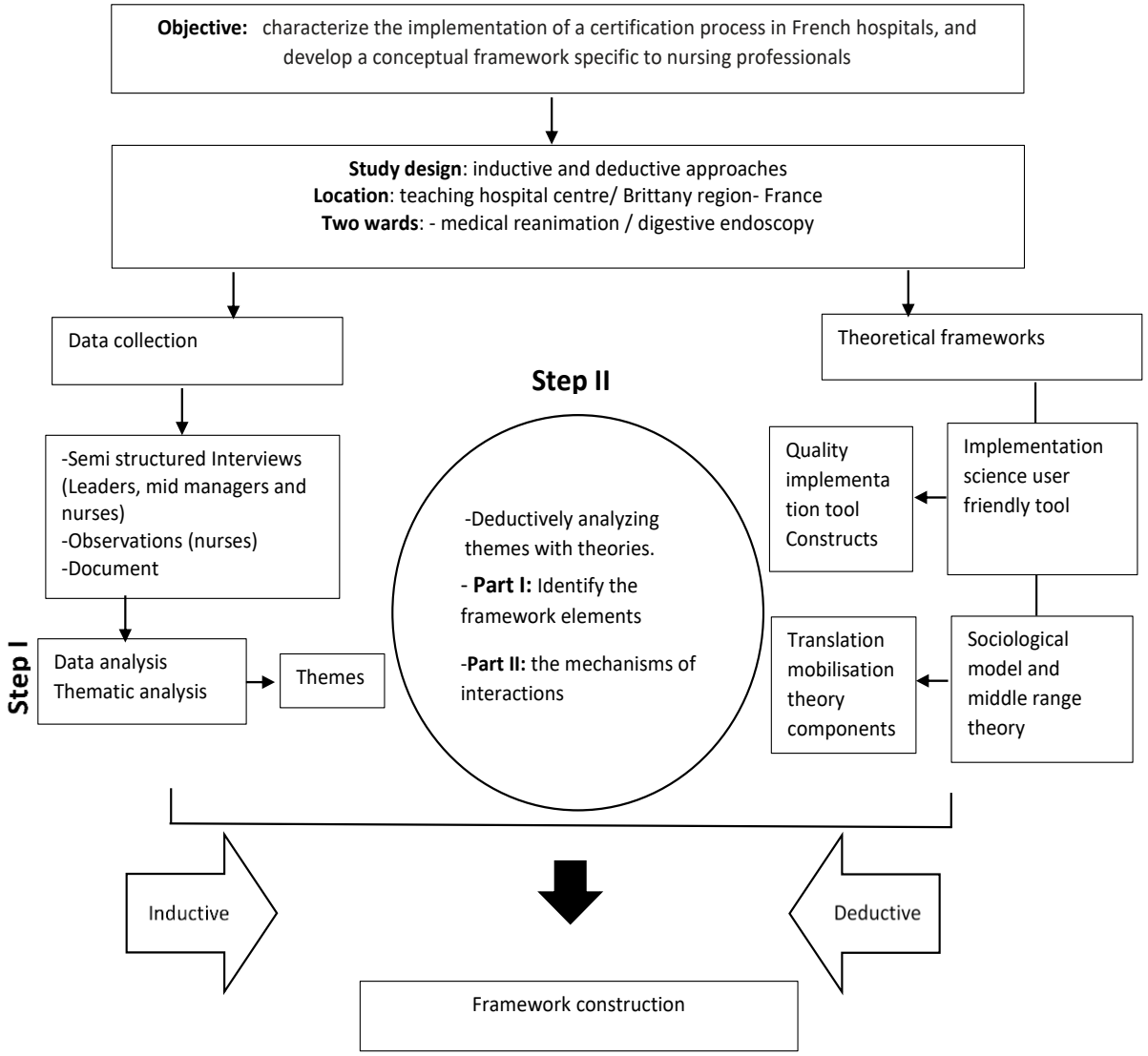

Figure 1. A flow diagram summarizing study design and output (adapted from Creswell and Plano Clark (Creswell & Plano Clark, 2011).

Study location

This study was performed between April and December 2019 in a large teaching hospital (924 beds) in western France. The hospital previously passed four certification processes and was awarded a B rank without recommendations during the last visit. Data were collected from two high risk wards: medical reanimation (Med Rea) and digestive endoscopy (Dig Endo). These wards required a high governance status in terms of patient care and nurse practices as identified in the certification manual. These wards were therefore ideal locations to conduct our study.

The Med Rea ward has a patient/nurse ratio of 5:2. Here, seriously ill patients required respiratory assistance and were dependent on nursing and medical care. Med Rea nurses were qualified to manage and respond to contingencies and unexpected situations. The electronic health record (EHR) system in this ward was partially integrated, therefore a combination of electronic and paper records were used.

The Dig Endo ward functioned under a predefined intervention schedule; on average it experienced eight programmed interventions/day/room over a 10 hours shift, five days/week. The area was highly technical, with a high patient rotation and an integrated EHR system.

Data collection

Data came from semi-structured interviews and observations and were supported by documents relevant to certification procedures.

Interviews

Interviews were conducted with actors from different hierarchical levels involved in the implementation of certification procedures, e.g., leader, mid-manager, and nurse levels. This strategy provides an in-depth insight into their experiences, perspectives, and roles. It also captures the issue from multiple lenses allowing a better understanding multiple facets for certification procedures implementation processes (Nyanchoka et al., 2019). Sampling of interviews was performed based on a data-saturation approach, which means that the interviews' output reached a sense of closure because the new interviews yielded non-essential information in terms of study aims (Moser et al., 2018). The semi-structured interviews were conducted by the principle investigator (PI) only. The interview guide was covering the following topics: quality approaches in the hospital, certification procedures and implementation

processes for certification procedures, key factors, barriers and facilitators and their impact on nurse activities.

After the initial e-mail contact and the obtainment of written informed consents to participate provided by the participants, the primary phase interviews commenced with nursing leaders and managers. Nurse interviews were conducted during the observations on wards. Nurses with at least one year of work experience and having the French national diploma in nursing science were selected as basic qualification levels, to avoid knowledge or experience bias in the sector. Nurse demographic characteristics are shown (Table 1). All interviews were recorded and transcribed.

Table 1. Participant demographics (for the eight participating nurses)

Participant demographics		**Med Rea**	**Dig Endo**
Age (years)	30–45	4	2
	> 45	0	2
Gender	female	4	3
	male	0	1
Work experience (years)	<10	0	2
	>10	4	2
Experience in ward (years)	1–5	2	2
	> 5	2	2
Education	RN*	3	4
	HD*	1	0

*RN: Registered Nurse *HD: Higher Diploma (master degree or higher)

In total, 16 semi-structured interviews were conducted with participants from different organizational levels. To ensure participant anonymity, interviews were sequentially numbered as they occurred using an acronym based on roles in the implementation process; TL; top leader, MM; mid-manager, and RN; registered nurse.

Observations

In both wards, observations were carried out by the PI. The observations can be helpful in documenting current processes (Nilsson et al., 2018) as well as assessing local contexts and observing the nature and intensity of how interventions are being implemented (Palinkas et al., 2016). Before commencement, the PI was introduced to staff to reiterate research objectives. This ensured that the PI was accepted in both teams and was not a stressor for shadowed staff. Staff were therefore comfortable with their actions, facilitating "real-life" observations of daily workflows. Observations were conducted over different days, ensuring at least one full shift in each ward was conducted. To each nurse, the PI explained the purpose of the observations, which was to identify and not judge their daily practices. In France and across the nursing profession, trainees typically shadow nurses, therefore the PI directly integrated into the staff dynamic. This factor with the observation duration limited the "Hawthorne effect" or observation bias (Goodwin et al., 2017). As a registered nurse, the PI comprehended the different actions and became familiar with the work environment. To prevent over familiarity and retain a critical distance, only descriptive non-judgmental notes were taken (Hammersley & Atkinson, 2007).

Document collection

Various documents were collected from both wards, e.g., patient file documentation, traceability records such as checklists, blood transfusion follow-up, hemodialysis follow-up, working procedures and policies, and "Bord" table as indicators for staff performance. The PI was also introduced to the hospital informatics system (Dx Care) and was permitted to review electronic forms. During observations period, the PI also attended staff and quality meetings.

Research ethics

In France, research involving human in three types of study: interventional studies, studies with minimal risk and intervention, and non-interventional studies (in the usual framework of patient), requires an ethical approval from an ethical committee, the "Jarde law" L1121-1 PHC (LOI n° 2012-300 du 5 mars 2012). This study involved only professionals and the content of activity, without patient involvement or human experiments, it does not require an IRB clearance in the way it is understood in the United States (Dariel et al., 2014; Durand-Zaleski et al., 2008). It requires only an administrative approval and this was gained through convention before data collection and interviews; it was signed between the French School of Public Health and the teaching hospital. This convention defined the study duration and the investigations to be carried out.

The study was conducted in accordance with ethics in qualitative research guidelines (DiCicco-Bloom & Crabtree, 2006). A signed consent form was obtained from interviewees to formalize their willingness to participate. The PI was highly sensitive to confidentiality issues and conducted interviews in private offices in comfortable and informal settings. However, some Med Rea nurse interviews were conducted at nursing stations which facilitated rapid access to critical patients. All interviewees and interview transcripts were anonymized and assigned acronyms.

Data storage

Interviews transcripts were stored in two different Excel sheets; one devoted to leaders and managers and one for nurses. Sheets were divided into questions, and each column represented one interviewee. Answers were accorded to the related question, thereby maintaining one concept in each row/column 'case'. All datasets were stored on an encrypted access computer which required a password.

Data analysis

Analyses were conducted by the PI. The first stage involved a rigorous inductive analysis of interview transcripts (Thomas, 2006). Narratives reflecting certification procedures and implementation processes were extracted and organized according to type (e.g., action, interaction, actors, key component facilitators, barriers, context preparedness, and others). These narratives were then used in the second step and deductively analyzed using pre-identified conceptual frameworks (Elo & Kyngäs, 2008); the Quality Implementation Tool (QIT) and the Translational Mobilization Theory (TMT). The interpretation of observations and document reviews were both used as support datasets. In the observations, we followed how certification procedure practices were embedded in the daily practices, and analyzed how they were effectively integrated. In relation to documents, we went through each wards' action plan for certification implementation, reviewed supportive documents such as policies and working procedure, and assessed their usefulness for successful implementation. Each data analysis stage was reviewed and discussed with the second author to ensure analysis credibility (Additional file 3 shows a study checklist using the Consolidated Criteria for Reporting Qualitative Research (COREQ) checklist).

The second analysis stage was two-fold: the first approach investigated the implementation of certification procedures using a generic implementation tool, i.e., QIT. This is a user-friendly pragmatic tool developed based on an exhaustive review of literature summarizing 25 implementation frameworks, regardless of the intervention, environment, or results (Meyers, Durlak, et al., 2012). The QIT encompasses six major components; 1) develop an implementation team, 2) foster a supportive organizational/climate and conditions, 3) develop an implementation plan, 4) Receive training and technical assistance, 5) practitioner-expert collaboration, and

6) evaluate the effectiveness of the implementation**.** These components presented in a tabular format, with each component divided into action steps in each row, and each row divided into three columns. These columns represented three distinct steps over the implementation process, i.e., i) planning, ii) real-time monitoring, and iii) innovation evaluation. QIT was primarily developed to implement innovation with quality (Meyers, Katz, et al., 2012). In this study, QIT constructs were used to frame emergent themes from interview transcript analyses. This was conducted by aligning tool components with actions and themes derived from manager and leader interviews [Additional file 1].

This first approach was generic in nature; the QIT allowed the capture of transversal elements involved in the implementation of quality procedures. However, we lacked an integrated approach to these factors in the local socio-material context. The consideration of socio-material contexts allows for a better understanding of interactions between the local context of implementation and the development of various factors (Allen, 2013), e.g., the implementation of informatics tools and leadership depends on local work dynamics. These elements were the core of the second approach, or TMT.

TMT is based on ethnographic research on organizing the work of nurses involved in patient care pathways (Allen & May, 2017). Nurses are "obligatory passage points" in hospitals which localize, refract, and shape materials and activities supporting patient care pathways (Davina Allen, 2018a). This systematic framework allows researchers to capture emerging contextually complex procedures during service processes (Davina Allen, 2018b). TMT embraces social, material, and cognitive processes, leading to practice fulfilment. TMT core components comprise: 'project' which is a goal-oriented strategic activity mobilized through 'mechanisms of

mobilization' (Table 2), across a 'strategic action field'. This latter term is defined by resources and conditions which enable and shape project mobilization (Allen & May, 2017; Davina Allen, 2018b). TMT was previously implemented in several different case studies, healthcare trajectory and multidisciplinary research projects (Allen, 2018; Allen 2018). TMT was also used to analyze the local context of nurse activities and explore the emergence of certification processes which were defined as "collaborative work practices" (Allen, 2018) in daily workflows. In this study TMT components were helpful in capturing local socio-material factors emerging from interviews analyses and observations, e.g., interactions between actors and innovation. As a result, we identified interaction mechanisms within the framework. This was based on triangulation between managers, nurse interviews, and shadowed observations, all of which were aligned to TMT core components [Additional file 2].

Table 2. Mechanisms of Mobilization of TMT(Allen, 2018)

Mechanisms of Mobilization	Definition
Object formation	"practices that create the objects of knowledge and practice and enroll them into a project"
Work articulation	"practices that assemble and align the elements (people, knowledge, materials, technologies, bodies) through which object trajectories are mobilized within projects"
Translation	"practices that enable practice objects to be shared and differing viewpoints, local contingencies, and multiple interests to be accommodated in order to enable concerted action"
Reflexive monitoring	"practices through which actors evaluate a field of action to generate situational awareness of project trajectories"
Sense-making	"practices though which actors interpret, order, construct and account for projects and at the same time produce and reproduce institutions"

III. Results

In addition to interviews, 83 observational hours were also conducted over four separate weeks. These were divided as follows; one module in the Med Rea ward over 40 hours, and two interventional rooms in the Dig Endo ward over 43 hours. All nurses were interviewed and observed on their daily shift. We therefore obtained a comprehensive description of all tasks in a complete working shift in both wards. This allowed the PI to focus on how nurses interacted with tasks related to certification procedures, e.g., patient file documentation, checklists, medication administration, and others.

The following sections outline the data retrieved in this study; part I shows emerging elements from certification implementation using QIT. Part II localizes these components within the activity's context, with different mobilization mechanisms.

Part I

Our results showed that the majority of elements were captured by the QIT components and action steps, further details in [Additional file 1]. Results showed that the "implementation team" in charge of certification implementation were well developed and structured, as mentioned by interviewees. The implementation team consisted of a process leader who managed the implementation process at an institutional level. They could be a physician or an MM working with: executive managers, the experts in field such as hygienist for infection control procedures, and professionals (nurses or caregivers), the referents, the quality engineer and a steering committee e.g., the committee for nosocomial infection prevention. All worked in collaboration with the TL.

The second component, "Foster a supportive organizational climate and conditions", identified several key essential elements for the successful implementation at professional level, such as a key actor with a 'referent of action' role. Referents are professionals who assist new implementation processes "*for example there is a nurse referent for hygiene; she disseminates new procedures and best practices to teams"* TL_1. Other elements included the communication of procedural needs and benefits, and the professional implication of such implementation. These were considered helpful actions in avoiding professional resistance to intended changes. Other actions enhanced accountability by using a quality management system (QMS), conducting a pilot study prior to implementation and effective communications and shared decision-making processes. In addition to the presence of an administrative support for the implemented intervention such as working procedures, protocols etc… either in paper or electronic forms.

The “receive knowledge and/or technical assistance” construct was identified by managers; *“Before implementation we defined what training was needed for professionals and the required technical support…”* MM_1.

Certification implementation occurred according to a program and an action plan defined for each department and ward. This was developed based on national recommendations as identified by the HAS certification manual, and each sectors’ CQ. This latter step reflected the identified risks in priori and posteriori for each sector and it was considered a roadmap for risk management. This program defined a set of tasks corresponding to each standard objective over predefined timelines (The Dig Endo action plan) and responded to the “Develop an implementation plan” component.

The fifth component; “Practitioner-developer collaboration” was not applicable to certification implementation procedures, whether there is no innovation developer, and hospitals implemented procedures developed based on the national recommendations. These recommendations are defined in the HAS certification manual and each hospital develop their action plan accordingly to these recommendations. For the “Evaluate the effectiveness of the implementation” component, interviewees identified quantitative and qualitative evaluation strategies which were carried out differently, according to the intended action. It was based on the evaluation leaders of change readjust and adapted intervention to improve implementation effectiveness, “ *it was the ability to conduct a pre-test (for the intended change), an auto-evaluation procedure and receiving feedbacks from each sector thereby allowing us to see what we could do to improve because the auto-evaluation allowed us to identify missing elements”* TL_1.

In addition to these comments, TL also cited major barriers to the implementation of certification in different wards at the hospital, and cited a lack of organizational support, time, information, human resources, a generalized professional resistance, and an overall challenging process.

Part II

This part of the study framed the identified components at the activity level. It entails previous result analyses by explaining the different inter-relationships at the local context.

The HAS identified healthcare system priorities, and each subject under these priorities included a set of standards and indicators (Agence régionale de santé Bretagne, 2018). These standards underpinned the quality program of each healthcare facility as well as the policies and objectives of the QMS. Hence, the higher goal of the healthcare system - defined by care quality and patient safety - represented 'organizing logic' which determined the scope of possible actions and activities within facilities, and shaped its purpose. The primary mobilization of certification procedures initiated within departments was based on a list of priority actions previously elaborated through the CQ. This occurred via a set of action~~s~~ steps according to each sector action plan "we *have an action plan and a list of priority actions, and annually, we contact the quality engineer to revise this action plan"* MM_1. Interventions leading to the emergence of certification in the ward were introduced to nurses by mid-managers and/or by the referent, and this process reflected the 'object formation' mechanism. Interventions may took the form of new technologies and/or materials supporting practices, or interpretative repertoires such as protocol changes, policies, checklists and/or traceability documents. Through these interventions, nurses translated recommendations and certification criteria or other

quality policies into practice. For example, in the Dig Endo ward nurses were using a working protocol to support preparations for the pre- and on-going of new adopted change of intervention. The change leader - who led the implementation at the professional level - disseminated the information on the required changes to nurses, its needs and benefits in terms of patient care. In other words, the message was how change meet the facility's organizational logic, thereby reflecting a 'translation mechanism'. This was seen in nurse interviews; they perceived the importance and the need of certification procedures to improve patient care quality *"certification procedures are progress and enhancement tools which improve patient care"* RN_4.

Healthcare systems by their very nature are dynamic with changeable actions; thus, monitoring processes is important, particularly when implementing cross-sector processes or actions. In order to ensure work harmonization between different sectors. For example, in the Dig Endo ward, the implementation of a checklist was intended for 'with and without' general anesthesia (GA) units. The checklist was successfully implemented at the 'with' GA unit, but it was not successful in the 'without' GA unit. According to MM_1, the checklist was developed as a coordination sheet between the doctor and anesthetist; however, in the 'without' GA unit, there was no anesthetist, but only a coordination between doctors and nurses which generated a lack of monitoring data. This information was used by the change leader, who worked with other departments on a new checklist applicable to the Dig Endo ward and other interventional wards, such as interventional radiology. Changes were re-implemented and monitored to assess workability and acceptability among nurses. This 'work articulation' between multi-levels and sectors was fundamental for the successful integration of implemented checklist. It occurred at team and departmental meetings, alongside the on-going monitoring of integrated changes.

The evaluation of the implementation occurred continuously throughout the process, both formally and informally. This was done to describe the occurrence and positioning of the implemented intervention at the activity's level, as well as from the organization's perspective, indicating a 'reflexive monitoring' mechanism; *"We have monthly performance tables…we have follow-up indicator tables that we monitor monthly or once every semester or annually, and we also have morbidity rates which are monitored every two months*" MM_2. Whenever there was a drop in indicators or an adverse event, analyses occurred and corrective actions were taken. For example *"one day there was a big alert, endoscopes were contaminated and we looked for possible causes. We did not understand because all staff were well trained. After analyzing the situation, we realized instruments were overbooked; nurses and caregivers were under pressure and were reducing decontamination steps for the endoscopes. So we developed organization tables and we make sure doctors organized between them and avoid these overbooking. This information was passed on during our team meeting"* MM2. Another example from the Med Rea ward involved nurses who were using new intubation systems by tracing extubation rates, and were relaying their negative experiences at meetings. This feedback was considered a primary support in evaluating change feasibility and outcomes for patient care. Thus, nurses and managers were keen to improve, "*we reverted to our action plan and adjusted according to adverse events"* MM_1. The mobilization of intervention at the nurse level also depended on a 'sense-making' mechanism. In the nursing field, nurses are actively engaged with certification procedures, e.g., they are involved in protocol preparation and validation, they provide and share experiences, and they contribute to auditing systems. By involving nurses in the implementation process, actions and/or care processes evolve into their practices, meaning this active

engagement is invaluable for a successful change implementation in the activity system. Professional active engagement provides meaning and allows appropriate team-based action mechanisms.

Finally, leaders emphasized the role of MM and their ability to conduct a participative strategy over the implementation process in order reach a successful integration "*an implementation depends on the mid-managers, and what they disseminate between departments. But, each department has its own reality and the ability of each mid-manager to conduct an implementation effectively"* TL_2.

Both parts guided the construction of proposed framework (Fig.2) by understanding how the implementation process of certification procedures occurs through key elements and mechanisms of mobilization shaping the interrelationships between actions, actors, and the local context.

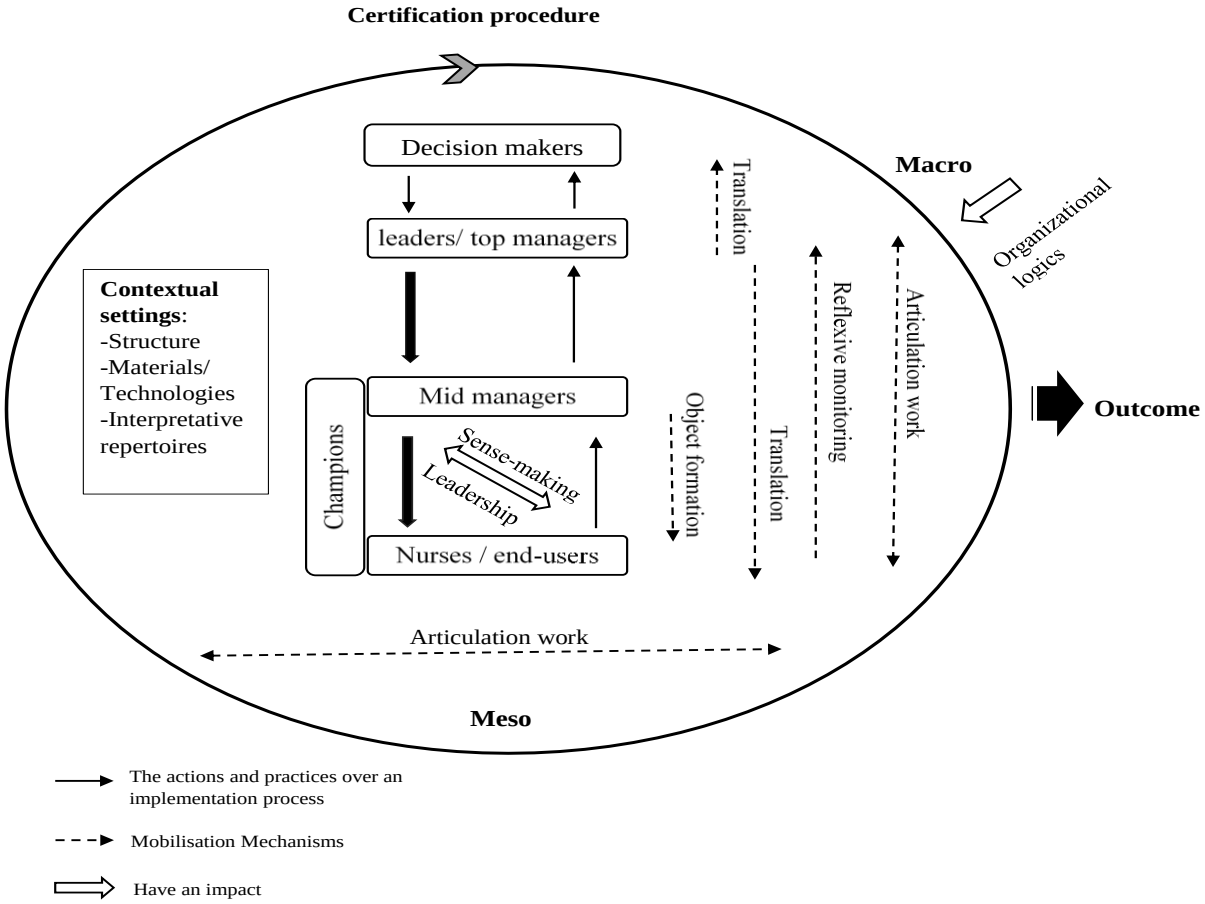

Figure 2. The proposed framework

Our framework (Fig.2) presents both levels incorporated into the implementation process; Macro and Meso levels. The Macro reflects healthcare systems by the organizational logics and the Meso reflects the organizational level which comprises the following core components; contextual settings: structure, materials, technologies, and interpretative repertoires. The actors implicated in certification implementation procedures are from different organizational levels. Champions are represented beside mid-managers and nurses levels because they emerge from both levels. The leadership approach and mobilization mechanisms shape interrelationships between the framework components including–object formation, translation, work articulation, reflexive monitoring, and sense-making. Solid arrow thickness reflects the importance of the implementation strategy type (top-down or bottom-up). The iterative aspect of certification is represented by the circle shape and the arrow which reflects the

continuity of this procedure. Finally, the outcome reflects the quality and safety of care provisions.

IV. Discussion

In this case-study, we expanded the understanding on the quality policy implementation in the activity system by developing an implementation framework for certification procedures in hospitals, at nurse level. The framework was constructed using a two- step mixed approach. In the first stage, the inductive analysis led to the identification of key elements for the certification procedures implementation. In the second, these elements were analyzed using two theoretical approaches the QIT and the TMT. QIT helps to capture the following framework components. First, the team in charge of certification procedures were characterized by a position and tenure diversity, which is considered essential criteria for a well-balanced and effective implementation team (Higgins, 2012). Although team members were changing depending on the implemented procedure, stability was always maintained in the roles. Second, elements related to a favorable organizational climate conditions, such as contextual settings, knowledge, resources, and material availability are fundamental for certification integration (Bergs et al., 2015; Mohamed et al., 2018). The administrative supports, such as policies and operational protocols are major facilitators of professional practice, in terms of actions and/or processes (Paina et al., 2019). The lack of any of these factors in addition to time, may constitute –according to interviewees- a major constraint hindering implementation of the desired change (Scholtes et al., 2017). Pettigrew *et al*., presents multiple contextual factors contribute to a strategic change (Pettigrew et al., 1992). Typically, a supportive organizational culture and individuals leading the change are locally

instrumental for the integration process (Marchionni & Ritchie, 2008). In line with this, our study showed that over the certification implementation process at the local level, the 'referent of action' played an essential role and it appeared they adopted the champion role. Champions may emerge during an implementation process, sometimes as part of an intervention, sometimes as part of an implementation strategy, and at other times not at all, i.e., they thrive in the implementation environment (Miech et al., 2018). They act as mediators between nurses and managers with a capacity to disseminate information and support mobilized actions (Mills et al., 2019). These champions - who are sometimes nurses - deployed, followed, monitored, and reflected peer experiences to improve change acceptability and sustainability. Due to their familiarity with the context, they identified the required contextual elements and local context readiness to deploy the desired changes (Soo et al., 2009). Thus, champions are key performers in the certification implementation process (Harper et al., 2019).

Other elements identified at the local level was the leadership approach (Guerrero et al., 2016) of proximity managers or the change leader (Geerligs et al., 2018). It allows an active engagement of nurses through a participative strategy used over the implementation processes (King et al., 2019; van den Oetelaar et al., 2016). In parallel, came the "sense-making" mechanism identified by the TMT. The possibility to experiencing a change feasibility by nurses and providing feedback on its organizational fits support the acceptability of implemented intervention in their practices (Anrys et al., 2019; Gill et al., 2019) and avoids resource wastage (Murphy et al., 2018). Change leaders and nurses must determine the pace and extent of change implementation and its feasibility within their service (Andreasson et al., 2016). A 'supportive leadership' approach used by the implementer (Andreasson et al., 2016) and a 'sense-making' mechanism both determine how professionals translate change

into practice, to meet desired outcomes (Allen, 2018b). Additionally, local managerial support of the implemented intervention was essential (Deschesnes et al., 2015). This emerges by communicating the needs and benefits of certification procedures with nurses and decision makers (King et al., 2019; Paina et al., 2019) under "translation" mechanisms (Allen, 2018a). Understanding the meaning and importance of change is an important precondition for successful implementation. This comes from the notion that nurses may perceive the implemented intervention as a threat affecting their routines, and thus they resist the change (Kirk, 2016) . In addition, the identified actions under the "work articulation" mechanism (Allen, 2018b), such as continuous communication between managers, and sectors over the implementation process was essential, It helps settle issues in confrontational situations (Paina et al., 2019). These key junctures relied a well on a shared culture and staff learning; they formalizing workflow trajectories and ensuring work harmonization and staff commitment, thus achieving effective implementation (Yagasaki & Komatsu, 2011). An on-going evaluation all over the implementation process, comes under a "reflexive monitoring mechanisms", was considered essential element. Champions and nurses feedbacks, as well as, formal evaluation systems such as auditing help monitoring the position of implemented intervention, enhance and adjust the process toward reach the desired outcomes (Geerligs et al., 2018; King et al., 2019).

Our research contributes to and extends understanding and knowledge on "how" and "what" influences the implementation of these quality policies in nurses' work. The dynamic aspect of contextual factors may impede implementation in one setting and facilitate it in another (May et al., 2016). Knowing these factors (González-María et al., 2020) and how they interrelate during an implementation process is essential towards an effective implementation at the activity level (May et al., 2014). This

framework goes beyond the typical perspective of a conventional framework (Nilsen, 2015) as it considers local context mechanisms which shape and guide an implementation process, this was facilitated using TMT components (Allen, 2018b). The framework shows how key attributes and elements from local contexts interacted via multiple mobilization mechanisms, reflecting the impact of local socio-material contexts (Waelli et al., 2016). An organization's life occurs throughout an 'entanglement' between the materials and the social context and the way the actor and artefacts 'entail each other in practice' (Breimaier et al., 2015). Characterizing and exploring the key elements and the socio-material context of an implementation allows implementers to consider a broader vision on what influences a successful implementation outcome. In line with this, our suggested framework characterizes certification implementation in a hospital. We presented how an implementation context is composed from both social and material elements, which interact together in a continuum rather than in a linear "pipeline" manner (Melo & Bishop, 2020).

Study limitations

Our study had several limitations. Firstly, in the interview guide, we included no direct questions which developed the different QIT components, but elements were retrieved from interviewee narratives and matched by the different action steps. This may explain the absence of some action steps from the analysis table. Secondly, some data may have been missed from nurse interviews due to extenuating circumstances; nurses had to interrupt interviews to check and respond to patients. This elicited brief responses and may not have adequately reflected their opinion. Thirdly, nurses were not observed and followed over long periods for certification preparation. Observations were conducted to determine the emergence of certification practices in daily workflows, and to investigate work organization and coordination between

proximity managers and nurses. Finally, because this was an exploratory study in one setting, our data cannot be extrapolated to all hospital settings.

V. Conclusions

We propose a framework which analyses and describes the implementation of certification procedures at nurse level. Our observations were generated using two different approaches; practical implementation science using QIT, and the TMT approach which is a sociological model derived from implementation science perspectives. TMT was highly beneficial in understanding the emergence of certification within the local context of nurse activities. It allowed us to identify interactions between nurses, managers, the implemented intervention, and the context. It went beyond the systematic framework, to the actual reality of activity system complexity. In the future, we will test this framework in national and international empirical studies.

List of abbreviations

HAS: Haute Autorité de Sante (French National Health Authority)

ISO: International Organization for Standardization

IQSS: Indicateur de Qualité et Sécurité des Soins (Healthcare quality indicators)

CQ: compte qualité (quality account monitoring tool)

EHR: Electronic Health Record

IDE: Infirmiers Diplômé d'Etat (Registered nurse qualification)

QMS: quality management system

GA: general anesthesia.

Declarations

Ethical approval and consent to participate

This study involved professionals and the content of activity, without patient involvement or human experiments. In France, this type of study does not require ethical approval from an ethical committee. The study was conducted in accordance with ethics in qualitative research guidelines. An administrative review and clearance convention was signed between the French School of Public Health and the teaching hospital prior to data collection. This convention defined the study period and the research activities conducted in the hospital, the convention is available under reasonable request. All participants provided oral confirmation and written informed consent before participating.

Consent for publication

This included consent to publish anonymous quotes from individual participants.

Availability of data and materials

Datasets (which include individual transcripts) are not publicly available due to confidentiality policies. However, they may be obtained from the corresponding author upon reasonable request.

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Competing interests

The authors declare no competing interests.

Author contributions

IS and MW conceived the idea. IS, with the help of MW designed the study. IS was principal investigator and performed observations, interviews, analyses, and developed the conceptual framework. IS wrote the first draft and collaborated with MW to generate the final draft. MW verified the analytical methods, proposed corrections, and supervised the overall research. Both authors provided critical feedback and helped shape the research, analyses, and final manuscript. Both approved the final version.

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Additional files

Additional file 1: Table analysis using the quality implementation tool (QIT).

Additional file 2: Table analysis using translational mobilization theory (TMT).

Additional file 3: Study reporting using the COREQ checklist.

VI. References

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Supplementary materials article II

Supplementary material 1

Table 1: results of analysis using the QIT (1)

Components	Action steps	Total: 8
1. Develop an implementation team	1.1 Decide on structure of team overseeing implementation	6
	1.2 Identify an implementation team leader	8
	1.3 Identify and recruit content area specialists as team members	8
	1.4 Identify and recruit other agencies and/or community members such as family members, youth …as team members	4
	1.5 Assign team members roles, processes, and responsibilities	7
2. Foster supportive organizational/ communitywide climate and conditions	2.1 Identify and foster a relationship with a champion for the innovation	6
	2.2 Communicate the perceived need for the innovation within the organization	8
	2.3 Communicate the perceived benefit of the innovation within the organization	8
	2.4 Establish practices that counterbalance stakeholder resistance to change	8
	2.5 Create policies that enhance accountability	8
	2.6 Create policies that foster shared decision-making and effective communication	8
	2.7 Ensure that the program has adequate administrative support	8
3. Develop an implementation plan	3.1 List tasks required for implementation	7
	3.2 Establish a timeline for implementation tasks	6
	3.3 Assign implementation tasks to specific stakeholders	8
4. Receive training and technical assistance	4.1 Determine specific needs for training and/or TA	4
	4.2 Identify and foster relationship with a trainer(s) and/or TA provider(s)	4
	4.3 Ensure that trainer(s) and/or TA provider(s) have sufficient knowledge about the organization/community's needs and resources	NM
	4.4 Ensure that trainer(s) and/or TA provider(s) have sufficient knowledge about the organization/community's goals and objectives	NM
	4.5 Work with TA providers to implement the innovation	3
5.Practitioner–expert collaboration	5.1 Collaborate with expert about factors impacting quality of implementation in the organization	NA
	5.2 Engage in problem solving	NA
6. Evaluate the	6.1 Measure fidelity of implementation (i.e., adherence, integrity)	5

effectiveness of the implementation	6.2 Measure dosage of the innovation	4
	6.3 Measure quality of the innovation's delivery qualitative aspects of program delivery (e.g., implementer enthusiasm..)	5
	6.4 Measure participant responsiveness to the implementation process	5
	6.5 Measure degree of program differentiation	8
	6.6 Measure program reach	8
	6.7 Document all adaptations that are made to the innovation	7

Table 1. The methodology of analysis according to the Quality Implementation Tool (QIT) was conducted by identifying the presence or absence of each components and their action steps in interviewees' narratives, mainly managers and top leaders. This is in terms of the implementation strategy of certification procedure and the key elements for successful implementation. The following coding was used in the analysis: present/ yes: **1**; not present/No: **0**; Not mentioned by interviewees: **NM**; and not applicable to studied procedures: **NA**. As final step an overall of 'yes' is presented in the following table for each action step.

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Supplementary material 2

Table 2: Results of analysis for certification implementation using TMT (1**)**

Components	Elements	"how of" within the studied hospital field
Projects **Institutionally sanctioned strategic activity**	**Project**	Certification procedure
	Sub project	Example: certification within digestive endoscopy sector
	Project actor	Quality management system / quality programme
	Intersecting project	Direct patient care, organisational work
Strategic action field **(teaching hospital centre)**	**Organizing logics**	The care quality and patient safety
	Structures	Different hospital departments, example digestive endoscopy sectors, care quality direction and health manager, executive manager, quality engineers, endoscopy steering commission, local managers, processes pilots, multidisciplinary professionals (doctors , nurses, care providers..), technicians
	Materials/technologies	Infrastructure of digestive endoscopy (with and without general anaesthesia, emergency), different machineries and caregivers' tools of patient care (new endoscope…). Patient electronic health records, informatics system
	Interpretative repertoires	Protocols and policies, procedures, meeting reports, action plan; documentation system: checklist HAS endoscopy; ecology paper, patient file; traceability endoscopy (paper and electronic format)
Mechanisms of mobilization	**Object formation**	Introduce the intended action, materials and/or interpretative repertoires supportive for the emergence of certification in wards, by the proximity managers or referents of actions to professional (mainly nurses), this is according to each sector action plan defined on the action priority by the top and proximity managers and professionals.
	Articulation work	Support and accompaniment of action, actions' referents roles (professionals), ensure regular and /or necessary formation and technical assistance for professionals, the presence of shared culture, the regular and on-going meetings over the process of implementation, between the referent of action and proximity manager, the steering committee and managers, departmental meetings especially for the cross-sectional care process or

	practices, quality meeting in each department. Multidisciplinary team work, nurse organizing work and coordinating with other professional.
Translation	The proximity managers and action referents communicate with nurses the perceived benefits and needs of the implemented action and certification procedure, as well as, top leaders ensure to diffuse the importance of the intended change over a certification between the different managers and decision makers. And present how it can meet the organisation vision and mission, in terms care quality and safety improvement and also for the public authority.
Reflexive monitoring	nurses' feedbacks during team meetings, and from the referents of action about the action feasibility and acceptability, the presence auditing system, the follow up of performance tables, Bord table, adverse events rate, morbidity, different indicators allied with the objective of action plan
Sense-making	The nurses' active engagement in the process of implementation, and nurses play the role of referent of action, nurses are implicated to redact and up-date protocols, nurses take the responsibility to carry audit in other departments, there are test phase for the action nurses responsible to give their feedback on the change implementation and how to improve to gain it sustainability.

Table 2. presents the results of analysis using the Translation Mobilisation Theory (TMT) (1). The methodology of analysis was conducted based on Operationalizing TMT table (2), the interviewees' narratives and supported by the observations and collected documents. The following table presents the core components of TMT which are: the project, the strategic action fields and the mechanisms of mobilizations, and their elements, and in third column how it was figured out from the experience of certification implementation within studied teaching hospital centre.

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Supplementary material: 3

Study reporting using COREQ checklist (1)

No	Item	Guide questions/description	Study reporting
Domain 1: Research team and reflexivity			
Personal Characteristics			
1.	Interviewer/facilitator	Which author/s conducted the interview or focus group?	The corresponding author
2.	Credentials	What were the researcher's credentials? *E.g. PhD, MD*	Registered Nurse “RN” and PhD student
3.	Occupation	What was their occupation at the time of the study?	Third year PhD student
4.	Gender	Was the researcher male or female?	Female
5.	Experience and training	What experience or training did the researcher have?	Experience in nursing profession, healthcare system and quality management. Training on methods and analysis of qualitative data; qualitative research methodology; articles redaction.
Relationship with participants			
6.	Relationship established	Was a relationship established prior to study commencement?	There is no relationship established prior to study
7.	Participant knowledge of the interviewer	What did the participants know about the researcher? e.*g. personal goals, reasons for doing the research*	Participants only know a general intention of the study which is understand the implementation process of certification procedures in the hospital. .
8.	Interviewer characteristics	What characteristics were reported about the interviewer/facilitator? e.g. *Bias, assumptions, reasons and interests in*	The interviewees were carried by the corresponding author. Nurses’ interviews were conducted in their working shift this may lead to shorter and incomplete answers due to their limited availabilities

No	Item	Guide questions/description	Study reporting
		the research topic	
Domain 2: study design			
Theoretical framework			
9.	Methodological orientation and Theory	What methodological orientation was stated to underpin the study? *e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis*	Study used an mixed approaches, inductive and deductive approaches The methodological orientation was according to content analysis using two theoretical approaches, the practical implementation sciences and a middle range theory Analysis were integrated and translated in an implementation framework
Participant selection			
10.	Sampling	How were participants selected? *e.g. purposive, convenience, consecutive, snowball*	Participants were selected in a purposive way, in the first step they have to be involved in the process of implementation of certification, in the second step only nurses were interviewed because we interested to study the nurse role are engaged in the process of implementation in their daily workflow. All interviews were carried after confirmation to participate in the study
11.	Method of approach	How were participants approached? e.*g. face-to-face, telephone, mail, email*	Face to face semi structured interviews,
12.	Sample size	How many participants were in the study?	Sixteen interviews
13.	Non-participation	How many people refused to participate or dropped out? Reasons?	No one
Setting			
14.	Setting of data collection	Where was the data collected? e.*g. home, clinic, workplace*	In the workplace at hospital
15.	Presence of non-participants	Was anyone else present besides the participants and researchers?	Participants were interviewed alone and in a private place generally

No	Item	Guide questions/description	Study reporting
16.	Description of sample	What are the important characteristics of the sample? *e.g. demographic data, date*	For nurses the average of experience is 9 years in theirs services and 43 years old. All have same qualification level of studies “RN”
Data collection			
17.	Interview guide	Were questions, prompts, guides provided by the authors? Was it pilot tested?	Interviews were conducted according to a semi structured interview guide. Tested on nurses out of the studied hospital
18.	Repeat interviews	Were repeat interviews carried out? If yes, how many?	No
19.	Audio/visual recording	Did the research use audio or visual recording to collect the data?	Yes, all interviews were recorded
20.	Field notes	Were field notes made during and/or after the interview or focus group?	After each interview, a brief notes were registered for the important emergent ideas
21.	Duration	What was the duration of the interviews or focus group?	Leaders and managers: 30-45 min Nurses: 20-30
22.	Data saturation	Was data saturation discussed?	Yes, interviews have been stopped, when their output reach a closing sense
23.	Transcripts returned	Were transcripts returned to participants for comment and/or correction?	No
Domain 3: analysis and findings			
Data analysis			
24.	Number of data coders	How many data coders coded the data?	coding data were used in limited part of the study, and was conducted manually by the corresponding author and revised by the co-author
25.	Description of the coding	Did authors provide a description of the coding	Yes the used code were described briefly in legend of table

No	Item	Guide questions/description	Study reporting
	tree	tree?	
26.	Derivation of themes	Were themes identified in advance or derived from the data?	themes were derived from the analysis of interviews
27.	Software	What software, if applicable, was used to manage the data?	Data were analysed manually on excel sheets
28.	Participant checking	Did participants provide feedback on the findings?	No
Reporting			
29.	Quotations presented	Were participant quotations presented to illustrate the themes / findings? Was each quotation identified? e.*g. participant number*	Yes, some of the participants quotations are presented in the manuscript to support the themes and findings, and it identified according to the professional respondent according to a defined acronym and a sequence number
30.	Data and findings consistent	Was there consistency between the data presented and the findings?	Yes there was a consistency between the emergent themes, the used tools and the findings are translated in an implementation framework
31.	Clarity of major themes	Were major themes clearly presented in the findings?	In the discussion part of the study while presenting the developed framework
32.	Clarity of minor themes	Is there a description of diverse cases or discussion of minor themes?	Not applicable

Table. Presents the study report using the "Consolidated criteria for reporting qualitative research" COREQ checklist (1), we added a new column to the 32 item checklist and in which we answered about our study, the guide questions which described each item from the checklist.

Reference

Allison Tong, Peter Sainsbury, Jonathan Craig. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups, *International Journal for Quality in Health Care*, Volume 19, Issue 6, December 2007, Pages 349–357

The output of article II is summarized in Box II.

Box II. Principal findings and perspectives.

- This study expands the knowledge on the factors impacting implementation processes of certification procedures praticurlay and innovations generally into nurses' practices. It suggests an **implementation framework** that combines between the **systematic factors** and the role **of local socio-material context**.
- This framework consists of three major **strategic elements** (actors, contextual settings and leadership approach) **involved** in implementation processes at different **organizational levels,** and five **mobilization mechanisms that shape** the **interrelationship**s between the framewok's components during implementation processes.
- This study helps to understand the **emergence of certification procedures** within healthcare organisations and sectors using the **Translation Mobilisation Theory** and presenting how **actions are embedded in nurses' workflow.**

⇨ We need to apply the "**Integrative Framework for the Implementation of change in Nursing Practice (IFINP**)'' in different contextual settings in order to assess its generalizability and understand the relationship between strategic and social-material factors according to different organizational contexts.

"What is research but a blind date with knowledge?"

- Will Harvey.

Chapter III: Assessment of the Integrative Framework for implementation of change in Nursing Practice: a comparative case studies in French hospitals

Preamble

In the previous chapter we developed the Integrative Framework for the Implementation of change in Nursing Practices (IFINP). However, our major concern was whether the IFINP can be useful in other contextual settings. Merely developing a framework will not garantee its generalizability and utility in other organizational conditions. Is the IFINP flexible enough to capture the processes of implementing quality initivatives, in other types and sizes of organization and in other types of sectors? Are the components of IFINP applied to other implementation initiatives in nursing practices? How are the IFINP components interrelated in other implementation contexts?

Many questions have been identified to assess the developed framework. In this chapter we outline article III: in this article we tested and assessed the IFINP. This was based on a comparative qualitative case study in three French hospitals different in size and type and also on the experience of certification procedures implementation in three different sectors.

Article III

Assessing the Integrative Framework for the Implementation of Change in Nursing Practice: Comparative Case Studies in French Hospitals

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Research

Keywords: implementation, Integrative Framework for Implementation of change in Nursing Practices, strategic level, socio-material factors, interferences, mechanisms of mobilization, leadership, local managers.

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Assessing the Integrative Framework for the implementation of change in Nursing Practice: comparative case studies in French hospitals

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Competing interests

The authors declare no competing interests

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Declarations

Ethical approval and consent to participate

This study involved professionals and activity analyses, with no patient involvement or human experiments. In France, this study type does not require ethical approval. The study was conducted in accordance with ethics in qualitative research guidelines. All participants provided oral confirmation and written informed consent before participating.

Consent for publication

This included consent to publish anonymous quotes from participants.

Availability of data and materials

Datasets (which include individual transcripts) are not publicly available due to confidentiality policies. However, they may be obtained from the corresponding author upon reasonable request.

Assessment of the Integrative Framework for implementation of change in Nursing Practice: a comparative case studies in French hospitals

Abstract

Background: Quality improvements initiatives require often changes in professional practices and care processes. Implementing these into routine nurses practices is challenging and outcomes can be unpredictable. Multiple research was conducted to effectively implementing a change in clinical practice. Either by identifying barriers and facilitators impacting change implementation e.g. leadership, culture, technical resources which are common factors from an organization to another. Or by investigating the impact of local context of work on the implementation process such as the imbrication of social and material factors in appropriation processes. However, it seems that considering both approaches is essential for effective implementation. In these perspectives we developed in a previous research the Integrative Framework for Implementation of change in Nursing Practices IFINP based on the experience of certification procedures implementation in a French hospital. In this study we aimed firstly, to assess the framework's adequacy to study other organizational settings. Secondly, to understand the relationship between strategic and social-material factors of implementation.

Methods: This study relied on comparative qualitative case studies for certification procedures implementation in multiple organizational settings. Data collection was based on semi-structured interviews with managers and nurses in three French hospitals, which were different in size and types. All narratives reflecting actions and

interactions identified in certification procedures implementation processes were extracted and analyzed deductively using the IFINP components.

Results: The framework was flexible and useful to capture the different actions and interactions identified in participants' narratives for certification procedures implementation processes in the three studied cases. A strong interference was revealed between the mobilization mechanisms as well as, with strategic elements. Interference was seen mostly between 'reflexive monitoring and work articulation', and reflexive monitoring and sense-making' mechanisms. This, reflected the non-linear fact of implementation processes. Leadership was integrated in the different mechanisms especially in translation. Reflecting the importance of change leader role in translating change in terms of practice. This helped to understand the content of leadership factors in terms of activity to consider in implementation processes.

Conclusion: The IFINP helped to understand the content of strategic elements and their relationship with the social and material factors of implementation. Therefore, we advocate the IFINP as useful framework for managers to support implementation initiatives in nursing practices.

1. Introduction

Over the past decades, healthcare policies and reforms have constantly evolved to improve efficiency and benchmarks for cost-effectiveness and quality of care (Wardhani et al., 2009). Multiple external quality control procedures have been implemented to ensure quality and safety of patient care (Heaton, 2000). Implementing such quality initiatives is pivotal issue, firstly due to the complexity of healthcare systems (Strehlenert et al., 2019). Secondly, healthcare providers often feel disconnected to top-down decisions, as they consider these quality initiatives as being

imposed on them (Brouwers et al., 2021). For instance, although quality improvement (QI) initiatives are increasingly adopted in healthcare organizations (Allen, 2019; Jeffs et al., 2013). Often they lead to sub-optimal outcomes in healthcare (Akmal et al., 2021). An effective implementation of these initiatives is associated with positive patient and staff outcomes and enhances care cost-effectiveness (Geerligs et al., 2018). However, the failure of such implementation may have a serious impact, causing additional workloads and increased staff burden (Grimshaw et al., 2004). Previous research reported that anxiety toward integrating innovations in practice is a common concern (Rasmussen et al., 2015). Implementing such changes into routine practice is recognized as challenging and its outcomes are unpredictable and uncertain (McArthur et al., 2021). As a consequence, researchers have investigated how to effectively implement change into clinical practice (Beauchemin et al., 2019) by identifying factors may impact implementation processes, and using models, theories, and frameworks (McArthur et al., 2021; Orr & Davenport, 2015).

In literature, the subject of implementation was studied in two perspectives. The first has been drawn primarily on strategic approach. This identified wide range of transversal factors and implementation strategies which can be applicable across multiple clinical settings such as leadership, culture, resources and others (Eccles et al., 2009; Proctor et al., 2013). In addition to the multiple frameworks, models and theories which were developed in these perspectives (Mitchell et al., 2010; Nilsen, 2015) such as (Damschroder et al., 2009; Rycroft-Malone, 2004). The second, has adopted a perspective approach centered on the activity level. This was interested to the local social-material context and its impact on implementation processes (Allen, 2013; May et al., 2016) and how it is essential in addition to clinical manager's role to earn quality improvement results (Waelli et al., 2016). Andreasson et al., suggests a

potential risk of failure in implementing such a change in care processes decided by top management, given the gap between the strategic and the operative levels in hospitals (Andreasson et al., 2016). Previous researches indicated that bridging the gap between strategic and activity levels depends primarily on the role and ability of clinical managers to translate and adapt the intended change to the local context (Birken & Currie, 2021; Waelli et al., 2016). As described in the theory of middle managers' role "middle manager commitment to innovation implementation operationalized as four ways: 1. obtaining and diffusing information about an innovation; 2. adapting information and the innovation; 3. mediating between strategy and day-to-day activities; 4. selling innovation implementation'' (Meza et al., 2021). Considering both facilitator factors related to the work settings (González-María et al., 2020) and the dynamic aspect of local context, as well as how they are interrelated during implementation processes is essential towards an effective implementation at the activity level (May et al., 2014). However, generally these were addressed separately, as if there is one level for strategic and in parallel another one to understand activity system. It seems interesting to address both in an integrative framework, simultaneously useful to manager to identify strategic level and allow to consider specificity and analyze the local context of implementation. For example how a leadership factor is operationalized in implementation processes and regarding the overlapping reality of an implementation contexts. In these perspectives, in a previous research we have developed a framework for the implementation of innovations at nurses' level (Salma & Waelli, 2021), namely the Integrative Framework for Implementation in Nursing Practice (IFINP). The framework relied on an inductive analysis for certification procedures implementation in a teaching hospital case study and a deductive analysis using two theoretical approaches: the

Quality implementation tool QIT (Meyers et al., 2012) and the translational mobilization theory (Allen, 2018). In a context of implementation frameworks growing number and limited studies to asses these promising approaches (Mitchell et al., 2010), in addition to the differences in implementation context local specificity. We aim in this study firstly, to test the IFINP using the example of certification procedures in other case studies. This in order to identify the ability of framework components to capture implementation processes in multiple organizational settings. Secondly, to understand the different relationships between strategic element and the social and material factors of implementation context.

2. Materials and Methods

2.1. Choice of Certification procedures

In this study we consider the subject of certification procedures implementation to test the framework as it meets its perspectives. In addition, the certification is a mandatory procedure for both public and private health organizations (Holcman, 2015). This is useful for exploring multiple types of organizations. Also, the implementation of certification procedures remains a pivotal managerial issue in terms of preparation, implementation, and sustainability in professional routine practice (Duval, 2017). Given, the multiple requirements imposed by this procedure in terms of care processes auditing and best clinical practices guidelines (Allen, 2019). While, it is seen as workloads for professionals, primarily nurses (Myny et al., 2012), it is essential to improve care quality and patient safety (Hesselink et al., 2016). Thus, it seems interesting to examine the usefulness of framework in understanding how different contexts deal with certification procedures integration into routine practices.

2.2. Study design

This study relied on comparative qualitative case studies. A case study allows researchers to examine a phenomena in the 'real life' context (Houghton et al., 2013), such as understanding the implementation of interventions in the healthcare systems (Crowe et al., 2011). The used approach allows to understand and explore the studied phenomenon from different perspectives "Through case-by-case comparisons, the analyst fine-tunes, modifies, and qualifies the propositions so that they express precisely the limiting conditions revealed by the pattern of findings across all cases" (Greene & David, 1984)

2.3. Study location

In order to test the framework in different organization types and contexts, and to identify the impact of local context on implementation process, we selected two other hospitals, distinct by the size, types and status located in western France. In addition, the framework was developed based on the experience of implementation procedures in high risk sectors, in this study we have decided to study another type of sector in the previous teaching hospital center (Salma & Waelli, 2021), as presented in Table 1.

Table 1: hospitals' characteristics

Hospitals	**A**	**B**	**C**
Type	Teaching hospital center	hospital center	hospital center
Size in beds	924	991	450
Status	Public	Public	Private
Selected Sites	Medicine	Medicine Reanimation Endoscopy	Medicine Palliative care Operation room

2.4. Data collection

Data collection was based on semi-structured interviews with relevant actors in the implementation of certification procedures. We were unable to conduct an observation period in the sectors due to COVID -19 sanitary crises.

Interviews

Multiple actors on different organizational levels are involved in the implementations of certification procedures. Thus interviews were conducted with participants from different hierarchical levels. Which helped to provide an in-depth insight on the different experiences and role of each actor in each local context, and thus better understanding multiple facets of the different factors impact certification procedures implementation processes (Nyanchoka et al., 2019). Interviews were conducted until reaching 'data-saturation' concept in each hospital case. This means the interviews were conducted until the new output give non-essential data in terms of study objective (Moser & Korstjens, 2018). In order to avoid bias in results concerning a directed answer in terms of framework components, the interview guide was general. The interview discussed the process of implementation of certification procedures at the level of nurses' activity, the elements contributor to effectively integrate the changes imposed by these procedures into nurse's daily practice. Interviews were

conducted by the PI IS, either directly in face to face or via an online zoom meeting according to the hospitals' regulations and participant's preference. Table 2, shows participants at each hospital.

Table 2: Study participant numbers and their roles

Hospitals	**A**	**B**	**C**	**TOTAL**
Top leaders (TL)	4	3	2	9
Mid manager (MM)	2	4	3	9
Registered nurses (RN)	3	7	5	15
TOTAL	9	14	10	**33**

A total of 33 semi-structured interviews were conducted in the three studied hospitals. To ensure participants anonymity, interviews were sequentially numbered as they occurred using an acronym based on roles in the implementation process and studied context; TL; top leader, MM; mid-manager, and RN; registered nurse. A, B or C according to the studied case.

2.5. Data analysis

The theoretical framework

This framework was developed to understand the implementation of innovations at the level of nursing activity in French hospitals (Fig.1). This was based on an inductive analysis of teaching hospital center case study and a deductive analysis using two theoretical approach the Quality implementation tool QIT (Meyers et al., 2012) and the translational mobilization theory (Davina Allen, 2018). The framework distinguishes two types of key components in the implementation processes of certification procedures. First, the contextual settings considered as strategic elements e.g. actors, organizational logics, leadership, structure, materials, technologies, and interpretative repertoires. Second, the mechanisms of mobilization which encompass the actions, practices and interactions these elements. The framework presents five

mechanisms: the object formation, translation, sense-making, reflexive monitoring and work articulation. These mechanisms shape and guide implementation processes, thus reflect the role of local social-material factors (Salma & Waelli, 2021). The framework presents how an implementation context consists of both social and material elements interacting together in a continuum rather than linear 'pipeline' approach (Melo & Bishop, 2020).

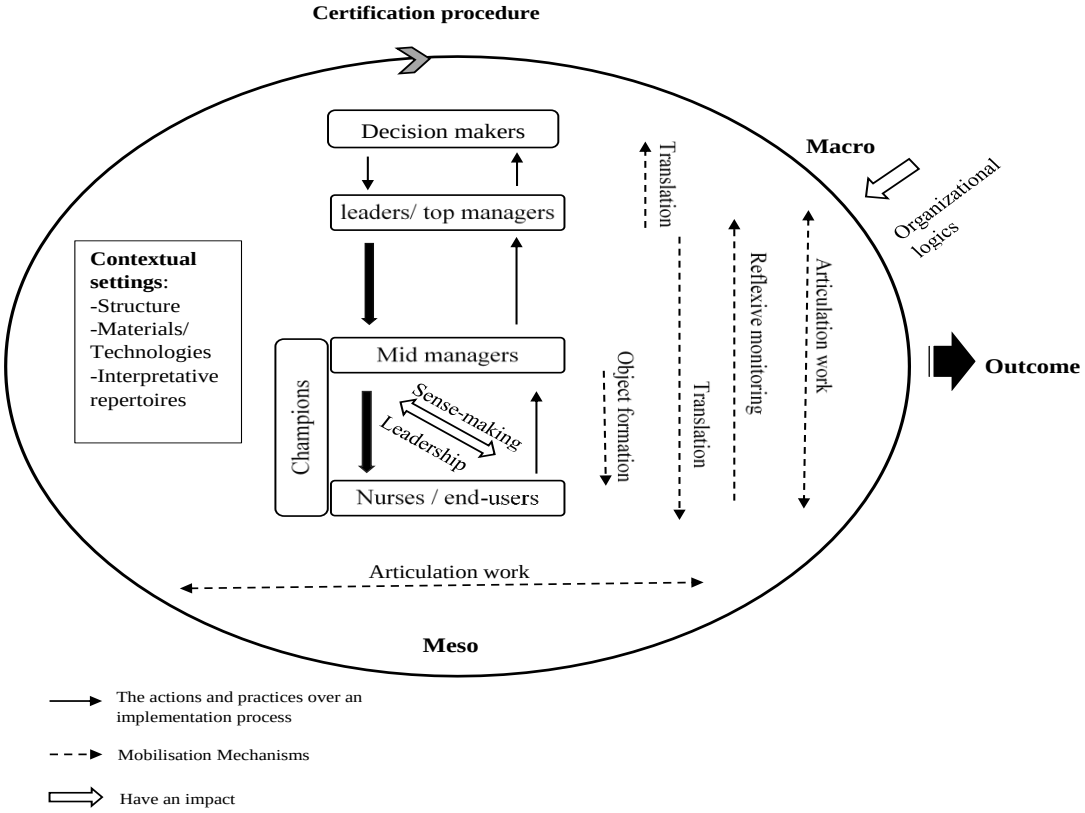


Figure.1 The Integrative Framework for Implementation of change in Nursing Practices (IFINP).

IFINP facilitates the implementation of innovation into practice. It identifies different macro and meso levels during an implementation process. Macro levels reflect healthcare systems. Meso levels reflect organizational levels which consist of contextual settings and actors involved in certificate implementation processes at different organizational levels. Mobilization mechanisms also include object formation, translation, work articulation, reflexive monitoring, and sense-making. These shape interrelationships between framework components. IFINP also identifies the leadership approach of change leaders at local levels (champions and/or local managers) (Salma & Waelli, 2021).

Data coding

All narratives reflecting the subject of certification procedures implementation processes such as actions, interactions, key factors and contextual settings and others, have been stored in separated tables according to each hospital. These narratives were then used in the second step and deductively analyzed using the elements of framework which was presented in table format (table 3) for the study perspectives. To ensure analysis credibility, both authors conducted a simple test on a first time. This test was in order to characterize and stabilize categories and define inclusion and exclusion criteria. Authors proceeded separately on a coding for a narratives' sample (n=30) according to the literature previous definition presented in table 3. This was followed by discussion session about sample coding results, to frame each category and precise inclusion and exclusion criteria. Then, the PI (IS) proceeded on narratives coding. The study reporting guideline was based on consolidated criteria for reporting qualitative research (COREQ) (Tong et al., 2007).

Table 3: Definitions of IFINP components based on the previous literature (Allen, 2018; Miech et al., 2018; Guerrero et al., 2016)

	Elements	Definition
Mechanisms of Mobilization	Object formation	"practices that create the objects of knowledge and practice and enroll them into a project"
	Translation	"practices that enable practice objects to be shared and differing viewpoints, local contingencies, and multiple interests to be accommodated in order to enable concerted action"
	Sense-making	"practices though which actors interpret, order, construct and account for projects and at the same time produce and reproduce institutions"
	Reflexive monitoring	"practices through which actors evaluate a field of action to generate situational awareness of project trajectories"
	Work articulation	"practices that assemble and align the elements (people, knowledge, materials, technologies, bodies) through which object trajectories are mobilized within projects"
Contextual elements	Organizational logics	elements which provide a set of normative conventions that define the scope of possible action, and shape its purpose
	Structure	elements that stratify social relations for example, social roles, divisions of labor, professions, hierarchies, departments, units, teams);
	Materials and technologies	elements that provide agents with the physical artefacts to support their practice for example, tools, technologies, bodies, knowledge;
	Interpretative repertoire	Elements that provide agents with the cognitive artefacts for sense making or example, classifications, scripts, categories, discourses, routines.
	Implementation leadership	"strategic approach characterized by influencing behaviors to promote success in implementation"
	Champions	'Key actors may emerge during an implementation process, sometimes as part of an intervention, sometimes as part of an implementation strategy, and at times neither'

2.6. Research ethics

This study involved only professionals without patient involvement or human experiments; in France this type of study does not require an IRB authorization as it is understood in the United States (Dariel et al., 2014). According to "Jarde law" L1121-1 PHC three types of study involving human require an ethical approval from an ethical committee: interventional studies, studies with minimal risk and

intervention, and non-interventional studies (in the usual context of patient) (LOI N° 2012-300 Du 5 Mars 2012 Relative Aux Recherches Impliquant La Personne Humaine (1), 2012). Additionally, according to the ethics in qualitative research guidelines (DiCicco-Bloom & Crabtree, 2006), a signed consent was gained from all participant and all interviews were conducted in private place in comfortable and informal settings. Participants were free to participate in the study. Also, all interviewees and interview transcripts were anonymized and assigned acronyms.

3. Results

Firstly, all interviewee narratives reflecting actions and elements in certification implementation procedures were captured by the framework (Table 4). IFINP categories described emergent issues at all sites (Cases A, B, and C) and sectors in the same hospital, whether general medicine, ICU, and interventional sectors (endoscopy and the operating room). Thus, the framework recognized the mobilized implementation elements, actions and interactions for the implementation of certification procedures into routine practice.

Table 4: Analysis of the three studied context using the IFINP components.

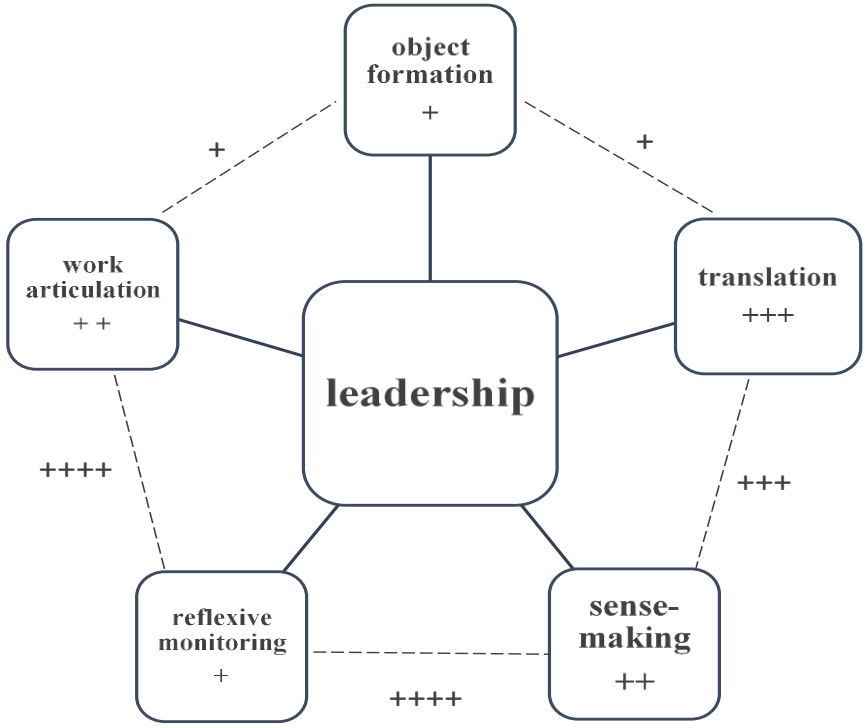
	Elements	A	B	C
Mechanisms of Mobilization	**Object formation**	'often it is our manager that alerts us to a change in protocol' RN2	'We prepare our action map according to certification requirements. Also, all the identified risks are objectified and we define our corrective actions. These are integrated into our quality care action plan' TL1	'We put the new document on the online document management system, in order to be accessible for all professionals. We diffuse an information that it is implemented. Then each local manager is responsible to diffuse the information to their teams and implement the document' TL2
	Translation	'As a local manager we are regularly obliged clarify the interest of new procedure to professionals, why we do it, for what purpose. It is not because we write or adapt the procedure to service it will be implemented!' MM2	'we have to explain for nurses that, what they are doing in terms of certification procedures is beneficial for patient care and to improve their work, even if it is perceived as additional traceability or work' MM1	'we have to clarify that the new procedure has an interest for them and for the patient, they must find a benefit which will help change their habits a little' MM2
	Sense-making	'Nurse are involved in the implementation process. In fact, I can't do it alone, because I don't know all about their daily difficulties. I think they will be much more precise in the finesse of things, that it is why they must be engaged' MM1	'The fact that we are not directly imposing a solution but involving them (nurses) in the debate during the preparations for implementation, is major facilitator to integrate changes into their routine, I think' MM2	'In fact to write a procedure with professionals can guarantees a better appropriation. For example, bring them to reflect on their practice and work with us on the improvement possibilities gives sense to their practices' TL2
	Reflexive monitoring	'For a new protocol we have to adapt it and use it. Once we get used to it, we evaluate after that we readjust, readapt and reevaluate what is blocking or the things that are not coherent' RN1	'At times we will have some lack, one of things that we are going to implement do not necessarily fully integrated. The feedback of services will alert us on problem. And sharing professional experience and feedback to enrich services on others previous experience, so that they do not relive the same problem' TL2	'we have to report a malfunction in terms of the implemented changes, and also questioning the quality department, so this implemented changer can be readjusted' RN1
	Work articulation	'sometimes we have to go to training to learn gestures or understand why we make a gesture in such and such a way, here we discuss between us about the new change and also we exchange	'every week there is a staff meeting in which we explain, observe, evaluate and analyze, so that teams can appropriate more' MM1	'the quality department analyzes and then following the degree of feedback, we can organize a meetings to point out the concerns that we encounter to adjust' RN1

		information' RN2		
Contextual elements	**Organizational logics**	'Really it depends on an organizational culture of quality and patient safety, it's all in that spirit' MM2	'I think it's a culture, the Culture of improving care facilitates the implementation of certification procedures' MM1	'we have to boost the culture of the quality approach between professional, which is quality and risk management culture' TL1
	Structure	'We are supported by the quality unit for the implementation of quality policies. The unit defines the working plan at different levels' MM2	'we have to create a steering committees with all the departments, all the wards heads, the pole managers to be able to discuss all the themes in order to start organization' , TL2	'there is members of the management committee or wards executives, thematic referents, different bodies the CLIN* the CLUD*, we have professionals who can be nurses or other professionals' TL2
	Materials and technologies	'first, we must have the materials in our disposal, which is it necessary to implement a new procedure' RN2	'We conduct always an analysis of the situation, we review we have and potential resources that we can have, and also we work with the concerned people' MM2	'Usually the procedure is created, often it is by a higher level it means the direction. we have our informatics system in which all our protocols are grouped together' RN5
	Interpretative repertoire	'For example we have a protocol file in the department, in which is identified how to conduct a such and such care, it means the working process of care that should be followed' RN2	'We already have tools supporting the implemented changes. For example on the computer there is a folder for the recent information, we also have an information file. I use these sometimes for certain protocols' RN1	'We have an administrative support for our protocol, and we know that we can refer for information in there. I think, this, helps a lot, not only to go have all the information supporting our practice but also to be up to date' RN5
	Implementation leadership	'The proximity manager it has a central role in the appropriation of caregivers to change, by their functioning mode... as proximity manager, I think I am really in the loop, we go within the teams and we identify main elements and barriers, and we try to find solutions' MM1	'We support them (nurses) on their knowledge and competence, their own current resource, In fact we listen to their need for supervision, and support then on their own practice' MM2	'I am there in pilot of certification. I actually organize the dispatching of certification themes of different actors, and I ensure the proper follow-up and the good timing with the other pilots in charge of the in implementation at the activity level' TL2
	Champions	'The nurse 'referent' participates in the implementation process in the concretization in the drafting of the quality approach, she can also give ideas, but this is more by the quality unit and managers' MM2	'I was hygiene referent, I was like an interlocutor of the hygiene cell of the hospital, in fact as hygiene referent I have lot of organizing role, for example when the hygiene protocols change we informed the team, put the change in file of information' RN1	'but all nurses are concerned in the implementation of certification procedure, however you have motor nurses who are generally the specialist referents and then others who follow more or less voluntarily' TL1

*CLIN: nosocomial infection control committee; * CLUD: committee for pain relief and control

Second, results indicated an overlapping aspect of the framework elements. Multiple participants' narratives showed a shift and interference between two or more mobilization mechanisms as identified in participants' narratives. As well as, between strategic elements and the mobilization mechanisms (supplementary material 1). Interview analysis showed that imbrications were mostly seen between both 'reflexive monitoring & work articulation' and 'reflexive monitoring & sense making' mechanisms in all the studied cased. However, the object formation mechanism was seen only but weakly associated to translation mechanism in comparing to others. Some narratives reflected an association between multiple mechanisms and sometime with contextual elements. For example, in "*so this impose to do reminders, at this moment we take advantage of the meetings to explain them the interest here is, also we work with the quality unit that alert us from time to time on the feedback, we also do audits which allows us to evaluate where we are" CTL 1* reflected the shift between translation, reflexive monitoring and work-articulation. And in *"the objective of having referent is to improve their skills and train them by giving them the methods and tools in terms of quality and risk management, evaluations or RMMs, whether it is the certification procedures, the manual, administrative support, things like that, to be able to decline and introduce the information and accompanied it" BTL2* reflected the leadership of referent through reflexive monitoring and work articulation mechanisms. In addition, the leadership factor was associated multiple times with each mechanism, but strongly interfered with the translation mechanism. Narratives analysis distinct between leadership at the higher level generally interfered with the object formation mechanism *"for the quality procedures we are very accompanied by the quality unit of our organization, which tells us what we should have to do at each level" AMM 2.* And leadership at the local level, the leadership of

proximity manager or/and referent. *"we set up a training so that they have the necessary qualifications, we have put everything in place so that it passes and integrated, all the elements were ready, in terms of procedural material documents and so that when it introduced we have all to ready to be in place" BMM2*. Given the dynamic aspect of implementation context it is essential to look out the box of barriers, facilitators and key elements for implementation processes, to see how is operationalized a strategic element such as the leadership factor within the local context and identify how they are interrelated Fig. 1.



_ _ _ _ : Intra-interference of mobilization mechanisms

_____ : Inter- inference of leadership and the mechanisms

+: The interference level

Figure 2. General representation of interference on mobilization mechanisms and leadership elements.

The + signs represent interference levels and dashed lines represent intra-interference mechanisms. Full lines represent the inter-interference of leadership and mechanisms.

The following section presented a stratified comparison of the three studied cases in terms of identified overlaps of mechanisms of mobilization and the leadership example.

Object formations and Translation with the leadership factor.

An object formation reflects the primary mobilization of certification procedures within the organizations. Analysis showed a similarity between the three studied contexts in terms of practices for the primary mobilization of certification procedures Table 5. Generally, top leader, mid managers, specialist and steering committee set an action plan based on certification criteria as well as departments evaluations. The action plan defines objectives and actions for each department. All information regarding a procedure or an action are diffused by manager or using informatics system accessible to all professionals. At nurses' level, referent or local managers are in charge to transmit procedures and changes either during meetings or by email and documents. Both took the responsibility to identify the preparedness of local context to change. The object formation is accompanied by translation mechanism. The adoption of procedure must be entangled to an explanation of the interest of these procedures. At higher level, by explaining 'why and what they should do' to introduce procedures at each level. At local level, through the needs and benefits and the interest of procedure in terms of patient care, which the core value of nursing profession. This depends strongly on the leadership of proximity manager or the leader of change at the local level to use formal and informal strategies to support and giving meaning to the implemented changes. Such as reminders in regular meeting or directly with professional.

Table 5: Site (A, B, and C) comparisons of object formation and translation mechanisms and interference with the leadership

Mechanisms	A	B	C
Object formation	'We have a map of our actions which is an action plan' *MM1* 'Usually there are referents for these protocols, for example the referent of hygiene who gives us the information, or also the diffusion of information could be by our local manager, either directly or during team meetings' *RN 1* ***(leadership)***	'There were working groups for each theme, in which we set what is needed to be formalized from what is missing, with an action plan. and we follow-up this action plan' *TL2* 'In general, an email is sent to our manager, then she diffuse the information for us' *RN1* ***(leadership)***	'Based on the certification criteria we conduct evaluations, for example an assessment is currently ongoing based on the requirements, or new criteria and will be defined our action plan based on it' *TL2* 'often we have little info files diffused by our manager for us for example there was a new protocol for the pharmacy software it presents all details even the small information'*RN4* ***(leadership)***
Translation	'For the quality procedures we are really very accompanied by the quality unit of our organization, which tells us well what we would have to do at each level' *MM2* ***(leadership)*** 'it's an organizational culture of quality and patient safety, it's all in that spirit…We explain to them that we write it in order to ensure optimal patient care in order to secure his care' *MM1* ***(leadership)***	'It must be explained for what and why , and above all it should really improve things in our work' *RN2* 'But for nurses it (certification) seems too far in terms of patient care. So it was essential that we do some communication work, to properly explain because there is a lot of acronyms' MM3 ***(leadership)***	'Well this requires to do reminders. It's at meeting times we take the opportunity to explain to everyone the interest of these procedure' *TL1* ***(leadership)*** it's often a big job of translating the HAS requirements for professionals, that's the big difficulty every time in fact, I have to explain how concretely it is translated into routine care … it is necessary each time, to come back and retranslate the requirements' TL2 ***(leadership)***

Sense making, reflexive monitoring and work articulation with the leadership factor

Disseminating information, and explaining procedures interests will not guarantee an effective implementation, it must make sense for professionals as well *"we can write it, we can explain it, we can tell them now we have to implement this, but after that the nurses must understand it and above all applies it to be effectively implemented" AMM2.* Analysis showed multiple strategies used by managers to make sense of the implemented procedures in nurses' practice (Table 6). Primarily, they insisted on professionals' implication and from the beginning of process. Implication differs from an active engagement in the development of procedure and the writing of procedure

as identified (case A and B), to an implication in organizing interventions, giving feedback and their opinion in terms of adopted procedures (case C) narrative possible. Ensure an accessible administrative support for professional either on informatics system or paper documents is essential as well e.g. working procedure and policies. It considered as reference for professionals' practices. In addition, interviewees emphasized on pilot test period when it is possible. This allows professionals to live and experience the change feasibility, readjust and adapt according to local context reality and thus accept it and using it.

There was a similarity in terms of monitoring and evaluation methods used in the three cases (Table 6). They distinct between formal ways such as auditing system, indicators, professional practices evaluation, adverse events. And the informal way through the local leadership professionals' feedback in terms of procedures feasibility which relied on majorly on the local leadership. Nurses' reflected these feedbacks either directly to local manager and referent or during teams' regular meeting to evaluate the procedure and discuss concerns. This interferes not only with sense-making mechanism but with the work articulation mechanism as well. A continuous monitoring is fundamental to take corrective actions and improve procedures integration which involved in work articulation mechanism. The ability to conduct continuous and regular meeting, and communication between actors on the multiple organizational levels, allows actors to readjust, adapt and formalize trajectories of change.

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Table 6: Site (A, B and C) comparisons for sense-making, reflexive monitoring, and work articulation mechanisms with the leadership

Mechanisms	A	B	C
Sense making	'We write the procedure with nurse especially, or we will really write the processes and then she is in charge after to implement it. we need her to participate in the development so that he can then deploy and use them' *MM2* ***(leadership)*** 'there must be documents or something to describe the procedure, as support' *RN1*	'so absolutely nurses are involved but in the writing of procedure itself they are not necessarily in, where they have a little more autonomy it is in the 'CREX' for example or there they are more in analysis and evaluation' *MM1* ***(leadership)*** 'when we are in a test process, it's much easier for teams to continue and understand the process even we are a pilot service, so here it is much easier to resume this with the teams, and to be able to continue' *MM2*	'to write with the professionals themselves guarantees a better appropriation since we push professionals to think about their practice and to work with us on the improvement of their practice' *TL2* ***(leadership)*** 'it is about working together, creating working group, and a dynamic involvement of professionals, which allow better understanding of what we have to do for effective implementation' *TL1*
Reflexive monitoring	'In fact, as an objective evaluation we use of the patient tracer, audits, professional practice evaluation etc. It must be integrated in their (nurses) practice to have a good feedback, and then there is their satisfaction also' *MM1* ***(leadership)***	'Once they report a limit for example the protocol is not suitable because there is an infrastructure problem and it must be corrected from an architectural view, or the architecture is adapted' *TL1* 'It's about nurses' feedback in their daily's, backwards and forwards, or sometimes by feedback from adverse events or indicators and other' *MM2*	'There is the audit, also the feedback of professionals as informally, the quality indicators every month. monthly indicators to see and evaluate by items (elements of certification)' *MM2* 'Often information is reported directly in oral to our manager, or sometimes by an adverse event sheet that allows you to declare problems , it allows you to review, it allows to reassess a little' *RN5* ***(leadership)***
Work articulation	'We can implement quality procedures by being in working groups discussing care improvements in the routine practices' *MM1* ***(leadership)***	'It is the analyze of daily feedback which continue to feed this action plan to set corrective actions to pursue new objectives ' *MM2* ***(leadership)***	'there are requirement we have to respect but in practice sometimes we cannot necessarily, it is benefit of these exchanges that we can evolve and improve' *RN4*

4. Discussion

This study aimed to test the IFINP based on a comparative case studies for certification procedures implementation in French hospitals.

First, it showed the flexibility of framework aspects to capture the reality of implementation processes of certifications procedures in a multiple settings of French healthcare organizations. The IFINP has successfully enclosed the different actions and interactions between the actors, context and implemented procedures regardless to the type of sector or the hospital type and size. This gives a formal aspect for the

usefulness of framework to understand the mechanism by which individual and organizational contexts affect the integration of innovation in nursing practice within organization (Mitchell et al., 2010).

Second, this study revealed a strong interferences of the framework aspects in implementation processes. Repeatedly, participants' narratives were reflecting an interposition between the different mobilization mechanisms in the process of implementation in the three cases studies. But mostly intrusions were seen between the object formation and translation mechanism at the higher level of managers, and the sense-making, reflexive monitoring and work-articulation mechanisms at the activity level. Which can be explained by the presence of two phase of implementation. The first reflecting the adoption of certification procedures at the organizational level. This involves the actions related to the preparation for the first smobilization and diffusion of changes, which is seen mostly at a higher level. For example, teams meetings in which they define the organizations' plan, as well as explaining and translating the regard certification criteria concretely in the daily practices. The second reflecting the appropriation of change at local level. This involves the different actions taken by the local mangers or change leader leading to effectively of integrate a change into routine practices. For example, professionals' implication which respond to sense-making mechanism went through active engagement of professional in the analysis and evaluations, by giving their feedbacks and suggestions to improve which interfere with the reflexive monitoring mechanism. As well as, through the reflexive monitoring practices such as monitoring teams meeting, managers and professionals define corrective actions to readjust and adapt, which interfere with the work articulation mechanism. The complexity aspect of healthcare system (Pettigrew et al., 1992) accompanied by implementation processes

complexity arising from the presence of multiple contributors, the multifaceted and multidimensional strategies in addition to procedures complexity (Dobbins et al., 2002), impose a dynamic aspect to improve the uptake of desired change by professionals (Dryden-Palmer et al., 2020). Which explaining these interferences between the mechanisms of mobilization in certification procedures implementation processes. Support the non-linear fact of implementation processes (May et al., 2016).

In addition, the IFINP helped to give a concrete aspect for the content leadership factors through the different identified interferences with mobilization mechanisms For example, the higher level leadership seen in top leaders working strategies, in providing information and clear instructions, supporting mangers and professional (Barr, 2002; Jansson et al., 2011), interfered with the object formation and translation mechanisms. In addition, the identified leadership approaches (Wolak et al., 2020) at local level interfered with translation, sense-making, reflexive monitoring and work articulation mechanisms. This gives insights on the importance of change leader role and their willingness in implementation process of certification procedures within the three studied cases. This impose the question on the given place for the change leader role and activity in implementation processes (Waelli et al., 2016) which involves a lot of translation, support and monitoring of changes. In difference to the strategic approaches which only emphasis the leadership as factor (Jun et al., 2016; Qin et al., 2020), the IFINP helped to consider it within the local context of implementation. It helped to define the core concept of leader's activity in innovation implementation and thus going toward formalize the content of their activity

Third, the stratified comparison of framework elements and in terms of overlaps revealed a similarity of used strategies and interventions between the cases through

the implementation process of certification procedures: case A other type of sector; cases B and C other type and size of organization. Which reflected an independence from the activity type but a dependence to the cultural aspect. And This may explained the subject of certification and its process, which creates a harmonization and standardization of work processes between French healthcare organizations in terms of the quality management (HAS, 2020) .Thus, as perspective we propose to study other international contexts as well as other type of managerial innovations

Study limitations.

We acknowledge there are potential limitations for his study. The cases are focusing on the implementation of certification procedures at the level of nurses, participants at micro level were essentially nurses. However, the scope of implementation is broad and certification procedures involve multiple professionals not only nurses. Which may lead to missing data in the process of implementation. Secondly, in terms of data collection method. The study was primarily based on semi- structured interviews, given the sanitary crisis of COVID -19 and hospitals restrictions we were unable to conduct an observation period, this may underappreciate the extensive value of methodology. However, to overcome this limitation we discussed with participant thoroughly the subject as well as examples from their previous and experience. Finally, in this study we tested the framework in multiple hospitals settings but based on the last certification experience, however it seems interesting to test the framework in real-time of certification procedures, implementation in order to evaluate the framework usefulness a guide for implementation processes.

5. Conclusion

This study provides multiple insights based on comparative cases studies to test IFINP. It shows a robust intrusion between the framework components, mechanisms

and elements, as well as the usefulness of an integrated framework to explain the implementation of certification procedures in multiple contexts. The IFINP gives a concrete aspect about the content of leadership factor in terms of change leader's activity in implementation processes. Therefore, we advocate the use of IFINP by managers and implementers to support implementation initiatives with a broadened vision combining key elements of implementation process and its interferences with the local social-material context.

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Supplementary materials article III

Supplementary material 1

Study reporting using COREQ checklist. The study was reported by using the "Consolidated criteria for reporting qualitative research" COREQ checklist (1), we added a new column to the 32 item checklist and in which we answered about our study, the guide questions which described each item from the checklist.

No	Item	Guide questions/description	Study reporting
Domain 1: Research team and reflexivity			
Personal Characteristics			
1.	Interviewer/facilitator	Which author/s conducted the interview or focus group?	The corresponding author
2.	Credentials	What were the researcher's credentials? *E.g. PhD, MD*	Registered Nurse "RN" and PhD student
3.	Occupation	What was their occupation at the time of the study?	forth year PhD student
4.	Gender	Was the researcher male or female?	Female
5.	Experience and training	What experience or training did the researcher have?	Experience in nursing sciences, healthcare system and quality management. Training on study design and methodology qualitative and quantitative data analysis.
Relationship with participants			
6.	Relationship established	Was a relationship established prior to study commencement?	There is no relationship established prior to study
7.	Participant knowledge of the interviewer	What did the participants know about the researcher? e.*g. personal goals, reasons for doing the research*	Participants only know a general intention of the authors in terms of the study aim and objectives: which is understand the implementation process of certification procedures in the hospital. .

No	Item	Guide questions/description	Study reporting
8.	Interviewer characteristics	What characteristics were reported about the interviewer/facilitator? e.g. *Bias, assumptions, reasons and interests in the research topic*	The interviewees were carried only by the principle investigator (PI). Nurses' interviews were conducted in their working shift, alone and in private space.
Domain 2: study design			
Theoretical framework			
9.	Methodological orientation and Theory	What methodological orientation was stated to underpin the study? *e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis*	Study used deductive approach The methodological orientation was a content analysis of discourses using the Integrative framework for implementing change into nursing practice IFINP
Participant selection			
10.	Sampling	How were participants selected? *e.g. purposive, convenience, consecutive, snowball*	Participants were selected in a purposive way, in the first step they have to be involved in the process of implementation of certification, in the second step only nurses were interviewed because we interested to study the nurse role are engaged in the process of implementation in their daily workflow. All interviews were carried after confirmation to participate in the study
11.	Method of approach	How were participants approached? e.*g. face-to-face, telephone, mail, email*	Face to face semi structured interviews,
12.	Sample size	How many participants were in the study?	Thirty- three
13.	Non-participation	How many people refused to participate or dropped out? Reasons?	No one
Setting			
14.	Setting of data collection	Where was the data collected? e.*g. home, clinic, workplace*	In the workplace at hospital
15.	Presence of non-	Was anyone else present	Participants were interviewed alone

No	Item	Guide questions/description	Study reporting
	participants	besides the participants and researchers?	and in a private place generally
16.	Description of sample	What are the important characteristics of the sample? *e.g. demographic data, date*	For nurses the average of experience s 9 years in theirs services and 43 years old. All have same qualification level of studies "RN"
Data collection			
17.	Interview guide	Were questions, prompts, guides provided by the authors? Was it pilot tested?	Interviews were conducted according to a semi structured interview guide. Tested on nurses out of the studied hospital
18.	Repeat interviews	Were repeat interviews carried out? If yes, how many?	No
19.	Audio/visual recording	Did the research use audio or visual recording to collect the data?	Yes, all interviews were recorded
20.	Field notes	Were field notes made during and/or after the interview or focus group?	After each interview, a brief notes were registered for the important emergent ideas
21.	Duration	What was the duration of the interviews or focus group?	Leaders and managers: 30-45 min Nurses: 20-30
22.	Data saturation	Was data saturation discussed?	Yes, interviews have been stopped, when their output reach a closing sense
23.	Transcripts returned	Were transcripts returned to participants for comment and/or correction?	No
Domain 3: analysis and findings			
Data analysis			
24.	Number of data coders	How many data coders coded the data?	coding data were used in limited part of the study, and was conducted manually by the corresponding author and revised by the co-author
25.	Description of the coding tree	Did authors provide a description of the coding tree?	Yes the used code were described briefly in legend of table

No	Item	Guide questions/description	Study reporting
26.	Derivation of themes	Were themes identified in advance or derived from the data?	themes were derived from the analysis of interviews
27.	Software	What software, if applicable, was used to manage the data?	Data were analysed manually on excel sheets
28.	Participant checking	Did participants provide feedback on the findings?	No
Reporting			
29.	Quotations presented	Were participant quotations presented to illustrate the themes / findings? Was each quotation identified? e.*g. participant number*	Yes, some of the participants quotations are presented in the manuscript to support the themes and findings, and it identified according to the professional respondent according to a defined acronym and a sequence number
30.	Data and findings consistent	Was there consistency between the data presented and the findings?	Yes there was a consistency between the emergent themes, the used tools and the findings are translated in an implementation framework
31.	Clarity of major themes	Were major themes clearly presented in the findings?	In the discussion part of the study while presenting the developed framework
32.	Clarity of minor themes	Is there a description of diverse cases or discussion of minor themes?	Not applicable

Reference:

Allison Tong, Peter Sainsbury, Jonathan Craig. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups, *International Journal for Quality in Health Care*, Volume 19, Issue 6, December 2007, Pages 349–357

Supplementary material 2

Table 1: IFINP components interferences**.** Table 1 presents the analysis of interviewees' narratives reflecting the interferences of INIFP components, mechanisms of mobilization and factors. Retrieved elements simultaneously in each narratives are checked by x.

Studied site		Narratives	Mechanisms of mobilisation					factors	
			Object Formation	Translation	Sense-making	Reflexive monitoring	Work-articulation	Leadership	Contextual settings
A	MM 1	Well, we have a table about what we are going to do, we have a map in fact of our actions which is an action plan, ... we must not perceive and live the certification as a barrier, there are a lot of people will say "it's the certification !!", they take it as sanction! but for me it allows to pilot and improve	X	x					
		first it must makes sense, so the sense, the time to do things, and haves the appropriate environment			X				x
	MM 2	We are supported by the quality unit for the implementation of quality policies. The unit defines the working plan at different levels. For example, you have to implement this procedure at this and this places, such and such levels, then we actually redact this quality procedure	X	x				x	
		Really it depends on an organizational culture of quality and patient safety, it's all in that spirit, and I think it's essential to make sense for nurses, because we only do things if we understand… We explain to them that we implement this to ensure optimal and secure patient care.		x				x	x
		Only nurses know the best to talk about and how to implement these certification procedure, it is their daily work, and routine practices ... they are the ones who are able to readjust and re-evaluate, so that they are involved in write things that make sense			X	x			
	RN1	There are nurses referents for these protocols, for example the referent of hygiene who gives us the information or also could be by our local manager it depends, these are information meetings	X					x	
	RN1	It the communication first, and second there is the working procedure which describe and support our practices to make sense into our practices			X		x		

	TL1	She (nurse) participates in reporting the existing on term of strengths and weakness, and giving work notes. She also participates in identifying what could be useful to readjust things an then we integrate it, after that she will applies the readjustment in her daily's'				x	x		
	TL2	for implementation procedures, we identify referents/champions, we improve their skills and train them in methods and tools required for certification, quality and risk management, so they can introduce/implement change and help nurses to change, an be able to accompanied and monitoring it				x	x	x	x
B	MM 1	Nurses are involved in certification implementation procedures, but not necessarily at writing stages. They are more involved in the analysis of evaluations and experiences with the change. It is part of the quality approach they will take their turn to analyze an adverse event situation and then try to improve this difficulty by implementing improvement actions			X	x			
	MM 2	Daily feedback informs the action plan by identifying problems and setting corrective actions. This effectively integrates the procedure into routine practice. Then we can pursue new objectives to improve patient care'.				x	x		
		There are many times we conduct meeting with the teams and the specialist committee for example with the hygiene committee to discuss and improve our procedure				x	x		
	RN1	the referent has the role of interlocutor and mediator, for example mediator between the hygienist nurse and the team and then relaying questions and feedback from the team to hygienist	X				x	x	
	TL1	the implementation of certification impose to conduct multiple reminders with the different actor, we take advantage of quality meetings to explain them the interest of these procedure, also we collaborate with the quality unit to alert us from time to time on the feedback, we also do audits which allows us to evaluate where we are		x		x	x	x	
	TL2	the nurse is responsible for implementing everything, either in management or in teams consultation for policies definition, our professionals are there for both to be the guarantors of practice and to alert us when there is problems, so for reporting an adverse events, feedback on such or such type of deviations			X	x			
C		If we want a procedure works, we must have a lot of listening and understanding of professional and their profession, understanding their work , listing to them and understanding what hurdles they confront as well as what their routine interactions					x	x	
		We have to rely on the local manager, and then it is not just disseminating a new process, it is explaining why it arrived, why we are making things evolve, and argument evolutions. in fact we have to give meaning for what are doing, if we only disseminate things, if we change things unilaterally without explanation it will not work		x	X			x	
	MM 2	It is first the presentation to teams and then the explanation, which requires a regular service meetings on what we aim to change or apply	X	x				x	

		Explain for teams what is the procedure and make debriefings to see it is possible or not, readjust with them to improve, and in final to be implemented and be the optimal for patient and then team as well	x	X	x		
	RN1	I think we need communication, someone who shows how it will occur, a support in fact, I think it's the support from our managers, and then they have to explain for teams what is the interest of this change for whom it is will be beneficial and then explain what can be implemented	x				x
	RN3	We refer to our local manager in case of problem. We explain for her the difficulties with these new procedures, what bothers us, what we are going to do now, for example we worked like this before and it works very well, but this always in reference to our local manager			x		x
		We had meetings, we met once a month to discuss all the events, we list everything that poses a problem in terms of the new changes and set corrective actions, in order to be able solve the problems this is following an action plan			x	x	

The output of article III is summarized in Box III.

Box III. Principal findings and perspectives.

- The Integrative Framework for Implementation in Nursing Practice (**IFINP)** has captured all **different elements** and **interactions** emerged during certification procedures implementation processes in the three studied fields.
- **Multiple interferences** were seen between the IFINP components, elements, and mobilization mechanisms during implementation processes. Interference was seen mostly between '**reflexive monitoring and work articulation'**, and '**reflexive monitoring and sense-making'** mechanisms.
- The **leadership** was **integrated** in the different mechanisms especially in **translation a**nd **sense making** mechanims which reflect the importance of **change leader role in translating** of procedures in terms of practice.
- These interferences helped to understand the **content of leadership approach at the higher and local levels,** in other words the **roles** and **activities** of **leaders and local managers** in the implementation processes.

⇨ We advocate the use of the Integrative Framework for the Implementation of Nursing Practices (IFINP) **for managers** and **implementers** to support implementation initiatives first, by identifying what **fators at different organizational levels** are involved in implemementation processes. Second, to understand how they **are interrelated** at the local context level according to predefined **mobilsation mechanisms**. This, can be helpful to explore the **various potential barriers and facilitors** impacting implementation processes.

"What I learned on my own I still remember."

- Nassim Nicholas Taleb

General summary of results, general discussion, and conclusion

General summary of results

This thesis aimed to study and analyze the implementation of quality policies in French hospitals at the level of nurses' activity, using the example of certification procedures in order to generate more pragmatic recommendations for managers and decision makers to support implementation initiatives. Thereby, we set the major preliminary objectives which have been shaped and guided following the research process. Finally, we designed this research study according to these objectives.

First: whether certification procedures can be considered as an innovation, precisely a managerial innovation. We set to understand what factors may impact the implementation of such innovation into nursing practices and investigate the most effective ways for successful implementation according to literature. This objective was answered in the first chapter I of article I.

Second: chapter I showed a need for an integrative implementation framework and the main thesis' objective is to understand and analyze the implementation of certification procedures at the level of nurses' activity. For that purpose, we developed an implementation framework to meet both perspectives. The framework addresses literature gaps and can be useful to understand the implementation processes at the level of nurses' activity. This objective was fulfilled in the Chapter II (article II).

Third: developing a framework cannot approve its usefulness; thus, we decided to test and assess the developed framework (chapter II) in multiple contextual settings using comparative case studies. This was done by following the implementation of certification procedures in different types and sizes of healthcare organizations and different types of services. And thus, we can also investigate certification implementation in multiple organizational contexts. This objective was addressed in chapter III (article III).

The following section summarizes each chapter with its main contributions.

Diagram summarizing thesis chapters and outputs:

Methods	Principal results
Chapter I (Article I)	**Objectives:** To map the diverse factors impacting change implementation in nursing practices and investigate different implementation strategies.
Scoping review 28 included studies. Implementation factors, barriers and facilitators Implementation strategies	This study showed that: - a multifaceted approach, with a tailored intervention, was the most effective implementation strategies. - most of the previous studies identify systematic factors and factors related to the local socio-material context are poorly addressed. This study contributed to the body of research by: - identifying the need to develop an integrated approach addressing both factors simultaneously. - providing a summarized table that outlines the different types of factors and implementation strategies on the different organizational levels. This table can be useful tool for researchers to develop their understanding in implementation science, and for managers as guide for implementation initiatives
Chapter II (Article II)	**Objectives:** To develop an integrative framework through the identification of key implementation process components and by integrating these components into a framework considering the socio-material context of nurses' work.
Mixed approach study (Inductive and deductive) Qualitative Case study: 16 interviews (managers and nurses) and 83 observation hours (2 sectors). Emerged themes were analyzed using two theoretical frameworks	This study generated: - an integrated framework useful to understand the implementation processes of certification procedures at nurse level by using a practical implementation science and a sociological model derived from implementation science perspectives. This framework presents the essential elements and mobilization mechanisms in implementation processes at the level of nurses' activity. This article contributed through the suggested framework: - by addressing literature gaps in terms of factors related to the local socio-material context in implementation processes.

Chapter III (Article III)	**Objectives:** To test and assess the generalizability of the developed framework in multiple organizational settings. To explore links between strategic and socio-material factors during implementation processes.
Comparative qualitative case studies 33 interviews (managers and nurses) in three French hospitals different in types (public/private) and size (large/ medium) within three sectors. Emerged themes were analyzed using the IFINP	This study showed: - how the Integrative Framework for Implementation in Nursing Practice (IFINP) was flexible and captures multiple interactive factors in different contextual settings for certification implementation procedures. - that multiple interferences exist between strategic level elements such as leadership approaches and mobilization mechanisms. Also, intra-interferences exist between mobilization mechanisms during implementation processes. - that IFINP provides a clear definition of the managers' role when implementing new nurse practices. - similarities between implementation strategies and interventions across different sector types and hospitals suggesting an independent certification implementation strategy at the three sites. This study contributed: - by offering a practical managerial framework supporting implementation initiatives in nursing which is the IFINP. - by developing understanding in terms of certification procedures implementations processes.

Figure. Synthesis of main findings for each chapter.

General discussion

This thesis studied the implementation processes of quality policies and measures in French hospitals at the level of nurses' activity by using the example of certification procedures. We elaborated on the subject of implementation into parallel sides. First by reviewing literature, second by conducting multiple case studies in which we analyzed retrospectively the implementation processes of certification procedures implementation in French hospitals and at the level of sectors. Both have generated results that confirmed previous implementation literature on one hand, and contributed to address literature gap on the other hand. In the following section we discuss the main results of this thesis project.

1- Implementing quality policy or initiatives in nursing practice.

Our thesis provides a wide range of factors different in type and impacting implementation processes across the multi-organizational levels. We identified the systematic factors which are generic and can be retrieved in multiple context settings and different management levels. These factors are essential for implementation processes; however, they often failed to explicitly consider how local context can shape implementation success (Damschroder et al., 2009). It is acknowledged that the circumstances related to activity levels may lead to a successful intervention in one setting and its failure in others (Squires et al., 2019). Our scoping review highlighted the robust systematic elements underpinning implementation initiatives for different types of nursing practices changes. These elements emerged majorly across the organizational level, e.g., resource availability, leadership approaches, organizational culture, effective communications, and managerial and organizational support, and professional level, e.g. knowledge, education and skills, participant perceptions, and involvement (Aitken et al., 2011; Colson et al., 2019; Keiffer, 2015; Lam et al., 2016; Qin et al., 2020; Robert et al., 2011; Wolak et al., 2020; Yagasaki & Komatsu, 2011). An absence in any of these factors could be a major barriers for successful implementation (Scholtes et al., 2017). These factors were also recognized by both managers and nurses in our qualitative studies. Our participants have emphasized on the role of champions,

whom are expert clinicians but with informal leader roles (Mark et al., 2014). They were identified at different organizational levels and considered as key actors for successful implementation at the nurses' levels (Miech et al., 2018; Salma & Waelli, 2021). However, a review of the findings showed that champions are poorly recognized (Abbott et al., 2014; Aitken et al., 2011; Christensen & Christensen, 2007; Stewart & Bench, 2018; Grealish et al., 2019; Kite, 1995; Wolak et al., 2020). But, we explained this by the presence of other actors at the level of professionals such as role models and/or opinion leaders (Barr, 2002; Kirik 2016; Breimaier et al., 2015; Colson et al., 2019; Keiffer, 2015; Kite, 1995; Lin et al., 2019; Qin et al., 2020). Opinion leaders are respected, influential, passionate, and competent personnel (Mark et al., 2014) whose decisions and behaviors are generally accepted by other peer professionals (Qin et al., 2020).

However, these elements need to be operationalized regarding the specificity of local context of implementation (Grol & Grimshaw, 2003). For instance, 'how', 'what', and 'who' in terms of leadership approach and regarding the complexity healthcare systems and reality of professionals' activity. An organization's life occurs throughout an 'entanglement' between the materials and the social context and the way the actor and artefacts 'entail each other in practice' (Breimaier et al., 2015). Our review showed a paucity in studies considering professionals' activity level perspective (Allen, 2013; Grealish et al., 2019; May et al., 2014). These studies have discussed other type of factors related to local socio-material context. In other words, this perspective involves the understanding of general mechanisms of a tool and its unintentional consequences through the multiple uses 'affordances' of such innovations or technologies (Allen, 2013). Which means how an innovation affordances were related to the socio-material infrastructures into which they were introduced (Allen, 2013). Nurse's capability to adopt and use such innovation depend on the degree to which guidelines were workable (May et al., 2014). Thus, it is important to consider the different interrelationships between the implemented action under quality policies or certification procedures, the actors involved, and local context in order to identify what factors could potentially impact implementation processes. Allen & May (2017) has provided insight on the factors

related to the local socio-material context through the different mobilization mechanisms identified in the Translational Mobilization Theory (TMT) which can lead to the emergence of such project in nursing practices.

Thus, the implementation of such quality initiative relies on both systematic and local contextual factors. The review findings showed that strategic and local activity perspectives were elaborated independently in most of previous work. Yet, It seems that a separation between factors could be problematic for management, especially in terms of manager's roles, where a strategic perspective differs from a nurses' local reality (Sandström et al., 2011). The Integrative Framework for the Implementation of change in Nursing Practice (IFINP) came with a perspective combining both systematic and contextual factors to support implementation initiatives (Salma & Waelli, 2021). Finding the best practices for effectively implementing such policies of evidence into routine practices is beneficial for the healthcare system. Especially, in front of critical situations where we need implementing change in the best effective way, e.g., pandemic, nursing shortage, increasing cost of care, and other looming factors impacting our health care system.

The IFINP was developed using a mixed method approach design. The inductive analysis of the case study for the implementation of certification procedures helped to identify elements from the local context reality and professional experiences. Then, the deductive analysis using an implementation science tool and a sociological model helped to formalize and characterize retrieved elements. The IFINP combines the elements related to a favorable organizational climate conditions, such as contextual settings, knowledge, resources, and material availability which are fundamental for certification integration (Bergs et al., 2015; Mohamed et al., 2018), as well as the administrative supports for professional practices (Paina et al., 2019). Also, it sheds light on champions role and place implementation processes at nurses' level (Miech et al., 2018). They are key performers (Harper et al., 2019) and mediators between nurses and managers with a capacity to disseminate information and support mobilized actions (Mills et al., 2019). Due to their familiarity with the context, they can identify the required contextual elements and local context readiness to deploy the desired changes (Soo et al., 2009). In conformity to in Pettigrew et al. (1992) which suggest that multiple contextual factors contribute to a

strategic change, the supportive organizational culture and individuals leading the change, such as champions, are locally instrumental for the integration process (Marchionni & Ritchie, 2008). This supports the necessity to consider the nature of contextual barriers to implementation and identify or groom champions who are well equipped to address them (Bonawitz et al., 2020).

In addition to the previous components, the IFINP presents five major mobilization mechanisms, 'object formation', 'translation', 'sense-making', 'reflexive monitoring', and 'work articulation'. These mechanisms involve practices that shape the interrelationship between actors, implemented action, and local context in implementation processes (Salma & Waelli, 2021). These components (elements of mobilization mechanisms) interfere at some point in the implementation processes as identified in the comparative case studies of three French hospitals. For instance, a strong interference was revealed between 'sense-making', 'reflexive monitoring', and 'work-articulation' mechanisms at activity levels. This can be explained by the multiple strategies taken to enhance the appropriation process of implemented procedures into nurses' routine practices. It involved various actions and roles of local mangers or change leaders leading to the effective integration. For example, professional involvement in procedures responded to 'sense-making' mechanisms and was observed by an active engagement via analyses and evaluations. This active engagement interfered with 'reflexive monitoring' mechanism in professionals' feedback and suggestions for improvement. Also, with 'reflexive monitoring' e.g., monitoring meetings, managers, and professionals to define corrective actions. They continuously evaluated, adapted, and readjusted implemented procedures according to local context requirements and interfered with the 'work articulation' mechanism. These interferences reflected the complex aspect of healthcare system (Pettigrew et al., 1992). Which is accompanied as well by implementation procedural complexity, given to the multiple contributors and multifaceted and multidimensional strategies (Dobbins et al., 2002). This situation requires a dynamic constituent to improve the uptake of important changes by professionals (Dryden-Palmer et al., 2020). This supports the non-linearity aspect of implementation processes (May et al., 2016).

2- Implementation and the role of the local managerial context.

One of the IFINP components, essential for the implementation at the local level, is the leadership approach (Guerrero et al., 2016) of either the proximity managers or the change leader (Geerligs et al., 2018). Contrarily, the absence of a leadership support could induce hesitation in nurses to integrate new or unusual practices. Practitioners reported the need for support from nurse leaders who in turn required support from their leaders (Gifford et al., 2018). This came from their role and activities in terms of translating and adapting such change into nursing practice and confirmed previous literature on the importance of middle managers commitment to innovation implementation. This was expressed by giving employees information regarding innovation implementation, making it relevant to them, giving them the tools necessary to implement the innovation, and encouraging them to use those tools (Birken et al., 2013). Thus, they can lead to positive shared perceptions which improves implementation effectiveness and leads to a high quality and consistent use of the innovation (Klein & Sorra, 1996). Change leaders and nurses must determine the pace and extent of change implementation and their feasibility within their service (Andreasson et al., 2016). Our findings showed that the leadership approach of change is integrated with the different mobilization mechanisms practices. For instance, their participative strategy used over the implementation processes (King et al., 2019; van den Oetelaar et al., 2016) and their role, which fall under a "sense-making" mechanism, e.g. encouraging nurses to experiencing feasibility of addressed change, and providing feedback on its organizational fit. This emphasizes on the importance of the acceptability of the implemented intervention in their practices (Anrys et al., 2019; Gill et al., 2019) and reduces resource wastage (Murphy et al., 2018). In addition to their role as an important factor in communicating the needs and benefits of the implemented procedure with nurses and decision makers (King et al., 2019; Paina et al., 2019) which came under "translation" mechanisms (Davina Allen, 2018) and their actions which are identified under a "work articulation" mechanism (Davina Allen, 2018). For example, the essential continuous communication between managers and sectors over the implementation process which helps settle issues in confrontational situations (Paina

et al., 2019). All these practices confirm the theory of middle management roles. This theory suggests that middle managers commitment to innovation implementation is operationalized over four steps: 1) obtaining and communicating information about an innovation; 2) adapting information and the innovation; 3) mediating between strategy and day-to-day activities; and 4) selling innovation implementation'' (Birken et al., 2015; Meza et al., 2021). Thereby, the relationship between these roles and implementation is mediated by implementation climate (Birken & Currie, 2021).

Besides, our results confirm Birken et al., (2018) on the role of senior leadership engagement in the enhancing the implementation climate and its influence on middle managers' role in the implementation. This was identified in interviews with managers by the role of leaders in translating each time certification objectives for mid-managers and defining with them the action plan for implementation. In addition to their role at the higher organizational level in monitoring and evaluating implementation effectiveness for all these.

3-Implication to literature and practices.

Our research contributes to the understanding and knowledge on "how" and "what" influences the implementation of these quality policies in nurses' work. The dynamic aspect of contextual factors may impede implementation in one setting and facilitate it in another (May et al., 2016). Knowing these factors (González-María et al., 2020) and how they are interrelated during an implementation process is essential towards an effective implementation at the activity level of nurses (May et al., 2014). Our IFINP goes beyond the typical perspective of a conventional frameworks (Nilsen, 2015) as it considers local context mechanisms which shape and guide an implementation processes. The framework shows how key attributes and elements from local contexts interacted via multiple mobilization mechanisms, reflecting the impact of local socio-material contexts (Salma & Waelli, 2021). Characterizing and exploring the key elements and the socio-material context of an implementation allows managers and implementers to consider a broader vision on what influences a successful implementation outcome. We presented how an implementation

context is composed from both social and material elements, which interact together in a continuum rather than in a linear “pipeline” manner (Melo & Bishop, 2020). In addition, we demonstrated IFINP flexibility in capturing the implementation processes in multiples settings of different French healthcare organizations. The IFINP successfully identified different actions and interactions between actors, contexts, and implemented procedures, regardless of sector type, hospital type, and size. This provided a formal aspect of our framework to understand the mechanisms where individuals and organizational contexts affected an innovation integration into nursing practice (Mitchell et al., 2010). The IFINP helped exemplify the leadership factor. The interferences seen between leadership and different mobilization mechanisms was useful in defining the content and activity undertaken by change leaders and their response to mobilization mechanisms. This scenario provided important insights on the role of change leaders in translating and adapting procedures to the local context, and thus integrating them into professional practice. These outputs also highlighted the weight of the willingness of change leaders to implement certification procedures at the three studied sites. Accordingly, the question about the place of local managers’ roles and activities arose, which must be considered by decision-makers in implementing quality policies (Waelli et al., 2016). Using the IFINP, we showed that the leadership approach involved considerable translation, support, and monitoring changes; whereas, other strategic approaches emphasized the leadership as facilitators, without clear conceptualization (Jun et al., 2016; Qin et al., 2020). Thus, the IFINP helped frame these elements within the local implementation context.

Our research revealed major similarities between implementation strategies and interventions across different sector types and hospitals. This suggested independent certification implementation strategies at the three sites. This could be explained as the generation of work harmonization and standardization processes between French healthcare organizations in terms of quality management (HAS, 2020).

Finally, both the scoping review and case studies suggested that a multifaceted approach with tailored interventions as the most effective way to generate change

(Abbott et al., 2014; Breimaier et al., 2015; Grealish et al., 2019; Kite, 1995; Koh et al., 2008; Lam et al., 2016; Lin et al., 2019; Munroe et al., 2018; Qin et al., 2020; Yagasaki & Komatsu, 2011). Which means that managers and change leaders intervention must involves simultaneous use of several implementation strategies (ISuman et al., 2016), which is tailored to the implementation local context (Kwok et al., 2020). Multiple factors were interacting with each other, requiring multiple strategies to generate effective implementation and positive results. Also, targeting intervention design to the needs of a specific context is expected to enhance effectiveness (Lavis et al., 2012).

Recommendations:

Three major recommendations emerged from this thesis project

1- We suggest the Integrative Framework for the Implementation of change in Nursing Practices (IFINP) as a useful framework for managers and researchers for the implementation of innovations in nursing practices. It emphasizes not only on the systematic factors but also on those related to local socio-material context which may impact implementation processes through the different identified mobilization mechanisms that shape and guide the interrelationship between actors, actions, and implementation context. Therefore. The IFINP can be used as a tool to explore, using its components and how they interact, the various potential barriers and facilitators for the implementation processes of such innovation into nursing practices.

2- This study put emphasis on the role of proximity managers in the appropriation of such quality initiative into professional routine practices. Especially, where an implementation effectiveness depends on the ability and willingness of individuals to implement them on the frontlines. Thus, we advocate the importance to enhance in the responsibilities and implications of proximity managers for implementation initiatives. As they are the ones who can translate these procedures in clinical practices and patient care. Also, they are the first detectors of irregularities in terms of implementation

processes and outcomes and thus their responsibility to take corrective actions to improve and achieve effective results. Managers have distinct opportunities to influence how professeionals are able to learn, and to adapt and align methods and practices for quality intitatives through developing and supporting implementation climate.

3- This research advocates for the early involvement of professionals and practitioners from the fieldwork in a certification project. This means not only their active engagement in the implementation processes of certification procedures at the organizational level, but also their participation level in the design of this national project and the definition of certification manual and standards at the Macro level. Work-field professionals can bring the reality of activity level, complexity, dynamic, and challenges to design a certification fit the needs of healthcare system and patient care. As they are the final users of these procedures in terms clinical practices, they can take the lead and find out which requirements, guidelines, policies, and other quality tools meet quality care improvement and patient safety perspectives. Those who work on the frontline, whether managerially or professionally, know more about the challenges of delivery than national policymakers. A crucial task for implementation support is, therefore, to tap into the perceptions and experiences of those whose behavior will shape the implementation processes.

Limitations

This thesis had several limitations discussed in each article. However, we acknowledge the following limitations. First, in terms of research design, this thesis relied on qualitative design, the results of this thesis cannot confirm a causation, this in terms of retrieved factors impacting implementations processes. To overcome this, we rebounded to literature to compare our results. Second, In terms of methodology, data collection was based majorly on semi- structured interviews given the sanitary crises of COVID-19 and associated hospital restrictions, we were

unable to conduct observations in sectors. This may have impacted the output of this research; however, we tried to overcome this by discussing thorougly the subject with the team and searching for examples from their previous experiences. Accordingly, we conducted the interviews at their working place, checked the documents related to certification with interviewees, and requested a description for specific examples and asked questions about facts and not analyses. Third, our empirical objet focused on the implementation of certification procedures at the nurse level, thus participants at the activity level were mainly nurses. However, the implementation scope is broad and certification procedures involved many professionals not only nurses. Thus, we may have missed data on some implementation processes. Fourth, in all of the studied cases we discussed the implementation process of certification but based on the last iteration experience and in the real-time implementation process of certification. Despite these limitations, the contextual variation across sites and robust analysis provide new understanding and insights about the elements contributing to the implementation processes of quality initiatives at the local level of nurses' activity.

General conclusion:

This thesis studied the implementation of quality initiatives in French hospitals and at nurses' activity level based on certification procedures implementation. Our thesis followed an abductive reasoning inference which combines between both inductive and deductive to answer our research objectives.

The major contributions resulting from these studies are summarized below.

Contribution in literature and practice

Our thesis project contributes in:

1- Identifying and addressing the literature gaps in terms of the impact of the local context on the implementation processes of such innovation in nursing practices. This was done by developing an implementation framework (IFINP) which enriches the insights of managers and researchers, by its integrative aspects, on the different types of factors; either systematic or those related to local socio-material context influencing implementation processes. Our IFINP can be useful to support implementation intitatives at nurses' level in different contextual settings and regarding the overlaps of real-work context. It can be used as a tool to predict and identify possible hurdles and enabler related to the social and matrial context of implementation.

2- Developing knowledge and understanding regarding the implementation processes of quality policies and procedures in healthcare organizations, particularly, the implementation of certification and its requirements at the level of nurses' activity within French healthcare systems. It is recognized that, to maximize their impact, such policies should consider condition-specific contextual factors influencing policy uptake and provide condition-specific implementation support. Thus, our thesis offers a detailed picture for managers and decision makers about what, who, and how in terms of the elements and moblizatiom mechanisms which contribute to the certification implementation processes. Thus, they can identify what management tools

may serve implementation perspectives in nursing practice. In addition, it enriches the knowledge about the activity content of the leadership approach regarding to the strategic and local levels of implementation. For instance, a leadership at the higher level involves more of object formation and translation practices. Meanwhile, a leadership at the local level, involves a lot of activites related to translation, sense-making, monitoring and evaluation, and work articulation to reach a successful integration into nursing practices.

3- Developing knowledge and understanding on qualitative research reasoning approaches. As this thesis follows an abductive approach, it gives insights for researchers on the importance of using both inductive and deductive approaches in qualitative research to find out and create a context of meaning for research inquiry through offering the most likely theories or rules. However, we note that the format of in which we presented our thesis, 'thesis by articles', hides the reality of the work done over the three years. The research work process and progress were based on an alternation between fields and theory to find out meaning for each retrieved phenomenon and results. We started by reviewing the literature but not systematically, followed by conducting the first work field and the scoping review, and ended by testing our main results of the developed framework in the first field. Even more, throughout these steps, we were continuously analyzing findings and rebounding to theories to look for the ultimate answers.

Perspectives

For future work and perspectives in this domain, it may be beneficial to conduct more empirical research, in which researchers follow the whole process of implementation of the certification procedures in hospitals. This can start from the early stage of the identification of certification manual perspectives to the day of visit. By following the implementation in the real context we can identify and define more specific problems and challenges that could emerge during the process of implementation. Accordingly, we give a roadmap to identify more pragmatic and directed solutions that are useful to improve implementation initiatives into routine practices. Therefore, to reduce the gap between certification requirements and perspectives, or more general quality requirements, and the daily practices of professionals', and going forward its sustainability.

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List of figures

Appendix Chapter III

List of tables

change in Nursing Practice: a comparative case studies in French hospitals

Scientific contributions

The results of this thesis project have been published or are about to be published in several scientific journals and have been presented in a number of Local and International Conferences.

List of Journal Publications

Scientific paper issued from this thesis

- Salma I, Waelli M. A framework for the implementation of certification procedures in nurse level: a mixed approach study. BMC Health Serv Res. 2021; 21:932 (Published).
- Israa SALMA, Mathias WAELLI. Mapping research findings on change implementation in nursing practice: a scoping literature review. Submitted to International Journal of Nursing Practices (Under revision).
- Israa SALMA, Mathias WAELLI. Assessing the Integrative Framework for the implementation of change in Nursing Practice: comparative case studies in French hospitals". Submitted to Health Policy Journal (Under revision).

Scientific paper in preparation

- Israa SALMA. The impact of certification procedures implementation from the perspectives of managers and professionals: a comparative case studies in French hospitals.

List of Conference Proceedings

Oral communications

- "The implementation of innovations in nursing practice". "Association national pour la formation permanente du personnels hospitalier" (Anfh). June 2, 2021. Webinar, Rennes, France.
- "A framework for the implementation of certification procedures: a case study in a French hospital" "Association de Recherche Appliqué au Management des Organizations de Santé" (ARAMOS). October 13-14, 2020. Webinar, Rennes, France.

- "Impact des programmes de certification sur le travail quotidien des infirmiers". workshop at « Association de Recherche Appliquée au Management des Organisations de Santé » (ARAMOS). 15 March 2019. EHESP, Rennes, France

Scientific conferences out of thesis

- Member in the committee of organization, and oral communication Interdisciplinary Seminar Organization: "Climate change and population health, the challenges of citizen mobilization" within the framework of Doctoral Networks. January 18, 2021**.** Webinar, Rennes, France.

Poster communications

- Understanding the implementation process of quality procedures: a case study in a French hospital". « 11ème Rencontres scientifiques du réseau doctoral en santé publique, EHESP ». 3-4 March 2020. Marseille, France.

Teaching

Due to COVID-19 it was difficult to conduct teaching hour.

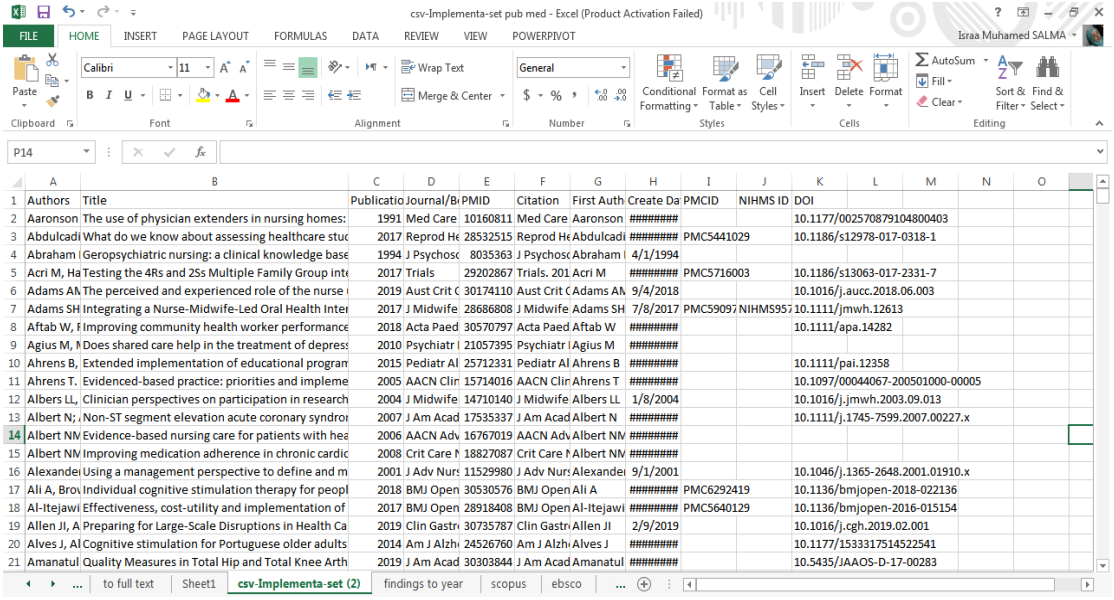
Participation in European Master in Public Health Course (4h):

-Qualitative research reasoning approaches: Inductive, Deductive and abductive approach.(November 23, 2021)

- Quality appraisal tool for qualitative research in systematic review. (November 30, 2021).

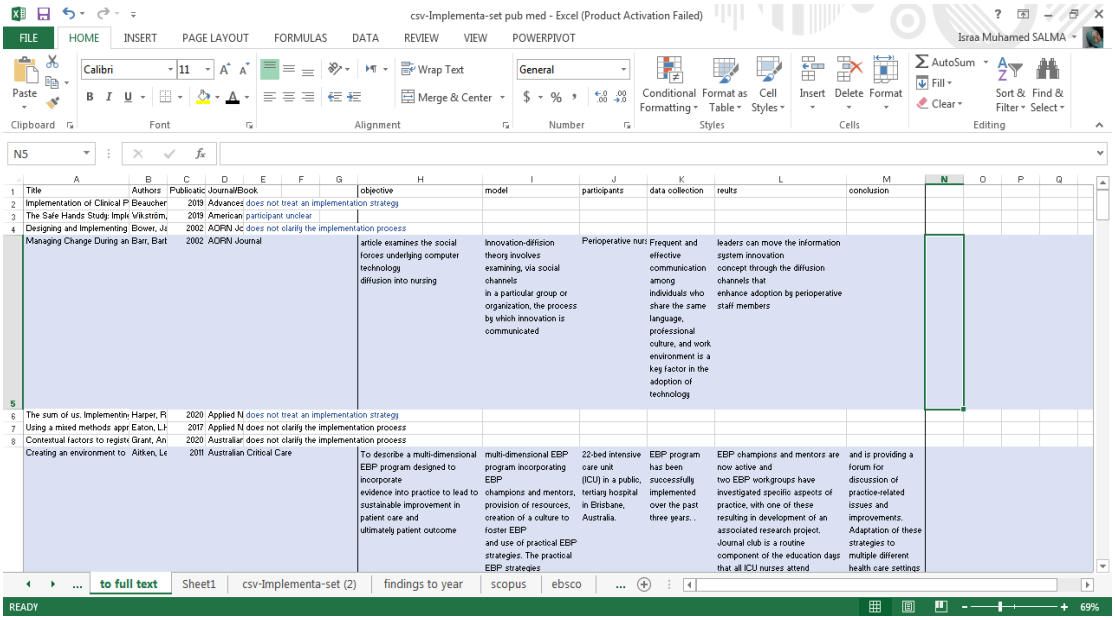
Appendix

Appendix Chapter I



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	Authors	Title	Publicatio	Journal/Bo	PMID	Citation	First Auth	Create Da	PMCID	NIHMS ID	DOI				
2	Aaronson	The use of physician extenders in nursing homes:	1991	Med Care	10160811	Med Care	Aaronson	########			10.1177/002570879104800403				
3	Abdulcadi	What do we know about assessing healthcare stuc	2017	Reprod He	28532515	Reprod He	Abdulcadi	########	PMC5441029		10.1186/s12978-017-0318-1				
4	Abraham	Geropsychiatric nursing: a clinical knowledge base	1994	J Psychosc	8035363	J Psychosc	Abraham	4/1/1994							
5	Acri M, Ha	Testing the 4Rs and 2Ss Multiple Family Group inte	2017	Trials	29202867	Trials. 201	Acri M	########	PMC5716003		10.1186/s13063-017-2331-7				
6	Adams AN	The perceived and experienced role of the nurse (	2019	Aust Crit C	30174110	Aust Crit C	Adams AN	9/4/2018			10.1016/j.aucc.2018.06.003				
7	Adams SH	Integrating a Nurse-Midwife-Led Oral Health Inter	2017	J Midwife	28686808	J Midwife	Adams SH	7/8/2017	PMC59097	NIHMS957	10.1111/jmwh.12613				
8	Aftab W, I	Improving community health worker performance	2018	Acta Paed	30570797	Acta Paed	Aftab W	########			10.1111/apa.14282				
9	Agius M, M	Does shared care help in the treatment of depress	2010	Psychiatr I	21057395	Psychiatr I	Agius M	########							
10	Ahrens B,	Extended implementation of educational program	2015	Pediatr Al	25712331	Pediatr Al	Ahrens B	########			10.1111/pai.12358				
11	Ahrens T.	Evidenced-based practice: priorities and impleme	2005	AACN Clin	15714016	AACN Clin	Ahrens T	########			10.1097/00044067-200501000-00005				
12	Albers LL,	Clinician perspectives on participation in research	2004	J Midwife	14710140	J Midwife	Albers LL	1/8/2004			10.1016/j.jmwh.2003.09.013				
13	Albert N;	Non-ST segment elevation acute coronary syndror	2007	J Am Acad	17535337	J Am Acad	Albert N	########			10.1111/j.1745-7599.2007.00227.x				
14	Albert NM	Evidence-based nursing care for patients with hea	2006	AACN Adv	16767019	AACN Adv	Albert NM	########							
15	Albert NM	Improving medication adherence in chronic cardic	2008	Crit Care M	18827087	Crit Care M	Albert NM	########							
16	Alexander	Using a management perspective to define and m	2001	J Adv Nurs	11529980	J Adv Nurs	Alexander	9/1/2001			10.1046/j.1365-2648.2001.01910.x				
17	Ali A, Brov	Individual cognitive stimulation therapy for peopl	2018	BMJ Open	30530576	BMJ Open	Ali A	########	PMC6292419		10.1136/bmjopen-2018-022136				
18	Al-Itejawi	Effectiveness, cost-utility and implementation of	2017	BMJ Open	28918408	BMJ Open	Al-Itejawi	########	PMC5640129		10.1136/bmjopen-2016-015154				
19	Allen JI, A	Preparing for Large-Scale Disruptions in Health Ca	2019	Clin Gastr	30735787	Clin Gastr	Allen JI	2/9/2019			10.1016/j.cgh.2019.02.001				
20	Alves J, Al	Cognitive stimulation for Portuguese older adults	2014	Am J Alzh	24526760	Am J Alzh	Alves J	########			10.1177/1533317514522541				
21	Amanatul	Quality Measures in Total Hip and Total Knee Arth	2019	J Am Acad	30303844	J Am Acad	Amanatul	########			10.5435/JAAOS-D-17-00283				

Figure 1: Study output for each database



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	Title	Authors	Publicatic	Journal/Book				objective	model	participants	data collection	reults	conclusion				
2	Implementation of Clinical P	Beaucher	2019	Advances	does not treat an implementation strategy												
3	The Safe Hands Study: Impl	Vikström,	2019	American	participant unclear												
4	Designing and Implementing	Bower, Ja	2002	AORN Jc	does not clarify the implementation process												
5	Managing Change During an	Barr, Bart	2002	AORN Journal				article examines the social forces underlying computer technology diffusion into nursing	Innovation-diffusion theory involves examining, via social channels in a particular group or organization, the process by which innovation is communicated	Perioperative nurs	Frequent and effective communication among individuals who share the same language, professional culture, and work environment is a key factor in the adoption of technology	leaders can move the information system innovation concept through the diffusion channels that enhance adoption by perioperative staff members					
6	The sum of us. Implementin	Harper, P	2020	Applied N	does not treat an implementation strategy												
7	Using a mixed methods appr	Eaton, LH	2017	Applied N	does not clarify the implementation process												
8	Contextual factors to regist	Grant, An	2020	Australian	does not clarify the implementation process												
	Creating an environment to	Aitken, Le	2011	Australian Critical Care				To describe a multi-dimensional EBP program designed to incorporate evidence into practice to lead to sustainable improvement in patient care and ultimately patient outcome	multi-dimensional EBP program incorporating EBP champions and mentors, provision of resources, creation of a culture to foster EBP and use of practical EBP strategies. The practical EBP strategies	22-bed intensive care unit (ICU) in a public, tertiary hospital in Brisbane, Australia.	EBP program has been successfully implemented over the past three years. .	EBP champions and mentors are now active and two EBP workgroups have investigated specific aspects of practice, with one of these resulting in development of an associated research project. Journal club is a routine component of the education days that all ICU nurses attend	and is providing a forum for discussion of practice-related issues and improvements. Adaptation of these strategies to multiple different health care settings					

Figure 2: study scanning stages (first output to full articles scan)

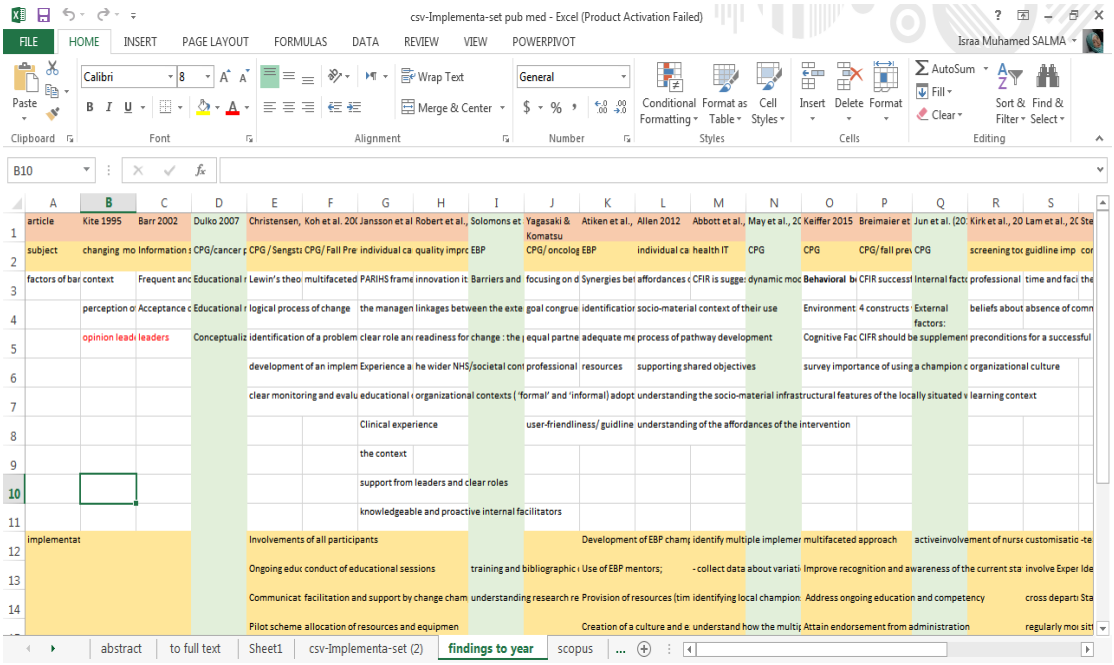


Figure 3: Analysis of findings for the included studies

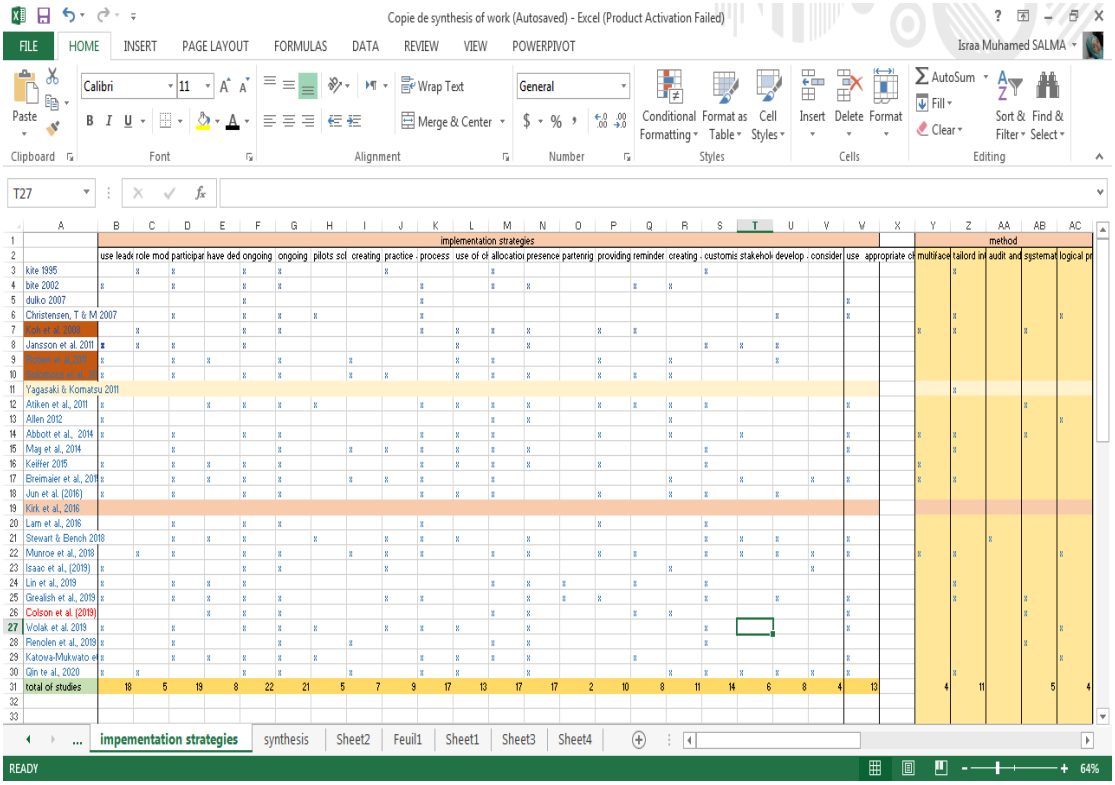


Figure 4: Summary tables for findings

Appendix Chapter II

1. Interview guide

Guide d'entretien manageurs (version francais)

Objet et intérêt: notre sujet de recherche porte des questions sur les démarches de qualité aux hôpitaux, dont on prend l'exemple de certification. Cette entretien sera destiné à bien comprend la stratégie d'implémentation de démarche de qualité et procédure « certification» et son impact sur le travail des infirmières. Ce travail se repose sur une discussion d'environ 45 min à 1 heure sur ce thème.

Méthodes et Confidentialité: l'entretien sera enregistré, transcrit puis analysée directement. Nous nous confirmons la confidentialité des personnels rencontrés, toutes les informations de l'entretien seront conservées en anonyma et non-interchangeable, après l'exploitation des informations.

I- Présentation professionnel: présentation personnel et professionnel, quelle est votre expérience et histoire du travail en général, quelle est votre expérience personnelle dans le domaine de qualité, votre rapport maintenant avec l'approche de qualité ?

II- Démarche de qualité:

- Qu'elles sont les démarches qualité présentes dans votre hôpital? Pouvez-vous m'expliquer qu'est-ce que vous déployez dans la démarche de qualité à l'hôpital ? Comment cela se passe en pratique, les éléments et les actions dans le contexte de démarche qualité?

- Concernant la mise en œuvre de démarche qualité: quelle est la stratégie d'implémentation de démarche qualité?

- Qui sont les personnels engagées dans la démarche d'implémentation (structure d'équipe de qualité sur l'échelle de l'institution, leader de processus, membre d'équipe)?

III-Certification:

- Que représente la procédure de certification pour vous? Parlez-moi sur l'expérience de votre établissement?
- Pouvez-vous m'expliquez la stratégie d'implémentation de procédures de certification? Quelles démarches sont entreprises pour accompagner la certification dans les services? Pouvez-vous les détailler?

- Qui sont les responsables de l'implémentation d'une procédure et les personnels impliquées?

- Dans le contexte de votre organisation, pouvez- vous détailler les éléments qui support ou entrave le déploiement des politiques qualités dans les services en général, et certification précisément?

- Comment se fait l'intégration des changements au près des équipes infirmières, les mesure pris pour une intégration effective, quelles dispositif sont pris en compte?

- Rôle des infirmières dans la procédure de certification et dans la processus d'implémentation précisément?

- Pouvez-vous expliquer, comment se fait les préparations au dans votre établissement et au niveau de votre services plus précisément pour favoriser un processus d'implémentation efficace?

- Pouvez-vous détailler un exemple?

- Comment se fait, l'organisation d'un Training ou assistance technique si besoin?

- Comment vous pouvez évaluer l'efficacité d'implémentation soit formel et/ou informel, qualitative et/ou quantitative?

- A votre avis qu'elles sont les éléments clés facilitateurs d'un processus de changement efficace, et de l'autre cote les barrières au niveau organisationnelle et au niveau local?

IV- Impact de certification:

- Comment vous trouvez l'impact certification sur le travail dans les services? Sur le travail des infirmières?

- Quelles sont les avantages et inconvénients sur le travail quotidien des infirmières?

- Que pensez-vous personnellement sur le rôle certification dans l'organisation et management du travail? L'amélioration de pratique des professionnels? et la prise en charge de patient ?

V- Quelles seraient vos suggestions pour améliorer la démarche d'implémentation de certification?

VI- Voulez-vous ajouter d'autre chose?

Guide d'entretien infirmière (version francais)

Objet et intérêt: notre sujet de recherche porte des questions sur les démarches de qualité aux hôpitaux, dont on prend l'exemple la certification. Cette entretien sera destiné à bien comprend la stratégie d'implémentation de démarche de qualité et procédure « certification » et son impact sur le travail des infirmières. Ce travail se repose sur une discussion d'environ 30 min sur ce thème.

Méthodes et Confidentialité: l'entretien sera enregistré, transcrit puis analysée directement. Nous nous confirmons la confidentialité des personnels rencontrés, toutes les informations de l'entretien seront conservées en anonymat et non-interchangeable, après l'exploitation des informations.

I. **Présentation professionnel**: présentation personnel et professionnel, quelle est votre expérience et histoire du travail en général?

II. Démarche de qualité:

- Que représente pour vous la qualité de prise charge en général et la qualité des soins?
- Pourquoi c'est important à votre avis?
- Quel est votre rôle dans la démarche qualité? Comment cela se passe en pratique, les éléments et les actions que vous exécutez?
- Comment se fait la mise en œuvre d'un démarche qualité a votre service? Pouvez-vous expliquer?

III. Certification:

- Que représente la procédure de certification pour vous? Parlez-moi sur votre dernière expérience?
- Pouvez-vous m'expliquez comment se fait la préparation dans votre service pour la nouvelle certification?
- Pouvez-vous détailler le processus de mise en œuvre de procédures de certification? Quels dispositifs sont pris en compte et par qui? Pouvez-vous détailler un exemple?
- Quelle est votre rôle dans le processus de l'implémentation de ces procédures?

- Quelle sont les barrières pour vous personnellement devant l'intégration et adoption de ces procédures dans vos quotidiennes? Et quelles sont les éléments qui favorisent une implémentation effective?
- Quelles sont les éléments clés facilitateurs et les barrières pour un processus de changement au niveau local de travail des infirmières?

IV- Impact certification:

- Comment vous trouvez l'impact certification sur le travail dans les services? Sur votre travail en général? Et votre quotidiennes?

- Que pensez-vous personnellement sur le rôle certification dans l'organisation et management du travail? L'amélioration de pratique des professionnels? Et la prise en charge de patient?

V- Quelles seraient vos suggestions ou recommandations pour améliorer la démarche d'implémentation de certification?

VI- Voulez-vous ajouter d'autre chose?

2. Consent form

FORMULAIRE DE CONSENTEMENT

POUR LA PARTICIPATION A UN ENTRETIEN

Titre de la recherche: L'impact de la certification sur le travail hospitalière des infirmiers.

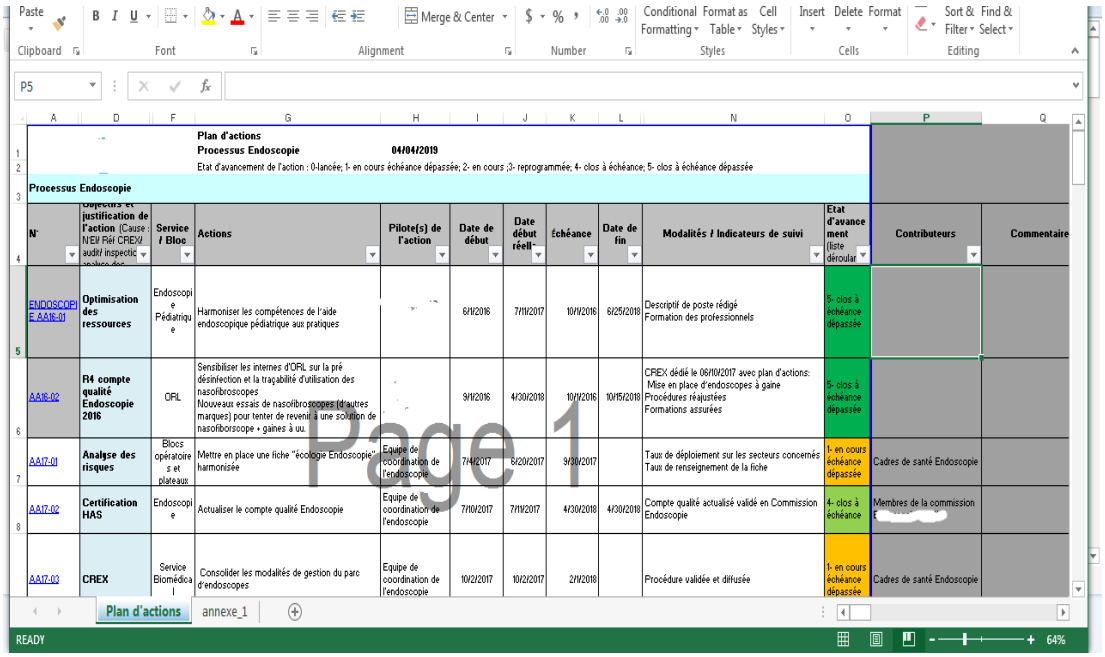
Je soussigné (e) …… *(nom et prénom)* accepte de participer à un entretien individuel et certifie avoir compris les modalités et objectifs de l'étude tels que présentés par Madame Israa SALMA, doctorante à l'EHESP.

Je certifie également autoriser l'enquêteur à analyser de manière anonyme le contenu de notre échange qui s'est déroulé le ……. à…….

Fait à ……., le ……

Nom et signature de l'investigateur *Signature du (de la) Participant (e)*

Israa SALMA



Plan d'actions

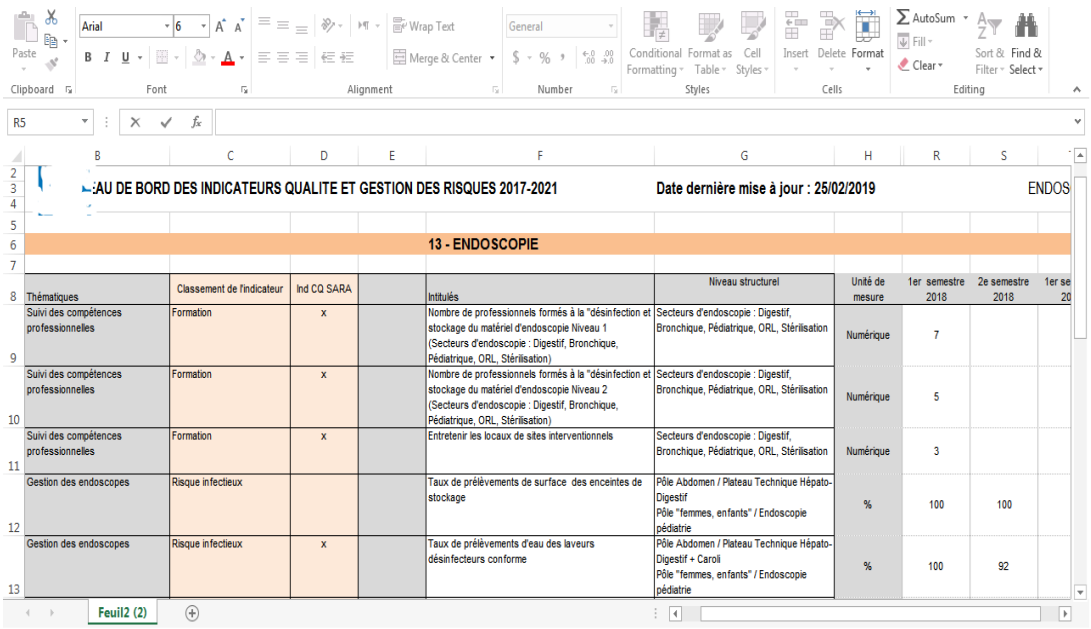
Processus Endoscopie 04/04/2019

Etat d'avancement de l'action : 0-lancée; 1- en cours échéance dépassée; 2- en cours ;3- reprogrammée; 4- clos à échéance; 5- clos à échéance dépassée

Processus Endoscopie

N°	Objectifs et justification de l'action (Cause : N'EV Rét CREX audit/ inspectio	Service / Bloc	Actions	Pilote(s) de l'action	Date de début	Date début réel	échéance	Date de fin	Modalités / Indicateurs de suivi	Etat d'avancement (liste déroular	Contributeurs	Commentaire
ENDOSCOPIE AA16-01	Optimisation des ressources	Endoscopie Pédiatrique	Harmoniser les compétences de l'aide endoscopique pédiatrique aux pratiques		6/1/2016	7/11/2017	10/1/2016	6/25/2018	Descriptif de poste rédigé Formation des professionnels	5- clos à échéance dépassée		
AA16-02	R4 compte qualité Endoscopie 2016	ORL	Sensibiliser les internes d'ORL sur la pré désinfection et la traçabilité d'utilisation des nasofibroscopes Nouveaux essais de nasofibroscopes (d'autres marques) pour tenter de revenir à une solution de nasofibroscope + gaines à uu.		9/1/2016	4/30/2018	10/1/2016	10/15/2018	CREX dédié le 06/10/2017 avec plan d'actions: Mise en place d'endoscopes à gaine Procédures réajustées Formations assurées	5- clos à échéance dépassée		
AA17-01	Analyse des risques	Blocs opératoires et plateaux	Mettre en place une fiche "écologie Endoscopie" harmonisée	Equipe de coordination de l'endoscopie	7/4/2017	8/20/2017	9/30/2017		Taux de déploiement sur les secteurs concernés Taux de renseignement de la fiche	1- en cours échéance dépassée	Cadres de santé Endoscopie	
AA17-02	Certification HAS	Endoscopie	Actualiser le compte qualité Endoscopie	Equipe de coordination de l'endoscopie	7/10/2017	7/11/2017	4/30/2018	4/30/2018	Compte qualité actualisé validé en Commission Endoscopie	4- clos à échéance	Membres de la commission E	
AA17-03	CREX	Service Biomédical	Consolider les modalités de gestion du parc d'endoscopes	Equipe de coordination de l'endoscopie	10/2/2017	10/2/2017	2/1/2018		Procédure validée et diffusée	1- en cours échéance dépassée	Cadres de santé Endoscopie	

Figure 1: Collected documents (action plan)



:AU DE BORD DES INDICATEURS QUALITE ET GESTION DES RISQUES 2017-2021 Date dernière mise à jour : 25/02/2019 ENDOS

13 - ENDOSCOPIE

Thématiques	Classement de l'indicateur	Ind CQ SARA		Intitulés	Niveau structurel	Unité de mesure	1er semestre 2018	2e semestre 2018	1er se 20
Suivi des compétences professionnelles	Formation	x		Nombre de professionnels formés à la "désinfection et stockage du matériel d'endoscopie Niveau 1 (Secteurs d'endoscopie : Digestif, Bronchique, Pédiatrique, ORL, Stérilisation)	Secteurs d'endoscopie : Digestif, Bronchique, Pédiatrique, ORL, Stérilisation	Numérique	7		
Suivi des compétences professionnelles	Formation	x		Nombre de professionnels formés à la "désinfection et stockage du matériel d'endoscopie Niveau 2 (Secteurs d'endoscopie : Digestif, Bronchique, Pédiatrique, ORL, Stérilisation)	Secteurs d'endoscopie : Digestif, Bronchique, Pédiatrique, ORL, Stérilisation	Numérique	5		
Suivi des compétences professionnelles	Formation	x		Entretenir les locaux de sites interventionnels	Secteurs d'endoscopie : Digestif, Bronchique, Pédiatrique, ORL, Stérilisation	Numérique	3		
Gestion des endoscopes	Risque infectieux			Taux de prélèvements de surface des enceintes de stockage	Pôle Abdomen / Plateau Technique Hépato-Digestif Pôle "femmes, enfants" / Endoscopie pédiatrie	%	100	100	
Gestion des endoscopes	Risque infectieux	x		Taux de prélèvements d'eau des laveurs désinfecteurs conforme	Pôle Abdomen / Plateau Technique Hépato-Digestif + Caroli Pôle "femmes, enfants" / Endoscopie pédiatrie	%	100	92	

Figure 2: Collected documents (Tableau de Bord)

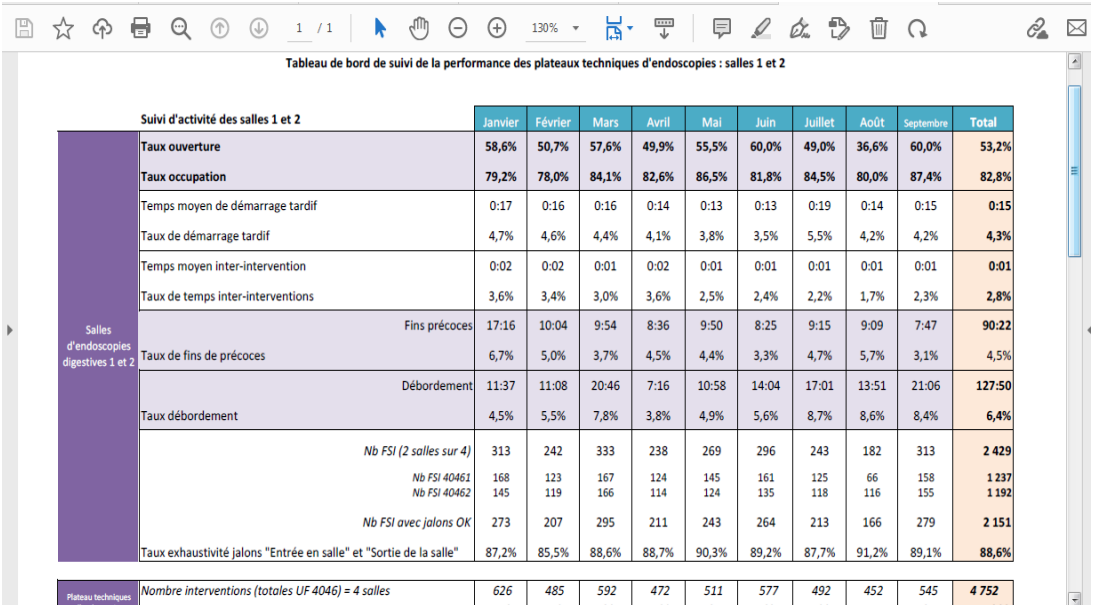


Tableau de bord de suivi de la performance des plateaux techniques d'endoscopies : salles 1 et 2

	Suivi d'activité des salles 1 et 2	Janvier	Février	Mars	Avril	Mai	Juin	Juillet	Août	Septembre	Total
Salles d'endoscopies digestives 1 et 2	**Taux ouverture**	**58,6%**	**50,7%**	**57,6%**	**49,9%**	**55,5%**	**60,0%**	**49,0%**	**36,6%**	**60,0%**	**53,2%**
	Taux occupation	**79,2%**	**78,0%**	**84,1%**	**82,6%**	**86,5%**	**81,8%**	**84,5%**	**80,0%**	**87,4%**	**82,8%**
	Temps moyen de démarrage tardif	0:17	0:16	0:16	0:14	0:13	0:13	0:19	0:14	0:15	**0:15**
	Taux de démarrage tardif	4,7%	4,6%	4,4%	4,1%	3,8%	3,5%	5,5%	4,2%	4,2%	**4,3%**
	Temps moyen inter-intervention	0:02	0:02	0:01	0:02	0:01	0:01	0:01	0:01	0:01	**0:01**
	Taux de temps inter-interventions	3,6%	3,4%	3,0%	3,6%	2,5%	2,4%	2,2%	1,7%	2,3%	**2,8%**
	Fins précoces	17:16	10:04	9:54	8:36	9:50	8:25	9:15	9:09	7:47	**90:22**
	Taux de fins de précoces	6,7%	5,0%	3,7%	4,5%	4,4%	3,3%	4,7%	5,7%	3,1%	4,5%
	Débordement	11:37	11:08	20:46	7:16	10:58	14:04	17:01	13:51	21:06	**127:50**
	Taux débordement	4,5%	5,5%	7,8%	3,8%	4,9%	5,6%	8,7%	8,6%	8,4%	**6,4%**
	Nb FSI (2 salles sur 4)	313	242	333	238	269	296	243	182	313	**2 429**
	Nb FSI 40461	168	123	167	124	145	161	125	66	158	**1 237**
	Nb FSI 40462	145	119	166	114	124	135	118	116	155	**1 192**
	Nb FSI avec jalons OK	273	207	295	211	243	264	213	166	279	**2 151**
	Taux exhaustivité jalons "Entrée en salle" et "Sortie de la salle"	87,2%	85,5%	88,6%	88,7%	90,3%	89,2%	87,7%	91,2%	89,1%	**88,6%**
Plateau techniques	*Nombre interventions (totales UF 4046) = 4 salles*	*626*	*485*	*592*	*472*	*511*	*577*	*492*	*452*	*545*	***4 752***

Figure 3: Indicator for nurses performance (traceablilty sheet)

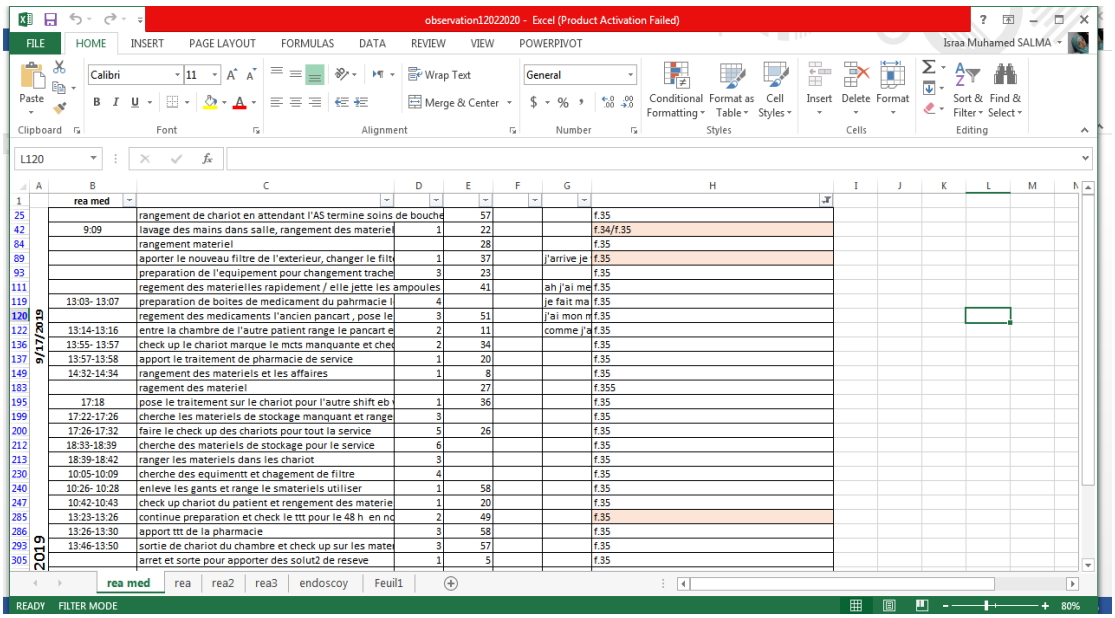


Figure 4: Primary analyis of observations

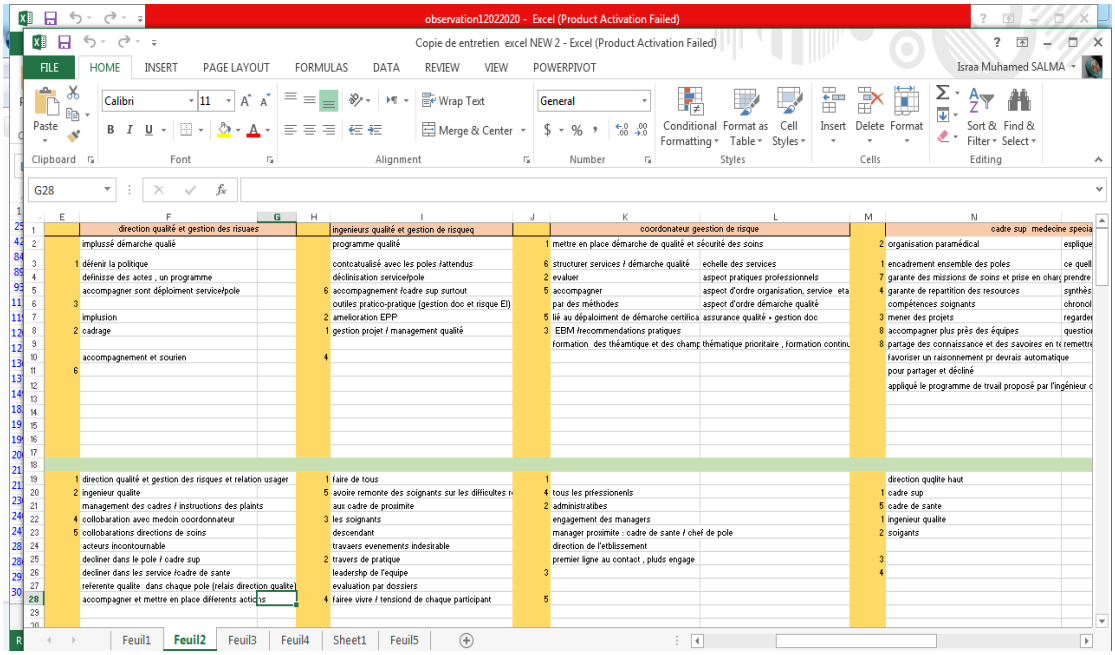


Figure 5: Primary analysis of narratives (managers)

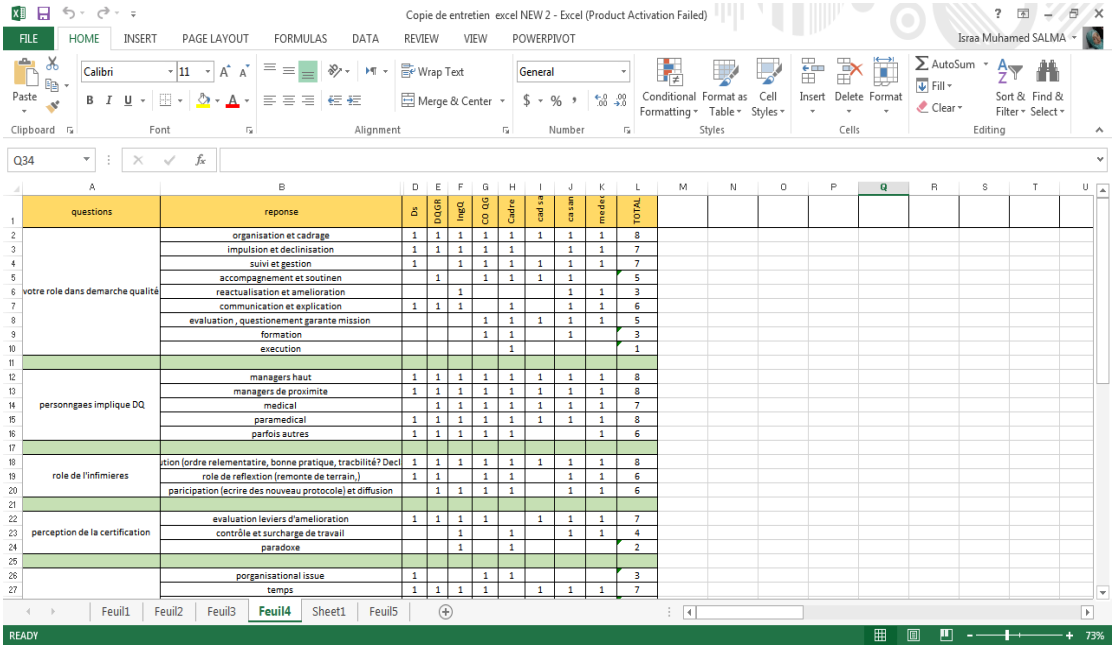


Figure 6: Primary synthesis of interviews (managers)

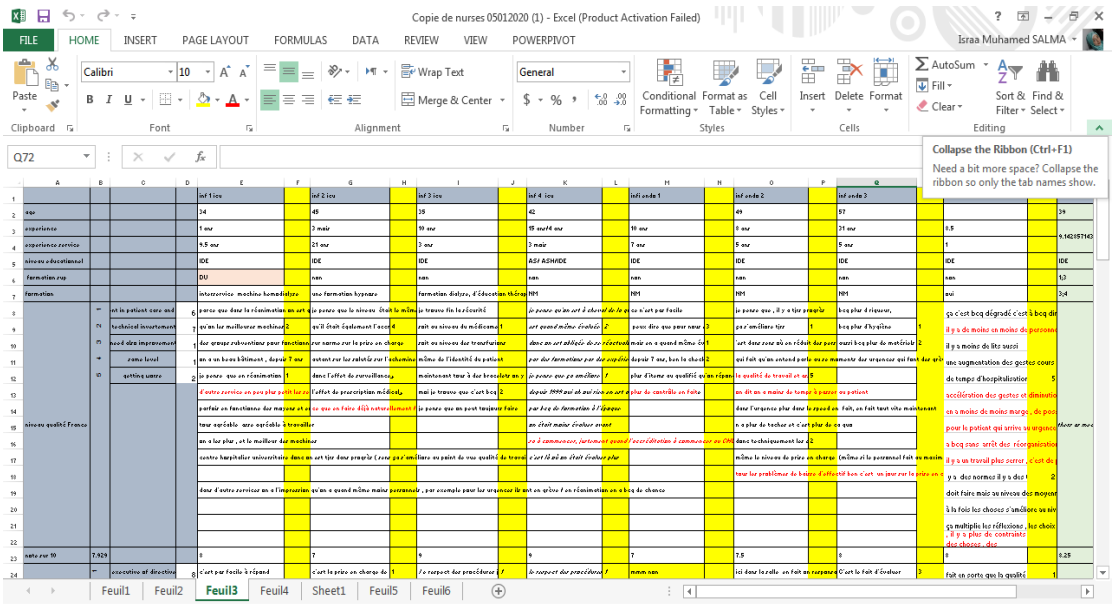


Figure 7: Primary analysis of narratives (nurses)

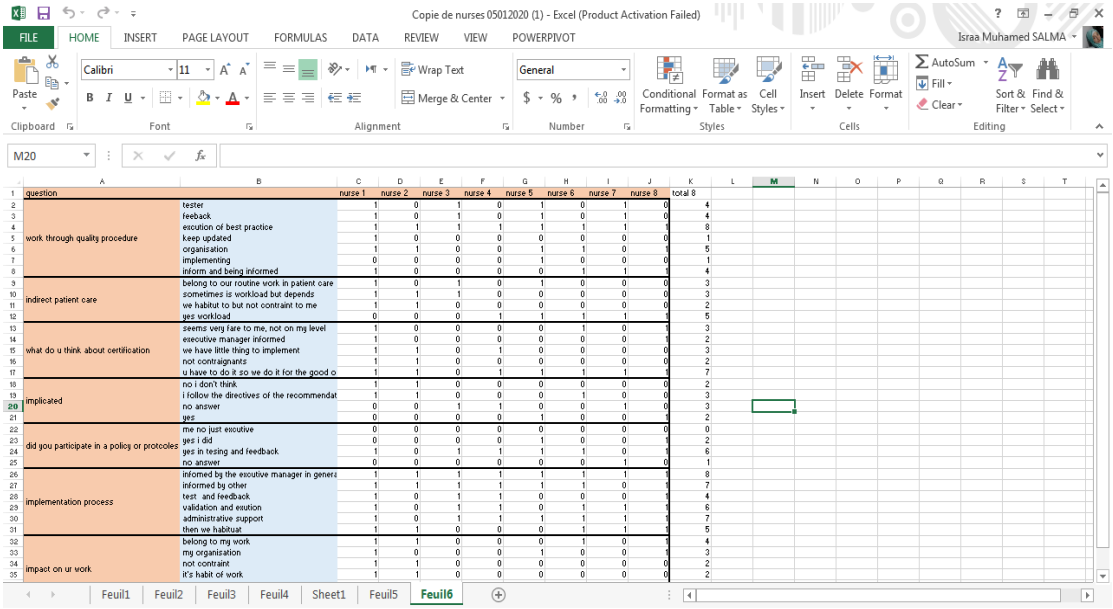


Figure 8: Primary synthesis of interviews (Nurses)

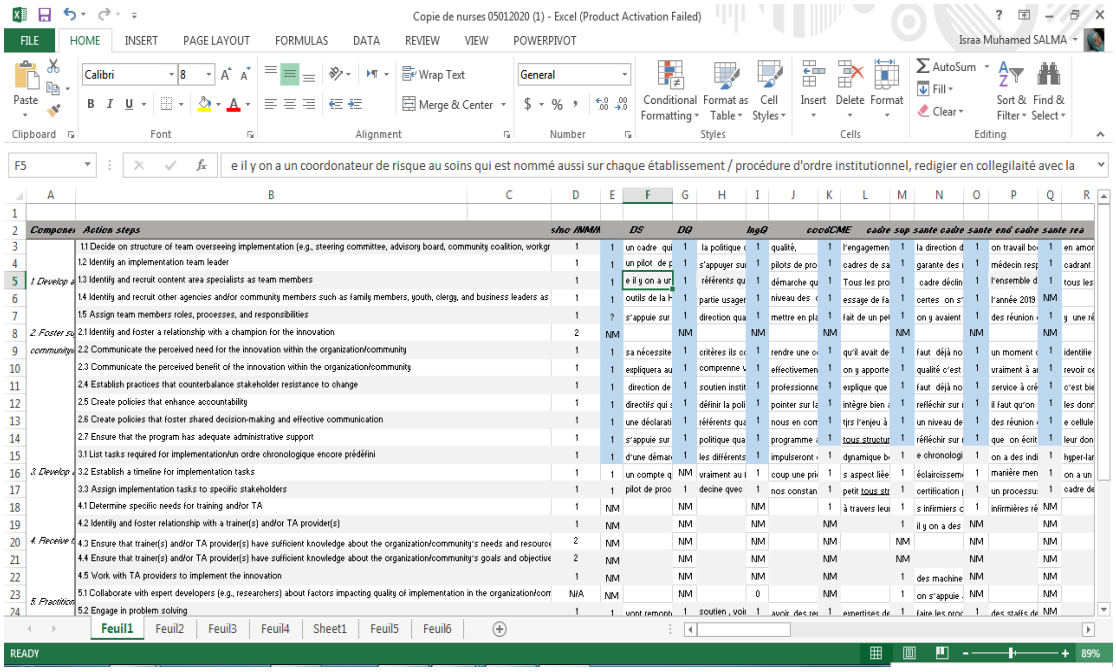
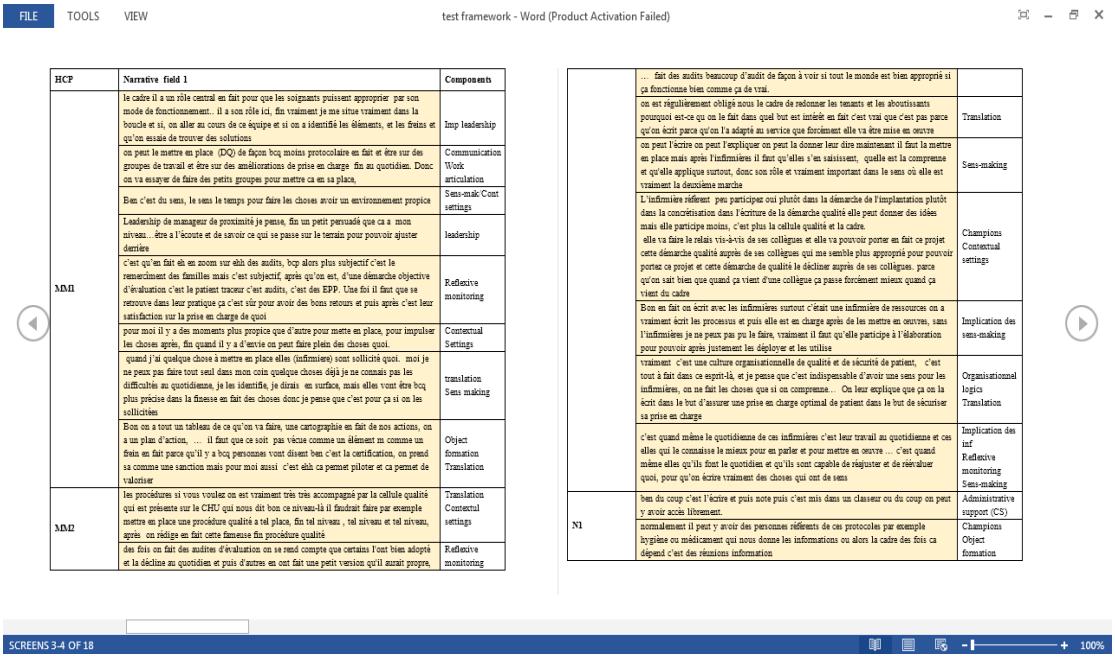


Figure 9: Analysis of emerged themes according to Quality Implementation Tool (QIT)

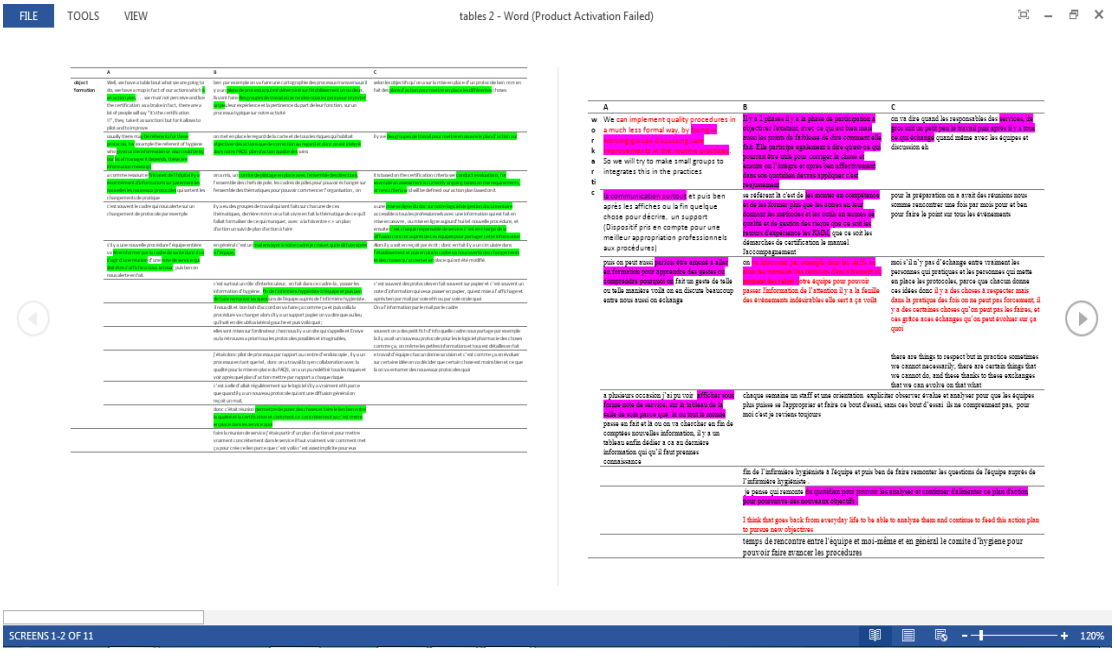
Appendix Chapter III



HCP	Narrative field 1	Components
MM	le cadre il a un rôle central en fait pour que les soignants puissent approprier par son mode de fonctionnement... il a son rôle ici, fin vraiment je me situe vraiment dans la boucle et si, on aller au cours de ce équipe et si on a identifié les éléments, et les freins et qu'on essaie de trouver des solutions	Imp leadership
	on peut le mettre en place (DQ) de façon bcq moins protocolaire en fait et être sur des groupes de travail et être sur des améliorations de prise en charge fin au quotidien. Donc on va essayer de faire des petits groupes pour mettre ca en sa place,	Communication Work articulation
	Ben c'est du sens, le sens le temps pour faire les choses avoir un environnement propice	Sens-mak Cont settings
	Leadership de manageur de proximité je pense, fin un petit persuadé que ca a mon niveau... être a l'écoute et de savoir ce qui se passe sur le terrain pour pouvoir ajuster derrière	leadership
	c'est qu'en fait eh en zoom sur ehh des audits, bcp alors plus subjectif c'est le remerciment des familles mais c'est subjectif, après qu'on est, d'une démarche objective d'évaluation c'est le patient traceur c'est audits, c'est des EPP. Une fois il faut que se retrouve dans leur pratique ça c'est sûr pour avoir des bons retours et puis après c'est leur satisfaction sur la prise en charge de quoi	Reflexive monitoring
	pour moi il y a des moments plus propice que d'autre pour mette en place, pour impulser les choses après, fin quand il y a d'envie on peut faire plein des choses quoi.	Contextual Settings
	quand j'ai quelque chose à mettre en place elles (infirmière) sont sollicité quoi. moi je ne peux pas faire tout seul dans mon coin quelque choses déjà je ne connais pas les difficultés au quotidienne, je les identifie, je dirais en surface, mais elles vont être bcq plus précise dans la finesse en fait des choses donc je pense que c'est pour ça si on les sollicitées	translation Sens making
	Bon on a tout un tableau de ce qu'on va faire, une cartographie en fait de nos actions, on a un plan d'action, ... il faut que ce soit pas vécue comme un élément m comme un frein en fait parce qu'il y a bcq personnes vont disent ben c'est la certification, on prend sa comme une sanction mais pour moi aussi c'est ehh ca permet piloter et ca permet de valoriser	Object formation Translation
MM	les procédures si vous voulez on est vraiment très très accompagné par la cellule qualité qui est présente sur le CHU qui nous dit bon ca suivant-là il faudrait faire par exemple mettre en place une procédure qualité a tel place, fin tel niveau , tel niveau et tel niveau, après on rédige en fait cette fameuse fin procédure qualité	Translation Contextul settings
	des fois on fait des audites d'évaluation on se rend compte que certains l'ont bien adopté et la décline au quotidien et puis d'autres en ont fait une petit version qu'il aurait propre,	Reflexive monitoring

	... fait des audits beaucoup d'audit de façon à voir si tout le monde est bien approprié si ça fonctionne bien comme ça de vrai.	
	on est régulièrement obligé nous le cadre de redonner les tenants et les aboutissants pourquoi est-ce qu on le fait dans quel but est intéréé en fait c'est vrai que c'est pas parce qu'on écrit parce qu'on l'a adapté au service que forcément elle va être mise en oeuvre	Translation
	on peut l'écrire on peut l'expliquer on peut la donner leur dire maintenant il faut la mettre en place mais après l'infirmières il faut qu'elles s'en saisissent, quelle est la comprenne et qu'elle applique surtout, donc son rôle et vraiment important dans le sens où elle est vraiment la deuxième marche	Sens-making
	L'infirmière réfèrent peu participez oui plutôt dans la démarche de l'implantation plutôt dans la concrétisation dans l'écriture de la démarche qualité elle peut donner des idées mais elle participe moins, c'est plus la cellule qualité et la cadre. elle va faire le relais vis-à-vis de ses collègues et elle va pouvoir porter en fait ce projet cette démarche qualité auprès de ses collègues qui me semble plus approprié pour pouvoir portez ce projet et cette démarche de qualité la décliner auprès de ses collègues. parce qu'on sait bien que quand ça vient d'une collègue ça passe forcément mieux quand ça vient du cadre	Champions Contextual settings
	Bon en fait on écrit avec les infirmières surtout c'était une infirmière de ressources on a vraiment écrit les processus et puis elle est en charge après de les mettre en oeuvres, sans l'infirmières je ne peux pas pu le faire, vraiment il faut qu'elle participe à l'élaboration pour pouvoir après justement les déployer et les utilise	Implication des sens-making
	vraiment c'est une culture organisationnelle de qualité et de sécurité de patient, c'est tout à fait dans ce esprit-là, et je pense que c'est indispensable d'avoir une sens pour les infirmières, on ne fait les choses que si on comprenne... On leur explique que ça on la écrit dans le but d'assurer une prise en charge optimal de patient dans le but de sécuriser sa prise en charge	Organisationnel logics Translation
	c'est quand même le quotidienne de ces infirmières c'est leur travail au quotidienne et ces elles qui le connaisse le mieux pour en parler et pour mettre en oeuvre ... c'est quand même elles qu'ils font le quotidien et qu'ils sont capable de réajuster et de réévaluer quoi, pour qu'on écrire vraiment des choses qui ont de sens	Implication des inf Reflexive monitoring Sens-making
N1	ben du coup c'est l'écrire et puis note puis c'est mis dans un classeur ou du coup on peut y avoir accès litrement.	Administrative support (CS)
	normalement il peut y avoir des personnes référents de ces protocoles par exemple hygiène ou médicament qui nous donne les informations ou alors la cadre des fois ca dépend c'est des réunions information	Champions Object formation

Figure 1: Analysis of narratives according to IFINP components.



	A	B	C
work practice	We can implement quality procedures in a much less formal way, by having working groups discussing our improvements in the routine practices. So we will try to make small groups to integrates this in the practices	Il y a 2 phases il y a la phase de participation à objectiver l'existant, avec ce qui est bien noté noté les points de férbleau de dire comment ça fait. Elle participe également à dire qu'est-ce qui pourrait être utile pour corriger le chose et ensuite on l'intègre et après les effectivement dans son quotidien devrais appliquer cela normalement	on va dire quand les responsables des services, de pole voit un petit peu le travail puis après il y a nos de qui échange quand même avec les équipes et discussion eh
	Programme initiation suivisuit et puis ben après les affiches ou la fin quelque chose pour décrire, un support (Dispositif pris en compte pour une meilleur appropriation professionnels aux procédures)	se référerait là c'est de se montrer en compétence et de les former plus que les autres en les donnant les méthodes et les outils en termes de qualité et de gestion des risque que ce soit les retours d'expérience les EPP, que ce soit les démarches de certification le manuel d'accompagnement	pour la préparation on a avait des réunions nous somme rencontrer une fois par mois pour et ben pour faire le point sur tous les événements
	puis on peut aussi parfois être amené à aller en formations pour apprendre des gestes ou compétences pour on fait un geste de telle ou telle manière voilà on en discute beaucoup entre nous aussi on échange	on [illegible] par exemple dans les staffs on parle des moments où on a besoin d'un référent [illegible] notre équipe pour pouvoir passer l'information de l'situation il y a la famille des événements indésirables ils sont à ça voilà	moi s'il n'y pas d'échange entre vraiment les personnes qui pratiques et les personnes qui mette en place les protocoles, parce que chacun donne ces idées donc il y a des choses à respecter mais dans la pratique des fois on ne peut pas forcement, il y a des certaines choses qu'on peut pas les faires, et ces gros axes échanges qu'on peut avoiser sur ça quoi there are things to respect but in practice sometimes we cannot necessarily, there are certain things that we cannot do, and these thanks to these exchanges that we can evolve on that what
	a plusieurs occasion j'ai pu voir effectuer une forme sorte de service, via le tableau de la salle de soin parce que. Je ou tout le monde passe un fait et là ou on va chercher un fin de comptées nouvelles information, il y a un tableau enfin déclar a ce au dernière information qui qu'il faut prennes connaissance	chaque semaine un staff et une orientation expliciter observer évaluer et analyser pour que les équipes plus puisse se l'approprier et faire ce bout d'essai, sans ces bout d'essai ils ne comprennent pas, pour moi c'est je reviens toujours	
		fin de l'infirmière hygiéniste à l'équipe et puis ben de faire remonter les questions de l'équipe auprès de l'infirmière hygiéniste	
		je pense qui remonte les questions pour pouvoir les analyser et continuer d'alimenter ce plan d'action pour pouvoir les soutenir objectifs	
		I think that goes back from everyday life to be able to analyse them and continue to feed this action plan to pursue new objectives	
		temps de rencontre entre l'équipe et moi-même et en général le comité d'hygiène pour pouvoir faire avancer les procédures	

Figure 2: Comparative analysis of three sites using the IFINP elements (1)

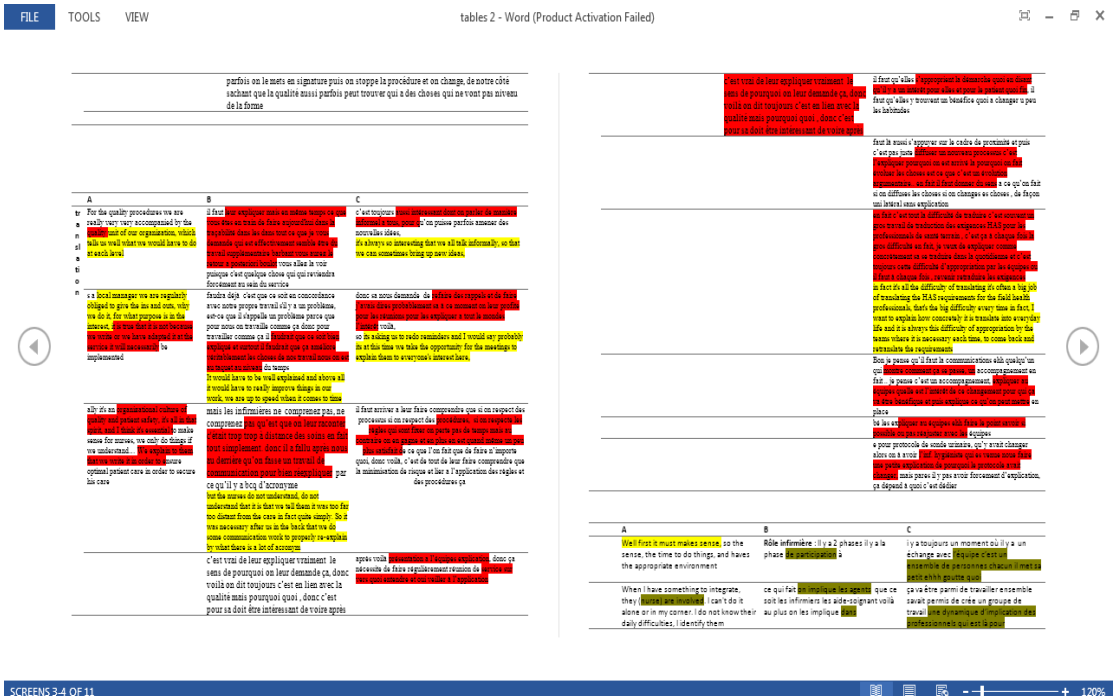


Figure 3: comparative analysis of three sites using the IFINP elements (2)