Nurse-driven innovation and the effect of bottom-up decision-making structure in hospitals

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ABSTRACT

Background: Nurses provide around 80% of care in hospitals and are the main undertakers of hospital processes and users of technology. Nurses are a diverse, knowledgeable and experienced group, however, they are often not listened to and not involved in decision-making processes.
Objective: The objective of this research is to understand how involving nurses, through a bottom-up decision-making approach may contribute to employee-driven innovation within hospitals in the Netherlands.
Materials and methods: 8 interviews were conducted with 7 nurses in the Netherlands and 1 nurse in the US.
Findings: Nurses generally agree that not enough recognition takes place and that decisions made on their behalf can create negative effects such as lack of motivation, the feeling of hopelessness and lack of employee retention.
Furthermore, it is believed that hospitals need to implement teams, educators, coaches and lines of communication within the hospital hierarchy to increase collaboration and communication. Allowing for nurse involvement in decision-making will lead to higher levels of satisfaction, employee retention and motivation. Overall, it is agreed that nurses are a creative, diverse and motivated group. Furthermore, nurses with less experience in their job positions are often not involved in any strategic meetings, and only operational meetings. Examples were given of how nurses can create profound effects when involved in decision-making early on in projects, which have increased the productivity of workspaces, as well as introduced new processes, layouts and technologies.
Conclusion: A bottom-up approach to decision-making assists in creating a motivated, satisfied and innovative workforce, furthermore, in creating nurse-driven innovation it is required to implement educators, coaches and innovation-based teams as well as create lines of communication and strategy focused meetings throughout hospitals, however, a major concern of nurses is their lack of time for non-patient related business. All in all, driving nurse innovation through a bottom-up approach is in favour of all parties involved, the hospitals, the nurses, the patients and the overall healthcare system. Furthermore, this research and the results are in line with the previous studies of Høyrup (2010-2012) in which employee-driven innovation was introduced in detail.

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Keywords
Employee-Driven Innovation, Nurse Innovation, Bottom-up Approach, Healthcare Innovation, Decision-making, Human Resource management

1. INTRODUCTION

1.1 Problem statement

Innovation in healthcare is one of the most important aspects of society, allowing for a higher quality of life and the longevity of humanity, however the role of innovation is often not linked with nurses. Nurses provide about 80% of care and are a link between patients and processes (Hughes 2006). Everyday activities that are undertaken by nurses are so vast and diverse meaning that nurses are able to see, experience and understand processes that no one else in hospitals have to. Understanding the role of nurses in hospitals, how their diverse knowledge can be harnessed, and nurse innovation can be driven, may be a crucial feat for hospitals to undertake in offering high quality care.

Innovation is seen as the attempt of developing and introducing a new and improved way of doing something and this development can occur at multiple levels such as the individual, work team and organizational level (Anderson et al. 2014). Essentially, it can be seen as the intentional introduction and application within a role, group or organization of ideas, processes, products or procedures, new to that unit of adoption, designed to significantly benefit role performance, the group, the organization or the wider society (West & Farr, 1989). In addition, Schilling (2016) states that among others, individual employees are an important source of innovation.

More specifically, work-floor employees are one of the important drivers of innovation which is also referred to as employee-driven innovation (EDI). This term is generally used to reference innovation that describes multiple types of employee involvement in innovative efforts (Høyrup, 2012). EDI follows the assumption that all employees are potential sources for innovation (Evans & Waite, 2010).
Høyrup (2010), further states that the drivers of EDI are expertise, experience, ideas, creativity and skills of firm employees. In addition, EDI is characterized by high involvement of the employees. High involvement and high participation are often relating to how decisions are made such as task allocation and authority (Høyrup, 2010).

An approach that can be taken when attempting to create high participation is involving employees in decision-making processes. This form of decision-making can also be called bottom-up decision-making, which is the opposite of a top-down approach to decision-making; instead of setting goals before determining the process and leaving the management to make decisions on their own, there is instead an input in this decision-making from multiple levels (Zeiger, n.d.). These decisions, projects and goals are then further communicated and assessed alongside management. This decision-making approach is a way of involving employees within an organization, at all levels.

An industry which is of interest due to the importance of innovation is healthcare (Taylor et al., 2020). This is because the healthcare industry, specifically hospitals work directly with patients on a day-to-day basis in helping individuals with their medical needs. This industry relies on not only on medicine and medical knowledge but also the supporting technology be it medical equipment or even databases in which patient information is stored. Furthermore, the healthcare system relies on caregivers and medical professionals to understand how these processes are undertaken. Within hospitals one can find a variety of professionals such as doctors, surgeons, and other specialized professionals, however research shows that nurses provide the majority of care.

Due to their vast involvement in hospital processes, nurses become a prime employee type to focus on, as their reach in the medical field is extensive.
Combining the importance of nurses and employee-driven innovation, it becomes a valuable aspect for management to understand how organizational structure and practices can harness the benefits that may occur, such as increased motivation, shared knowledge, organizational commitment and satisfaction of self-actualization and fulfillment (Tzu-Shian, Hsu-Hsin & Aihwa, 2010). A study done by Johansen et al. (2019) states that there is a positive relationship between involving medical professionals in decision-making and this has a positive impact on performance in hospitals.

The idea that the involvement of medical professionals in decision-making can be directly correlated to a study done by
Ford (2002) in which innovation in the healthcare sector should be seen as a networked approach. This means there should be a collaborative effort between companies and different stakeholders, such as including the perspectives of patients, doctors and engineers. Furthermore, a bottom-up approach is becoming a relevant topic of discussion.
In recent times, stakeholders of public healthcare are taking a closer look at a bottom-up approach to innovation, as a top-down model of innovation is failing to deliver effective change, as a way to resolve problems of healthcare (Taylor et al., 2020). In the UK, the National Medical Director stated that many of the problems of the NHS are solvable if the collective intelligence of over 1.4 million medical staff is utilized (Taylor et al., 2020).
Høyrup, (2012) further highlights the centrality of team-based and collective working practices to the innovation process, and the focus is on staff at all levels, and not primarily on those in research and development or roles specific in creating innovation.
Furthermore, addressing issues from the bottom up allows nurses the ability to speak up and drive innovative behavior towards improving everyday processes. The direct involvement of nurses, and the ability to harness their experience, understanding of hospital processes, ideas and motivation will greatly benefit the workspace as they are the main source of care in hospital settings.

1.2 Research objective

The overall aim of this research was to answer the research question “How can a bottom-up decision-making approach contribute to employee-driven innovation of hospital nurses?”. Here, the aim was to understand how the effects of a bottom-up approach of employees in strategic and everyday decision-making, from the practicing medical level in healthcare, nurses, will have on employee-driven innovation.

This question has multiple facets which were investigated and was therefore broken down into sections of knowledge within the research. The two main concepts in this research are EDI and a bottom-up decision-making approach. EDI is a bottom-up approach; however, within this research the aim was to investigate the specific aspect of decision-making within EDI. EDI itself follows the belief that all employees are a source of innovation and to take a closer look as to how involving said employees in decision-making may contribute to higher levels of EDI.

The aim of this research was to answer the question from the perspective of the nurse, and their view on how they believe involvement in decision-making plays a role towards EDI. An example of a result may be that involving employees in bottom-up decision-making increases the sense of responsibility and inner motivation, therefore creates benefits in driving innovation or that decision-making harms innovative efforts as nurses are overwhelmed with workload.

1.3 Contributions

The overall contribution of this research was to expand the academic knowledge of EDI in terms of healthcare.
The academic studies regarding EDI and nurses were limitedly explored and therefore this thesis expanded this field of knowledge. The basis of this research was that of Høyrup, (2010), in which he studied EDI as a concept, however not in the field of healthcare. The ideas of Høyrup within the EDI sector of academia will be compared to that of nurse-driven innovation for nurses in hospitals.

Taking a look at search results on Google Scholar for "nurse-driven innovation" and "employee-driven innovation" one can decipher the approximate difference in focus, seeing that nurse-driven innovation yields a mere eighth of the results of that of employee-driven innovation. The research was focused and specified, as the environment, pressure and overall work structure of a nurse in a medical setting is different to that of other industries, therefore when management may be looking at implementing methods of increasing employee-driven innovation, different strategies may take place within a healthcare setting compared to a regular office environment. This may be because hospitals are a clinical environment and hold great direct responsibility for the health and welfare of individuals and communities.

2. LITERATURE

2.1 Innovation in healthcare

Healthcare innovation, as stated by Thakur et al. (2012) is defined as those changes that help healthcare practitioners focus on the patient by helping healthcare professionals work smarter, faster, better and more cost-effectively. There are multiple types of healthcare innovation that can also be applied to the healthcare sector being incremental or radical Schilling (2016) as well as product, paradigm, process and position (Baregheh, 2016).

Innovation, according to Schilling (2016), has multiple sources being firms, individuals, universities, private non-profits and government funded research.

However, not only are the sources of innovation crucial, but also the source of funding and the type of innovation. For example, it may be that there is a difference in competitiveness between healthcare in private hospitals versus public hospitals. Tynkkynen et al. (2018) concluded with a study, that out of over 5500 samples of hospitals, public hospitals within the EU generally performed better in terms of technology and efficiency and economic performance. The authors explained it by stating that it is possible that public funding guarantees are the key driver to explain the differences. Public funding allows for higher investments without being consequently closer to insolvency than private hospitals. With efficiency in technology and economy, these hospitals may be able to invest in innovative practices within their workspaces. An area of innovation in hospitals are employees, this term is generally referred to as EDI; employee-driven innovation.

2.1.1 Employee-Driven Innovation in healthcare

Employee-driven innovation in healthcare has its foundation within the roots of EDI as a general concept. According to Høyrup (2010) and Kesting and Ulhøi (2010), Employee-Driven Innovation (EDI) can be seen as the generation and implementation of new ideas, products, services and/or processes across organizational levels. These ideas originate from one or more employees who generally are not required to undertake these activities.

Høyrup (2012) states that EDI arises from everyday culture and work practice, the ways workers enact their jobs and aim to be accomplished within their organizations. An important factor is that employees are continuously upgrading their skills formally and informally. Furthermore, EDI is based on the assumption that every employee can be a source of creativity and innovation when organizations provide the right support (Evans & Waite, 2010). In addition, De Jong and Den Hartog (2007) state that employee innovative behaviour is the beginning to create innovative ideas, be it incremental or radical.

As stated by Birkinshaw (2013) employee-driven innovation generally occurs apart from the formal job description. This activity which is not necessarily formalized may create a feeling of independence and may drive creativity. A study conducted by Valencia et al. (2011) focused on the effect that organizational structure has on employee innovation, in which it was discovered that adhocracy structure proved to incubate more innovation rather than hierarchical structures. Understanding the presence of this structure is important, as the term "bottom-up" and "top-down" imply there is a form of organizational structure that places management above other employees. Moreover, organizational structure may imply there is structure in decision-making, too.

EDI has focus on ideas, involvement and participation of employees in the process of innovation implementation in their organizations (Renkema, 2018). Moreover, within EDI, it is required that employees share, interact and coordinate their ideas across organizational levels (Renkema, 2018). A paper written by de Jong and den Hartog (2010), concludes that participative leadership increases intrinsic motivation of employees as well as their feelings of responsibility, efficacy

and control. This, in turn, is likely to enhance employees' innovative behavior in the workplace. On the other hand, Høyrup (2010) believes that direct participation is still primarily a management strategy and not equivalent to employee-driven innovation, in addition, direct participation can generate commitment, motivation and cooperation and create innovative behaviour.
Important to note is a statement made by Høyrup (2010) in which it was concluded that creativity, ideas and competence as well as problem solving are the main drivers of employee-driven innovation, as this is what would be tapped into with a bottom-up decision-making approach.

In conclusion, EDI is an "umbrella concept" that covers a broad range of innovation processes and issues (Høyrup, 2010), which can also be seen as a form of direct participation in which the employee takes the initiative to develop and implement changes. The belief is that every employee is a potential source of innovation.

2.2 Bottom-up decision-making involvement in hospitals

A part of viewing every employee as a source of innovation requires that employees are able to share their ideas in form of decision-making.
Decision-making is an integral part of our lives and can take many forms. As stated by BBC news Decision-making types can be broken down into three categories, being strategic, tactical and operational. Operational decisions are day-to-day, simple and routine decisions such as ordering of supplies often undertaken by "junior managers". Tactical decisions can be characterized by medium term, less complex decisions often made by "middle managers" such as launching new products. Thirdly there is strategic decision-making, characterized by long term complex decisions. These can be seen as activities such as aiming to be market leader See appendix B for an image of hierarchal separation between the three levels of decision-making.
When taking a bottom-up approach one places higher levels of decision-making control at the bottom levels of the hierarchy. However, who belongs to these levels of hierarchy is dependent on the industry.

Within this research the healthcare sector was assessed, and the effects of bottom-up decision-making with nurses.
Hospital staff nurses often feel unheard and uninvolved in their organization concerning decisions that affect patient care and other nursing-related issues on their units (Graham-Dickerson et al., 2013).
Nurses in this case are placed at the lower end of the hierarchy, making mostly operational decisions and day to day patient care decisions.
Benefits from involving nurses in more complex decision-making, rather than only managers and physicians, is that the collaboration increases work satisfaction (Baggs et al., 1997). In fact, the study found that the level of satisfaction is higher for nurses than for physicians, when faced with higher levels of involvement.
Increased use of involvement demonstrates efforts to include staff nurses in decision-making at the patient, unit, and organizational levels. Dickerson et al., 2013).
On the other hand, it is to be taken into account the levels of stress and complexity and how these can be reduced, as high levels of stress and complexity in the work can negatively impact the health of nurses as well as the decision-making capabilities, potentially threatening individual, patient and organizational outcomes (Shirey, Ebright & McDaniel, 2013).
A study conducted by Tee et al., (2007) concluded that factors which increase communication and collaboration between individuals in the workspace are stimulation in practice, education and mostly participation. Further benefits were studied by de Kok, Weggelaar-Jansen, Schoonhoven, & Lalleman (2021), in which it was found that involvement and participation of nurses also contributed to higher levels of nurse job retention and maintaining quality healthcare.
In addition, they state that it is important that nurses are able to collaborate and network with professionals and management, obtain and share knowledge, generate ideas to improve care. The study states also that nurses who further wish to support bottom-up decision-making by engaging in formal and informal communication to collectively find new solutions to improve quality and management should be willing to stimulate processional deviation.

2.2.1 Nurses in Healthcare

Nurses make up a large percentage of hospital staff, approximately three nurses per doctor according to the OECD in 2019. Understanding the benefits that nurse-driven innovation may bring to the workplace will assist in decision-making by management, and what the strategic focus should be in the workplace. Tapping into the experiences, knowledge and creative motivation of everyday employees may bring great progress into hospitals, both incremental and radical.
In addition, employees, in this case nurses, are a rich source of ideas, suggestions and innovations (Wihlman et al. 2014). Recognizing that nurses' inputs may be valuable for the workplace, implementing HR practices and management techniques such as engagement, encouraging creativity and allowing inputs and suggestions from this specific group would assist in driving innovative behaviour (Martins & Terblanche, 2003).

Understanding how to harness the nurses perspectives allows for a deeper understanding of actual needs and also the faults of processes and technologies that may be causing more harm than good. Schilling (2016) states that innovation is derived from those that create solutions for their own needs, as they have a deeper understanding of their needs and incentive to meet those needs. These individuals may create new or alter existing products based on their knowledge.

4. METHODOLOGY

4.1 Research Design

The research design and approach were qualitative. This is because the reality may be complex and requires the interpretation of opinions given by the units of observation, the nurses. According to Bhandari (2020) qualitative research is a more common approach in subjects which are based on social sciences.

Primary data was utilized, directly from nurses on a semi-structured interview basis, which allowed for complexity of answers, opinions and experiences. Meaning, the interviews were geared towards answering the research question. For the interview preparation a general guideline of topics was followed. This structure allowed the direction of the interview to be fluid. A semi-structured design is the most optimal choice in this case, as nurses may give further input into concepts and ideas that previous research has not yet uncovered, such as methods of involving nurses in decision-making. Due to the research focusing on primary data, it was required to take notice of ethical practices, such as handing data of individuals.

4.2 Data Collection

4.2.1 Interview information

In total 25 interview requests were made, and 8 interviews were conducted with an average of 27 minutes in length. The interviews were conducted via Microsoft teams or Google meets. The participants were mostly contacted via LinkedIn and through nurse research group websites.
The participants and their field of knowledge ranged drastically. In appendix C there is a summary of the nurse information, including the nurse code, location, experience level and other important notes which arose during the discussions.
See appendix A for an operationalization table of topics and approximate questions that were explored within the semi-structured interviews, these topics have then been split into further categories.

4.2.1 Inclusion criteria

The inclusion criteria are surrounding location, position and language skills.
The first criteria was that the nurses are working in hospitals within the Netherlands. Due to the university being relatively well known in the Netherlands, this created ease of connection, trust and familiarity. The following criteria is relating to how long the nurses are in their positions and their general field. They were working within their current positions for at least one year, allowing for relatively developed knowledge of their position in their work environment. The final criteria was regarding language, being that English is the primary form of communication.

Out of 8 interviews, 7 of the nurses were active in the Netherlands and one in the United States, meaning that nearly all the criteria initially set was fulfilled.
The participant that operates within the United States that does not fulfill the Netherlands location criteria, was at the forefront of creating nurse innovation through education and involvement of nurses at external events. This participant was one of the main inspirations behind the research and as there was a lack of respondents to the interview requests within the Netherlands, her input was of great value. Furthermore, this participant worked with nurses across the world, and therefore not making her opinion exclusive to the US.

The jobs of nurses ranged from active nurse in a ward to specialized nurses, nurse directors, nurse advisory board members, researchers and professors, thus representing the opinions of nurses at different hierarchal levels.

4.3 Data Analysis

The nature of the research was qualitative, according to Soiferman (2010), qualitative research is said to imply inductive thinking or reasoning to broader generalizations and theories. An inductive approach generally means that the researcher begins with specific observations and measures, then uses the data collected to detect themes and patterns.
Results that occur within qualitative research cannot be measured exactly, however must be interpreted and organized into themes. (Soiferman, 2010).

Inductive coding was applied, in which it was searched for general themes and patterns within the interviews. These have then been split into codes of pattern. These categories were: “Nurse information”, “Structure and how things are done”, “Benefits of involvement”, “Challenges of involvement”, “How to involve nurses”, “Other comments and stories”. These overall categories/codes however were comprised of sub-codes that arose as the interviews were conducted. These overall categories and their subcategories can be seen in the table below. This form of coding is also called axial coding.
The sub-codes for “Structure and how things are done” were directory boards, nurse managers role of nurses and meetings. These are the different concepts that arose regarding structure and who or what the structure was relating to.
The sub-codes for “benefits of nurse involvement and bottom-up approach” were hospital benefits and nurse benefits. This is to understand whether the mentioned benefit was aimed towards the nurses of hospitals specifically.
“Challenges of nurse involvement” was split into time balance, knowledge, complexity. Complexity in this case is regarding the complexity of decisions, and how the nurses may be affected by this.
“How to involve nurses” was split into six categories: education, management, collaboration, communication, time and authority. The sub-codes have been created post-interview and therefore, the titles to these codes suggest the suggestions of participants regarding this category. Lastly,
The category “other comments and stories” was created due to answers that add value to the research, however, are very short one-off pieces of information that do not fit into the other categories, these are lack of involvement, positive involvement and stresses.

Structure and how things are done
1. Directory boards
2. Nurse managers
3. Role of nurses
4. Meetings
Benefits of nurse involvement and bottom-up approach
1. Hospital benefits
2. Nurse benefits
Challenges of nurse involvement

1. Time balance 2. Knowledge 3. Complexity
How to involve nurses 1. Education 2. Management 3. Collaboration 4. Communication 5. Time 6. Authority
Other comments/stories. 1. Lack of involvement 2. Positive involvement 3. Stresses

Table 2. Table of codes.

This interview structure was not purely inductive, but also deductive, as there were preconceptions and these themes, such as looking for discussion relating to the topic of motivation, were searched. In addition, the themes that arose that were not in the scope of themes or expected answers were seen as inductive. Out of these answers, new themes were created post-interview during transcription. Not all codes and topics of discussion were included into the results section but only the relevant aspects.

In addition, the reason as to why the chosen questions were only loosely applied, was because of the differences between the nurses and their positions. For example, one of the nurses was just two years into being a registered nurse and another participant was a nurse director for many years, meaning questions were catered specifically to their positions and stories they chose to share.

5. FINDINGS

In the following section the results of the interviews will be broken down into a table of findings, and a further explanation of these findings. The table below is an overall summary of the main findings in the categories of: "Structure and how things are done", "Benefits of involvement", "Challenges of involvement", "How to involve nurses", "Other comments and stories".
See appendix C for an in-depth summary of the results and further information on the nurses in table format, which is the detailed per-participant view of the results.

Structure and how things are done **Directory boards:** ideas pass through, only "advisory". Boards and directors create change and regulations. **Nurse managers:** Wards have business coordinators and head nurses. Nurses report to these managers. **Role of nurses:** Multiple diverse tasks for nurses in wards. Multiple levels based on education. **Meetings:** Not all nurses participate in strategic meetings.
Benefits of nurse involvement and bottom-up approach **Hospital benefits:** "No healthcare without nurses". Understand processes and technology better than others. Creative problem solvers. Understand points of where to improve, think in possibilities. Trained, diverse, knowledgeable workforce. Employee retention. Close to patients and understand needs. **Nurse benefits:** Motivation, work satisfaction, feeling of control and leadership, mental stimulation. Joy in taking on responsibility and driving change.
Challenges of nurse involvement **Time balance:** healthcare and strategic business matters. **Knowledge:** Not all nurses know how to drive change or know all processes involved in decisions (finance, insurance etc.). Nurses may act "too personal". **Complexity:** Large group, difficult to listen to all. Complex decisions will require more input than only nurses. Issues may not always be solvable even if discussed. Change highly dependent on topic of discussion.
How to involve nurses **Education:** Who to go to and how to speak up. Implementing people there are educators, coaches and innovation specialists that ask the right questions and help nurses. Stimulation In the right direction every day. **Management:** To be more aware of everyday processes (breaking the hierarchy strength). Developing relationships with nurses. Discuss ideas with nurse teams. Driving innovation by focusing on the specialties and shared values of nurses. **Collaboration:** Nurses should be involved in change but not alone. Create teams relating to innovation and strategic decisions. **Communication**: More meetings that are strategic. Creating a line of communication between managers, directors, boards and nurses. All layers must acknowledge change and therefore communication needs to be established. Listen to nurses and recognize worries, step-by-step improvements. **Time**: Nurses need to make themselves available and if not, teams need to compensate. **Authority**: Giving nurses more authority to make decisions within working teams.
Other comments/stories. **Lack of involvement:** Nurse feels like change is often not implemented even if she speaks up and feels as though it's easier to implement change on higher levels. Demotivating when no one listens. Story of nurse that was appointed a psychologist without her permission or knowledge. **Positive involvement:** Example of someone asking the right questions and then the nurse decides to change that thing. Story of creative solutions in Covid times with patient care and how they solve problems when faced with them. Nurse director mentions a story of how nurses were involved in one beginning project at her hospital since the beginning. Nurse feels like she is able

to drive change because she knows who to talk to and how to do it **Stresses**: Burnout caused by stress at work. Nurse felt heavy top-down structure since nursing school, and "not innovating is the death quo". Easier to fit in than to speak up, people tune out to nurse opinions, no recognition for the years of service and constant negative feedback loops because of such a "high stakes job" as people are at risk. Replication of behavior is common in hospitals with nurses and nurses sometimes feel powerless.

Table 3. Summary of results.

5.4 Findings

The findings of this research will be organized in way of the codes, this being the order of the overall codes and their sub-codes. Important to note is that within each discussion, new ideas and new topics were brought up, based on the experiences and specialties that each nurse has. As an example, one of the nurses was one of 8 nurse directors within her hospital, and another participant was at the start of her career with just around two years of experience in her current position. This meant that nurses were able to report from multiple levels of their hospital's hierarchy. One of the nurses, participant one, provided a diagram of the hierarchal structure she operates in. Here a description between the levels of nursing can be seen, as well as a brief description of the roles they cover. This diagram can be found in appendix D.

Regardless of different experiences, there were overarching repetitive themes that arose during the interviews which have been separated into the aforementioned codes and sub-codes.

5.4.1 Benefits of nurse involvement and bottom-up approach

Within the results table the findings of benefits were split into two categories "Hospital benefits" and "Nurse benefits". These categories are to distinguish the main beneficiary, not implying their mutual exclusivity.

Within the sub-code "Hospital benefits" one of the most evident findings are that nurses have great understanding of processes and technology, as nurses provide the most care, meaning the most work experience is gained this way. A further finding is that nurses are a large, diverse, creative and driven group. All participants comment on how nurses are "fixers" and will solve problems creatively. "it's a big group. And so that's one reason when you listen to the nurses, you've got a big group. It's like a diverse group. I think it's a creative group in most health care organizations. We call them fixers" (Nurse 5). An example given was how they were adapting to Covid-19, and how, when involved early on in projects, nurses are able to provide great insight into how their work routines can be altered with hospital physical lay outs, as a nurse director states "We had a mock-up of the new rooms that they designed, the whole rooms. It's a very quirky layout" (Nurse 8). Nurses within the interviews often mentioned that they offer the highest percentage of healthcare time in hospitals "the first and the last to hold your hand" (Nurse 5).

Within the following code, "Nurse benefits" another belief from all participants found was that a bottom-up approach, by involving them in decision-making, will create higher levels of work satisfaction, motivation, employee retention and allow nurse leadership to thrive "Innovation initiatives to have nurses bring forward their ideas and doing these committees, building things and getting ideas out, is leading to greater retention satisfaction. And I guess it's retention and satisfaction among the nursing workforce, unlike anything else you saw" (Nurse 6).

5.4.2 Challenges in bottom-up decision-making

The main challenges summarized in the table are "Time balance", "Knowledge" and "Complexity".

Staring off with the sub-code time balance, it was discovered that balancing the time between care and business as well as strategic matters may be one of the largest overarching ideas when faced with the topic of challenges.

Nurses do state that their involvement in decision-making would be of great value "but if your first answer is, I don't have time, then you are shutting down the possibilities of being part of the discussion" (Nurse 7). In addition, were some clashing ideas within the interviews. All participants state the importance of nurse involvement within decision-making; however, all participants also state that they or nurses in general lack time within their days. One nurse stated that it wouldn't be possible for her to have "strategic meetings" more than once a month.

As well as time, it was also mentioned that not all nurses know how to drive change due to their knowledge lacking in certain areas outside of their expertise, such as finance and insurance, hence the sub-code "Knowledge" was created. Furthermore, it was mentioned that "maybe we might be a little too personal instead of business" (Nurse 3). One of the nurses which worked for under two years as a nurse states that "At a certain moment if you keep saying, saying and saying and no one is listening. You're not seeing changes. Yes. A certain point you stop" (Nurse 3) here it was discussed how, even if involvement takes place, if changes are not made or no one is listening, it can be demotivating.

A further challenge was "Complexity" of decisions. Not only is this relating to the knowledge of nurses, as "We don't know all the processes such as finance and insurance" (Nurse 3), but also that it is difficult to listen to all nurses simultaneously, as well as that even if discussed, issues may not be solvable.

Therefore, a participant in this case suggested that there be teams specifically made for collaborative efforts between doctors, managers and nurses.

However, being that nurses do not know "all the processes" including how to search for the right solutions, how to create the right solutions and on top of this, taking into account the financial and regulatory aspects of each process one of the nurses put great emphasis on making clear that "maybe structure shouldn't be changed because there are things in place for a reason" (Nurse 2). Within this interview, the nurse suggested that instead of full nurse control, that there should be teams of individuals working together in solving issues, allowing for a well-rounded view.

5.4.3 How to drive change and to involve nurses

Within the table of findings, there is a distinction between methods of involvement. These subcategories are "Education", "Management", "Collaboration", Communication", "Time" and "Authority".

The first sub-code of this category is "Education". Here it was found that some nurses may lack the understanding on how to drive change. "They don't have the whole picture to look at, for example payments in a hospital. We don't know everything about the processes in the hospital. But when you sit in a team with a nurse, they can. You cannot stand alone" (Nurse 4).

All participants indicated their own ways of driving innovation; however, the most common belief is that coachers, educators and dedicated people are needed to ask the right questions and assist as well as teach nurses how to drive change. On multiple occasions nurses expressed how they often do not question if processes at work be done more efficiently unless they are actively searching for solutions, or other individuals asks why they do certain things.

The second sub-code is "Management". This category is regarding activities that management could undertake towards involvement. Here it was often mentioned that managers are not nurses and "Do not know what is best" (Nurse 1) for nurses. A participant stated that an idea would be to actively develop relationships with management to break the hierarchal structure, and that the management should acknowledge the individual and shared values of nurses when facing decision-making involvement.

The 'know-how' to drive change was a reoccurring topic, as some nurses indicate that they know how to drive change, because they have years of experience "But other less experienced nurses may not know who to" (Nurse 1) this statement was made on multiple occasions by nurses who are either within advisory boards or have close ties to management.

The sub-codes "Collaboration" and "Communication" were further aspects of how involvement and change can take place. Here it was suggested that collaboration and communication are important values because "A key tool to manage here is to listen to nurses, recognize their worries and to recognize their successes and to facilitate the exchange of expertise within the team and to make Step-By-Step improvements that are doable, that are attainable" (Nurse 7).

Furthermore, the sub-code "Time" was created as the availability of nurses is an important factor. Here one nurse states that nurses must make themselves available or allow for their teams to fill in the gaps, in allowing for a long-term thinking and planning "but if your first answer is, I don't have time, then you are shutting down the possibilities of being part of the discussion" (Nurse 7).

The final sub-code "Authority" ties in with the amount of responsibility nurses can undertake, allowing them to feel a sense of satisfaction and leadership. "And suddenly you give somebody the power to say, you're going to hear me about how to fix this problem? Well, this is what I would do differently. The negative cycle breaks" (Nurse 6).

5.4.4 Other comments and stories

Within final the category there are the sub-codes "Lack of involvement", "Positive involvement" and "Stresses".

For the sub-category "Lack of involvement" it was found that nurses believe it is demotivating to speak up and not have change happen and that it is easier to implement change on higher levels of the hierarchy. It was mentioned on multiple occasions that the business coordinator is often not a nurse themselves, nor have they ever been trained as a nurse, but still continue to make decisions for the nurses themselves often causing conflicts at work. An example of a conflict was given by a nurse on the ward, who also is part of her nurse advisory board. Here, she was appointed meetings with a psychologist without her knowledge during "stressful" Covid adjustments at her workplace.

The following sub-code "Positive involvement" was created as there were examples of nurses and their creativity within the workplace, as well as how their involvement changed their day-to-day activities in a positive way, as the nurses were given the authority to create change. In examples provided, a nurse director was able to demonstrate that involvement in decision-making early on in project created positive effects. An example was given as their hospital was planning to open a new ward and the nurses were involved in the layout design in finding ways to make their work more efficient. The nurse directly states that the ward now has a "quirky" layout, allowing the nurses to see the patients from the corridors.

Another story was provided by a member of a nurse advisory board, in which, when nurses were guided in the right direction, they were able to add small innovative changes to their daily processes, such as to create special wire separating tools which made patient ICU transfer an easier task.

The final sub-code is "Stresses". This code was created as nurses expressed levels of stress, burnout and the negative feelings towards lack of control in the workplace "We are not in those discussions and it's not fair. That often does make us less motivated. You have a lot of people that have burnout" (Nurse 3). One of the participants working at the forefront of nurse-driven innovation indicated that nurses are "stuck in a negative feedback loop" (Nurse 6) in which her years of service were not recognized and very little to no positive feedback was given for her "hard work" however, she believes this is because the stakes are very high. Furthermore, it was stated by one of the nurses that the feeling of powerlessness at work, created by stress can cause nurses to harm patient "And not only physical pain, but also emotional pain or social pain. It's an expression of powerlessness" (Nurse 7).

6. DISCUSSION

Overall, the results provided great insight into the thoughts, beliefs and opinions of nurses on bottom-up decision-making involvement. These ideas that arose can be directly linked with the basis of this research and the theories behind EDI.

Within the interviews, it was found that nurses are considered a creative group and that involving them in decision-making will assist in driving motivation, work satisfaction and retention of employees. This result coincides with Høyrup (2010) in which it was concluded that creativity, ideas and

competence as well as problem solving are the main drivers of EDI and that direct participation can generate commitment, motivation and cooperation and create innovative behaviour. Moreover, the research of de Jong and den Hartog (2010) backs up these results further, as they came to the conclusion that participation increases the intrinsic motivation of employees as well as their feelings of responsibility, efficacy and control. This may likely be the main reason as to why nurses feel higher levels of motivation when participating in decision-making.

In addition to the benefits found, the interviews revealed ideas on how involvement within the hospitals could take place. Here it was suggested that innovation focused individuals such as educators and coaches teach them and ask the right questions in their day-to-day life. Nurses mentioned this will help them in looking for the right solutions in their everyday working lives. The idea that educators may need to be implemented, may go against the idea that as stated by, Birkinshaw (2013), employee-driven innovation generally occurs apart from the formal job description. This activity which is not necessarily formalized may create a feeling of independence and may drive creativity, however once educators and coaches are put into place, this may begin to formalize the innovative process and remove the aspect of EDI being outside of the formal work description.
On the other hand, Høyrup (2012) states that EDI arises from everyday work practice, and it is important that employees are continuously upgrading their skills formally and informally, which ultimately may mean education in terms of innovation within the workplace.
In addition, EDI is seen as an assumption that every employee is a source of innovation and creativity when organizations provide the right support (Evans & Waite, 2010) backing up the idea that the addition of further education for innovative practices is beneficial for the workforce and hospitals whilst still following the overall assumptions of EDI.

In attempt of allowing nurses to be involved, it was stated by multiple nurses that a heavy hierarchal structure needs to be broken down, allowing for communication from the bottom to flow to management “breaking the negative feedback cycle” (Nurse 7). It was suggested that this is done through the addition of strategic meetings, rather than operational meetings. For example, meetings that are regarding business, innovation and strategic related topics rather than meetings that are more focused on activities such as the ordering of products or other everyday activities. This suggestion implies a shift from short-term thinking to long-term strategic planning.

This brings us onto one of the greatest challenges, time.
Overall, there was a general consensus that nurses are a great source of wisdom and knowledge and that they should be involved in processes, however it was made apparent that nurses working on the wards are extremely busy, which may conflict with the idea that nurse should be innovating in their day-to-day activities, this challenge was also made apparent during the participant selection process, as nurses were often unavailable due to busy schedules.

An implication that occurred within the research was the lack of respondents. Out of 25 interview requests, only 8 were conducted equalling around 32%. The nurses that did respond were mostly nurses that had branched into other parts of the hospital such as research, nurse directors and nurse innovators. However, there were still coinciding beliefs between all participants and theoretical saturation was mostly met, as information between the respondents would only vary based on experience, rather than overall beliefs. This proved to be highly beneficial in drawing conclusions on the research.

Further research within this field is needed, as this topic has been limitedly explored in the academic setting, and can yield great potential for both hospitals, nurses and researchers. It is recommended that the focus is further on the view of nurses in their hospital setting, however further researchers should take into account that nurses do lack time, and therefore research data collection should be planned ahead. Furthermore, it may be beneficial to interview a larger quantity of nurses that work on the ward full time, and to view the perspective of multiple nurses from the same hospital, which may assist in understanding how nurse perspectives in the same ward may be altered due to different factors and experiences. Having a more focused study may allow researchers to pinpoint specific drivers or hindrances of innovation in a more controlled setting through observations.

7. CONCLUSION

In conclusion, the basis of this thesis was on the importance of nurses in their workplace, the hospital. Nurses are not only the main care givers in the medical sector, but they are also a great source of innovation, and driving this innovative behaviour can have a profound positive impact on hospitals. One way of driving nurse innovation is through decision-making involvement, from the bottom-up, meaning the direct nurse involvement, rather than a strict top-down approach to decision-making.
Through the interviews conducted, benefits from a bottom-up decision-making approach arose, such as higher work satisfaction, motivation and employee retention. These aspects directly play a role in creating higher levels of EDI. It was further discovered that nurses feel as though they are currently not involved enough in the strategic aspects of their wards and have little experience with these matters. However, it was shown that nurse involvement early on in projects can allow for long-term thinking and greater hospital functions when considering the largest working group in hospitals.
The results suggest that this creative, diverse and driven group should work together with individuals trained in creating innovative solutions and to allow educators, coaches and specialized individuals to ask the right questions as nurses are generally more care focused.
In addition, nurses are the main undertakers of processes and the main users of hospital technology, meaning that asking the right questions and allowing for their input in decision-making is in high advantage for the hospitals in understanding aspects of the healthcare system that the nurses experience on a day-to day business.

Lastly, it is of utmost importance to consider that nurses are a group of individuals, with a variety of specialities and differences in interests. The overall theme of the interviews was a focus on the individual nurse, how listening to the individual would drive a feeling of leadership and responsibility, rather than how this would benefit the hospitals.
Nurse innovation investments in the workforce are lacking, and currently, it appears that this workforce is neglected in terms of positive recognition and instead are stuck in a negative feedback loop due to high stakes.

Overall, a bottom-up approach to decision-making assists in creating a motivated, satisfied and innovative workforce, however, in creating nurse-driven innovation it is required to implement educators, coaches and innovation-based teams as well as create lines of communication and strategy focused meetings throughout hospitals. All in all, driving nurse innovation through a bottom-up approach is in favour of all parties involved, the hospitals, the nurses, the patients and the overall healthcare system.

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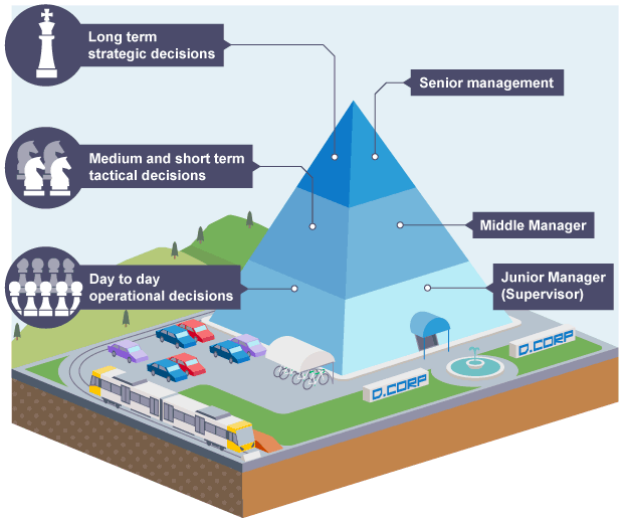
9. APPENDIX

Graphic A - Operationalization.

A list of possible questions and to the nurses, in understanding their thoughts and feeling on innovation and decision-making, as well as the hospitals influence on the ideas.

Interview Plan		
Introducition section		
Explain innovation and research purpose etc		
Info on nurse		
1. time spent in the field		
2. time spent in the specific working office		
3. their role and position in the hospital		
Decision making		
When it comes to later decision making, such as the implementation of new processes or technology, how does the hospital handle opinions on this?		
Are there specific methods that your hospital has in allowing your voice to be heard (weeking meetings, regular/occational surveys etc)		
who do you report to?		
do you feel like when you want to make changes in your worklace, are able to drive this change?		
are there methods in place to assist in driving change?		
Do you feel like decisions are made more top down or bottom up and why?		
Innovation		
Do you have any examples of when innovation was driven by you and follow nurses?		
Do you have any experiences where you would have liked to intervene/ not allowed something to happen (such as a piece of technology that caused more harm to nurses than good, howeever were implemented by management anyway)		
Further thoughts		
What are your thoughts on bottom up decision making?		
What are your thoughts on nurse driven innovation?		

Graphic B – hierarchy of decision-making



Appendix C – Tables of nurse information and interview results

Nurse Information
Nurse 1. **Location**: NL, **Experience**: 13 years Current position for 6 years. **To note:** Part of advisory board
Nurse 2. **Location**: NL **Experience**: 20 years **To note:** Pediatric hematologist. Program manager and 20 hours nurse. Combining clinical and research, in academic hospital.
Nurse 3. **Location**: NL **Experience**: Max two years **To note:** Mostly works as registered nurse.
Nurse 4. **Location**: NL **Experience**: Two years in current position. **To note:** Very specialized in smaller team.
Nurse 5. **Location**: NL **Experience**: 30 years **To note:** Chief nursing information officer., also worked as a nurse manager and nurse advisory board, studied nursing management and public governance.
Nurse 6. **Location**: US **Experience**: 17 years **To note:** No longer in the field but was a nurse for many years. TEDx speaker, member of world healthcare congress.
Nurse 7. **Location**: NL **Experience**: 30 years **To note:** Trained nurse, master's in science, lecturer in nursing, done a PhD. Career in gerontology. Mainly research. Focus on person centered care.
Nurse 8. **Location**: NL **Experience**: 20 years **To note:** Nurse director in Amsterdam. Master's in management and innovation.

Structure and how things are done
1. Directory has to pass ideas through the nursery board, but they only advise no true power just voice, Dynamic environment, Government decided that there are levels to nursing, every department has a business coordination coordinator. And most of the time the business coordinator isn't a nurse. Small hospital. Board wants to have two ambassadors from every ward that we can have and meeting with every three months. So, what's going on, on the wards? And we can get the ideas and bring it to the direction or the management. Level six nurses have more responsibility. Expectation that level six nurses participate in change processes. Different

people for different needs such as team manager and business coordinator. A lot of meetings, with other wards too.
2. Boards of directors, experts etc will create change. In hospitals there are lots of protocols and safety regulations etc, things are organized a certain way for a reason. There are regular strategic meetings where topics can be discussed Different meetings for different types of decision-making (Ie, everyday vs overall quality etc)
3. Dynamic environment, many tasks. Most tasks are administrative. Changes are constant. Not exactly sure who to talk to with bigger concerns, but more smaller daily issues.
4. Dynamic environment. Not much control currently, they have to report everything to managers. No strategic meetings for this nurse.
8. Innovation takes place as a co-creation process with different professions, different students. They assist the nurses in creating innovative solutions. (example with the wires). Structure is very medically driven, 8 nursing directors, nursing advisory board, structure for innovation isn't fully there yet. Advisory board easier to approach with ideas. People identify more with advisory boards because they're connected. Lots of working groups, and if people don't have time other will help them out.

Benefits of nurse involvement and bottom-up approach
1. Share voices instead of just doing what other people tell them. They work with the technology, we know how processes happen, we notice things more and can give better quality care, we can solve problems if you let us. Involvement motivates, more fun, breaks repetitive cycles, makes work more interesting and makes nurses want to stay and work (retention and satisfaction), stimulating. "it feels great to drive change", much more joy in taking responsibility.
2. Improvement of care, feeling of motivation, control, feeling of leadership.
3. The users of technology, the ones that deal with the changes, better efficiency when involvement occurs. Motivation, feeling of responsibility
4. Nurses are practical, creative, a lot of tasks in small time, trained and technical. Motivation in involvement. Opportunity to change things, lots of knowledge already on how things could be changed.
5. There are lots of nurses, big diverse group, creative group. You also hear what patients might think, because nurses work with patients and know their needs. They generally have great ideas. "the first to hold your hand, and the last to hold your hand". Nurses inspire each other, think in possibilities and appreciated. More work pleasure, satisfaction, fun, better care. Innovation will spread as they inspire each other.
6. feels there needs to be stronger nurses, nurses do so much and need more recognition, no healthcare without nurses. No healthcare without nurses. Nurse innovation leads to greater retention and satisfaction. "nurses need to be heard". Involvement is rare, and nurses do know how to make things work with their knowledge.

Challenges of nurse involvement
1. lack of involvement means decisions are made for nurses without nurses, "then you just have to do it". Not all Nurses are prepared to speak up or know how to speak up. Even if issues are brought up on advisory board, doesn't mean they get solved. Lack of time. Balance between patient care and other things. Balance between care and business.
2. because things are organized for a reason, it may not be a good idea to change things without involvement of the management. "it's not always good to change structure, but maybe smaller things" Not everyone knows the reason as to why things are the way they are. Change is highly dependent on the topic of discussion. Not all nurses know how to bring up suggestions or know how to drive change.
3. Nurses may be a little too personal in decision-making
4. difficult to take on more than they already do. Nurse prefers to outsource the work to the administration (secretary etc). Shortage of nurse labor. Nurses don't always see the whole picture, for example financial and insurance stuff.
5. Nurses may not know all the processes going on such as financial structure.
6. Not possible to listen to every nurse, so many nurses. High stakes, mistakes in healthcare can cause even death meaning that care focus is very important, and people do not always have time to praise? Very complex issue. Great time constraint "only monthly meetings".
7. There will always need to me managerial involvement because of how complex changes can be too. All need to be on board with the changes. Nurses should not be blamed for doing things the way they do it.

How to involve nurses
1. teaching nurses how to speak up, who to go to develop relationships with management etc. Management should be more involved on the ward and to see every day operational activities. Meetings within the teams on the ward. Limited nurses know how to drive change. Giving nurses the option to drive change.
2. discussing ideas with a team to make sure that they make sense (because hospitals have a lot of structure and regulations for a reason) communication and team work is key here.
3. Idea of improvement already in interview: for example, to implement digital alternatives to paper.
5. Nurses should be involved in decision-making, but not alone! Stimulating the nurses by asking them questions. Need for educators or coaches.
6. Creating mini hierarchies within hospitals to break up the large structure and to give more people a voice. Creating a committee for innovation, Train them to innovate, get the managers involved on the floor to see the issues and assist in making changes. Managers giving power to nurses to try and fix things (breaking the negative cycle also with power and recognition). Hackathons and external outside of work meetings with nurses, combining the knowledge of nurses with management or directors, creating a line of communication between the “bottom” and the “top” creating a space and a way for knowledge etc to be exchanged.
7. Driving innovation by focusing on the shared values of the practitioners. Pushing them to innovate will not work. Innovation and ideas and decision-making should be acknowledged by all the layers. Having external parties connect with all layers of the hierarchy and see all perspectives and then find ways to realize ideas with all perspectives in mind (communication and collaboration) Focusing on the individual values of the nurse and nurturing these. Leadership, structure important to create innovation. Listen to nurses, recognize worries, facilitate exchange of knowledge and expertise, step by step improvements that resonate with personal values, use advisory board to step in for voice of nurses. Nurses need to make themselves available. Lack of time can be compensated by others and the team. People need to make sacrifices for the bigger picture. Stimulate nurses in their everyday life.
8. focusing on the individual strong points and bringing these people together. Professionalizing (training), Educating, internal structure for innovation (allowing people to collaborate),

Other comments/stories.
1. Story of when the nurse was tired and she was faced with a phycologist assessment that was not discussed with her, started crying at work due to stress.
2. Feels like she is able to drive change because she knows how to do it in general.
3. Feels as though change is not implemented even if voices are heard, change easier to implement on higher levels. Demotivating when no one listens to your suggestions. Nurses not often involved in decision-making. Feel as though they are less motivated, and it often causes burnout, changes happen for nurses without nurse input, and it doesn’t feel fair or “nice”.
5. Gives an example of how a nurse did something because she was used to it (although it was very tedious), another person came in and asked her why she is doing it that way and now she is trying to change it with the help of other people. Nurses also being creative with personal protection gear during covid and putting their name tags and pictures of themselves without protection so patients can see their faces anyway.
6. often felt like she was treated like a kid. Felt the heavy top-down structure at nursing school and in career. Felt they could not change anything because “that’s how things are”. Not innovating is “deadly”. Easier to fit in than to stand out. Nurses complain about things at work. Cycle of complaining. Nurses stopped identifying as nurses because they feel disadvantaged. “people tune out to your opinion”. Everything done by doctors is billed for, not nurses. The “best” nurse is the one that gets everything done. Little praise, only sanctions when mistakes are made. Some nurses have no recognition for many years of work. Nurses not invested in, only a commodity. Some nurses are at the forefront of innovating, changing the status quo. Negative feedback loops because of high pressure: more at stake. Nurses trained to own mistakes. Nurses learn to take the blame more often than doctors because of less protection. People do things because its normal to them, they don’t question. People rarely involve nurses.
7. Replication of behavior occurs within hospitals (can be good or bad!). Nurses inflict pain on others because of powerlessness. Nurses know a lot but are not always included in planning etc. Nurses not recognized in their wisdom.
8. Example of new build how people were involved from the beginning onwards, now the hospital lay out is based on nurse inputs too.

Appendix D – Overview of nurse hierarchy