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Nurses' Experiences with Inpatient Care in Single-Bed Rooms: Literature Review

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Abstract

Hospital patient wards were increasingly abandoning multi-bed Nightingale wards for single-patient rooms layouts. Previous studies pointed to the benefits of single-bed hospital rooms for patients. Less research was done on the advantages and challenges that nurses perceived while caring for patients in these environments.

The objective of this study was to examine what experiences nurses had had when caring for patients in inpatient ward single-bed rooms. The study was undertaken in the form of a qualitative literature review. Peer-reviewed articles found in academic search databases that focused on the hospital nurses' point of view working on the inpatient ward were reviewed and analysed.

The study identified common themes in the literature that included significant effects that single-patient ward layouts had on nurses, patients and relatives communication practices, challenges to patient monitoring in single-bed rooms, opportunities for holistic and individualized nursing care and demands on nurses' working environments.

Advantages that single-patient rooms had on patient privacy and satisfaction were not clearly demonstrated when it came to the experiences that nurses had when working on these wards. Based on these findings, it was proposed that more research into the effects that single-patient wards had on staff communication, patient monitoring and nurses' working environments be conducted.

Keywords (subjects)
Single-bed patient rooms, Hospital inpatient wards, Nursing care, Nurses' experiences

Miscellaneous

Contents

1 Introduction

Many studies examined the advantages and disadvantages that single-bed patient rooms, as opposed to multi-bed patient rooms, had from a patient-centred perspective. The benefits of single-patient rooms on patient satisfaction seemed to be well established and their perceived advantages on clinical patient outcomes seemed likely (Ulrich, Zimring, Zhu, et. al., 2008). However, academic literature that examined the lived experiences of nurses, when working in these environments seemed to be scarcer (Donetto, Penfold, Anderson, Robert & Maben 2017, 121). While empirical research was ongoing, what were the advantages and challenges that nurses faced when caring for patients in these settings?

When hospitals were constructed and modernized, the common trend in patient ward design strongly favoured more private, single-bed patient room layouts, as opposed to the traditional, large, multi-bed patient room environments in favour since the days of Florence Nightingale (Simon, Maben, Murrels & Griffiths 2016, 147-148, David 2011). There were several reasonings for this trend in patient room design. Rationales that supported opting for single-bed patient rooms included improved patient privacy, confidentiality and reduced infection risks, from contagious diseases, which were commonly transferred inside the hospital environment by patients to other patients or nursing staff (Kivimäki 2020, Nieminen, 2014). By reducing infections rates through patient to patient transmission, physicians hoped to reduce the need for antibiotics, thereby countering the proliferation of antibiotic resistant diseases like MRSA, ESBL and Clostridium difficile. (Nieminen 2014)

While hospital construction tended towards the development of single-patient rooms, proponents of multi-bed room design in hospitals claimed that evidence in support of single-patient rooms remained inconclusive and that a need for more evidence remained which showed, for instance, that single patient rooms in fact reduced hospital infection rates. This literature review was undertaken as a reflection on the lived experiences that nurses had when caring for patients in inpatient hospital ward single-bed rooms. Nurses could benefit from the awareness of the effects that single-bed rooms had, as their patients' health outcomes could be influenced by the healing environment they were in. In the best possible healing environments, all the components of

healing and prerequisites for effective nursing interventions (including social, psychological, spiritual, physical, and behavioural components of health care) could be focused on optimal patient outcomes. (Jonas, Chez, 2004, Stall, 2012).

The aim of the study was to find out about inpatient hospital ward nurses' experiences when caring for patients in inpatient ward single-bed rooms. The purpose of the thesis was to find information that nurses and nursing care managers could utilize when further developing their profession in modern, single-bed hospital room environments. The thesis sought to find answers to the research question about what kind of experiences nurses had when caring for patients in inpatient hospital ward single-bed rooms.

2 Nursing care in single-bed rooms

A feature of traditional multi-bed patient room wards, also called Nightingale wards, was that several patients beds, separated by curtains, were located in each patient room. These layouts, however, were becoming less popular as hospital construction trends aimed towards single-bed patient room design. Proponents of single-patient rooms cited increased patient comfort, privacy and prevention of infectious diseases as reasons to prefer single-patient rooms over Nightingale style rooms. However, some nurses claimed that hospital decision makers should not be too quick dismiss the advantages of multi-bed room focused wards out of hand. (Bradford 2015, David 2011)

For example, a former, auxiliary nurse from London nurse wrote about her experience when her relative was moved from a multi-patient, Nightingale ward to a private hospital room:

> *There were small units where none of the other patients was able to get up to find staff if there was a problem. Nobody seemed to be keeping an eye on her and it was difficult to find nurses to alert them to her needs. Had she been on a Nightingale ward, she would have been more visible to staff. Instead, I felt her needs were ignored. She had a nasogastric tube but no one seemed to be paying attention to whether she was feeding sufficiently. She ended up losing so much weight she was unable to fight off infection and she passed away.* (David 2011)

This experienced nurse's anecdote illustrated the worries and subjective experiences that veteran nurses had when patient care was becoming more focused on the single-patient room model. Importantly, how did nurses monitor patients in these settings, track their patients' vital signs and prevent at-risk patients from falling?

2.1 Holistic nursing care

A defining feature of holistic nursing was to care for all aspects that affected a patient's health and wellbeing (Potter & Perry 2014, 19). The goal of holistic nursing was to promote the healing of the whole person, which took the spiritual, physical, mental and environmental aspects of the patient's healing into account (Holistic nursing: Focusing on the whole person 2013).

For example, sleep had been identified as an important factor in promoting patient healing. Disruptions in sleep-cycles for example due to loud noises commonly found in critical care environments could lead to poor health outcomes (Qinglan et. al. 2017, 2). Private pave rooms also gave more opportunities for patients to sleep better, because in these spaces there were no loud roommates snoring or in crying out pain. (Pennigton, Isles, Berry 2013, 18-19)

Modern, single-patient rooms were defined by the private space afforded to each patient. Traditional hospital designs featured open wards with 30 beds each, so-called racetrack wards surrounding nursing offices and multibed rooms units with about four to six beds. (Maben, Griffiths, Penfold, Simon, Pizzo, Anderson, Glenn, Hughes, Murrels, Brearley & Barlow 2015, 1)

With an increasing focus on holistic healing approaches, researchers considered what psychological effects the environment of patient room design had on patient outcomes. Through this research, evidence-based approaches to designing hospital patient rooms had come to the forefront. These could be defined as: "*conscientious, explicit, and judicious use of current best evidence from research and practice in making critical decisions about the design of each individual and unique project*" (Hamilton & Watkins, 2008). However, such approaches were still in their early stages. (ibid.)

2.2 History of evidence-based hospital room design

Evidence-based patient room design research originated in 1984 when Roger Ulrich, an early pioneer of patient-room design and patient outcome research, showed that post-cholecystectomy patients recovering in rooms that had windows overlooking natural scenery had shorter hospital stays, needed less painkillers and received fewer negative nurse's evaluation reports than patients who stayed in rooms with windows which faced brick walls. (Ulrich, 1984)

Ulrich proposed that an evidence-based approach to designing hospital rooms be expanded beyond his original study's scope, stating that hospital architects were not considering the human aspect of hospital function. Over time, the study of evidence-based design grew to such an extend that by 2008 a systematic review found over 1200 studies that put forward the notion that the design of hospitals and patient-rooms played an important part in patient healing outcomes, as well as the well-being and work safety of healthcare staff. (Ulrich, Zimring, Zhu, et. al., 2008)

The literature on evidence-based hospital and patient-room design identified several approaches and practices that could affect patient outcomes when being cared for in single and multi-bed patient rooms. Private, single-patient rooms were cited as the main source of improvement in many health outcomes, including fewer hospital acquired infections (HAI) by reducing airborne and droplet transmission of infectious diseases through physical barriers to contact, improved hygiene of rooms and air conditioning systems. However, simple hand washing was also being cited as a major determining factor in reduced levels of HAIs. Patients could sleep better in private rooms, due to more privacy and less noise from other patients and nurses, which in turn helped healing processes. Privacy and confidentiality was improved, which allows nurses to easier communicate with patients about sensitive topics and concerns. Patients had been shown to be more honest about their symptoms and feelings, which helped to diagnose issues and improve treatment. Better ease of communication, where patients and families could be together and communicate with nurses and doctors were more easily. Private rooms generally made it easier for relatives and friends to come for a visit. Nurses' stress

levels were reported to be lower when working with patients in private rooms. Finally, patients were more likely to report overall satisfaction with their treatment when assigned to private rooms. (Ulrich, Zimring, Zhu, et. al., 2008, 53).

2.3 Features of single-patient rooms

The consensus view in hospital design seemed to be that private patient-rooms enabled better bed management, gave more opportunities for better patient privacy and eased patients' perceived comfort by giving them more control over their surroundings. The available literature also showed advantages in controlling infectious diseases by placing physical barriers to contagions, including a reduced rated of norovirus and Clostridium difficile in changing from multi-bed to private rooms. (Pennigton, Isles, Berry 2013, 18-19)

Reviewing the background on studies on of single and multi-bed rooms in patient care showed that there were multiple potential areas and applications where patient care could be improved, for instance, through an evidence-based approach in hospital room design. Private rooms were shown to have the most benefit, in facilitating patient care and improving patient experiences. Yet multi-bed unit proponents posited that a need for more communal environments remained. Considering patients' experiences was an important approach that explained the effects that patient-room environments had on health outcomes and gave direction to further inquiry. (Anaker, Koch, Heylighen, Elf, 2018, 1)

In industrialized, developed countries like Finland, multiple-patient rooms were slowly becoming history. Many hospitals in Finland were constructed in an era when it was customary to house many patients in the same rooms. Now the trend was to construct one-person patient rooms. In recent years, when hospitals had been renewed, mainly single-patient rooms have been built. For example, in South Karjala Central hospital's new cardiology ward, most patient rooms built were single-patient rooms. From a patient's perspective, their comfort was shown to have increased by having their own private room in the hospital. Like in a hotel, the patient had their own television, bathroom, shower and sink at their disposal. Yet many hospitals in Finland featured inpatient wards where patients spent time together in multi-bed rooms. (Kivimäki 2020)

There were numerous privacy issues in these cases. Patients in neighbouring beds could easily overhear private information, as well as conversations the patient or their family members were having. Also, when nurses came to pass out medicine or perform care interventions, their patients' health history was open to others. Patient privacy then was is best ensured when every patient could be themselves in their own room. When, for any reason, there were two or more patients in the same room, nurses needed to be cognizant of what information to share when another patient could hear what was said. One solution was that, if were multiple patients, one patient could be moved to another room while personal information was being given to them. (Kivimäki 2020)

Other wards that were dealing with privacy issues included surgical recovery wards, where there were no separate rooms for patients. Instead of walls, patients' beds were instead separated by thin curtains. These naturally did not stop sound from traveling. In these surroundings nurses aimed to minimize the amount of identifying information that was said aloud. They often tried to speak with a low voice. However, there would be rushed situations where a patient with keen hearing could overhear details about their roommates. In recovery wards the need for patient monitoring was especially high, which was why nurses avoided isolating patients in separate rooms. To help solve privacy issues, some suggested to have spaces in recovery and ICU wards divided by glass walls or doors. In addition to the implications on nursing care plans, in many regions the practice of patient rounds, when the responsible physician visited patients in multiple-bed rooms was decided to be abandoned. Thereafter the aspiration was to move patients to quiet places where they could be informed about their treatment. (Kivimäki 2020)

2.4 Controversy in single-patient room design

Controversial aspects of patient room design included the decision whether to assign a patient to a private, or a multi-bed patient room environment. A cursory examination of the available literature suggested both advantages and disadvantages to the single-patient room approach. From a patient's perspective, a private patient room seemed to have many advantages. For example, it gave patients enough space to move and not be entangled in furniture or medical devices. They are also spared embarrassment by their own, or others'

bodily sounds or nakedness. A Survey conducted in Scotland in 2008 showed that, out of 990 respondents 41% preferred private rooms, 22% would have preferred to be in small rooms with less than seven beds and only 3% in larger rooms. Those who preferred private rooms were most concerned with privacy (93%) and less noise (42%). However, 78% of respondents preferring multibed rooms wanted more social contact and not be isolated. (Pennigton, Isles, Berry 2013, 18-19)

Supporters of multi-bed units would point out that many patients who stayed in single-bed rooms wanted the presence of, and feel safer with, other patients. Further, it was up for debate how far technology could make up for the distance between nurse and patient when the patient was at risk of falling out of bed, or if critical vital signs monitoring (ECG, blood pressure, heart rate, etc.) could still be performed in a private room environment. Also, particularly older and infirm patients needed nurses to help them with many simple daily tasks, like moving in and out of bed, to a chair or to got to the bathroom, something that they may have been forced to do by their own if left alone in a single-bed room. As to infection control, private room critics questioned wheter the evidence clearly showed that the environment was in fact the deciding factor in reduced infection rates, rather than healthcare workers washing and disinfecting their hands. Critics of multi-bed units would further question whether patients looking out for one another in shared rooms, meaning that someone would call a nurse if they spotted problems, or helping with each other's basic needs, was not recognized enough as advantages that the multi-bed environments had. (Pennigton, Isles, Berry, 2013, 18-19)

To illustrate differences in these perspectives, studies done in Sweden had shown that many patients seemed to prefer private hospital rooms, but also understood the advantages of multi-bed rooms. In single-bed rooms patients felt safer because they were in their own environment. However, they could also feel lonely and isolated. Also, single-patient rooms were understood as a disadvantage when trying to mobilize patients, as everything they needed was already in the room. (Persson, Anderberg, Ekwall, 2012)

3 Aim, purpose and research question

The aim of the thesis was to find out about nurses' experiences when caring for patients in inpatient ward single-bed rooms. The purpose of the thesis was to find information that, for example, nurses and nursing managers could use in further developing nursing care in single-bed hospital rooms. The literature review sought to find answers to the research question about what kind of experiences nurses had when caring for patients in inpatient ward single-bed rooms.

4 Research methology

4.1 Literature review

In general, literature reviews were a method of seeking, analysing and synthesizing research studies using a systematic process. The aim of conducting a literature review was to answer a clearly defined research question. As a nursing care researcher one we sought to summarize previous empirical and theoretical studies to increase the sphere knowledge about specific healthcare issues and to analyse, for instance, methods and challenges in the field of nursing research. (Rew 2010, 65; Whittemore 2005, 546, 548.)

The processes that were involved in this literature review included: Determining the specific challenge or issue at hand, synthesizing any published research about the phenomenon, evaluating whether a body of knowledge about the research question being asked already existed and specifying which research questions needed to be asked to define a clear aim for the literature review. After determining the research questions being used and finding the aim of the literature review, the methods of conducting the literature review were evaluated. This was done by specifying which criteria were included to search for research articles and which search engines were to be used, such as PubMed and Cumulative Index of Nursing and Allied Health (CINAHL). (Rew 2010, 66.)

To achieve a structured approach in undertaking the literature review it was important to prevent search biases and reduce the likelihood of getting sub-standard results from searching. Also, the quality of the data gathered during the search needed to be evaluated critically. For example, a nurse researcher's personal opinions, or the emphasis that different journals placed on nursing issues may have otherwise skewed the research findings. (Whittemore 2005, 548; Rew 2010, 65, 67.)

4.2 Literature search

Databases and keywords used were specified before gathering the research data. The literature was gathered from online databases, such as PubMed and CINAHL. In general, information could also be sought from experts, by asking them which sources they had used in their own clinical decision making. An exclusion criterion for the age of whichever articles were chosen for the literature review needed to be specified, to reduce the possibility of citing dated research or missing new research findings. The search methods and criteria were noted to allow for future replication of the study. (Rew 2010, 66.)

Inclusion and exclusion criteria were determined prior to searching the available literature for data. Articles were further selected by determining search terms, selecting databases to query, reviewing article findings, extracting data from the selected articles, rating the quality of research articles and summarizing the research findings.

The inclusion/exclusion criteria were critically examined to determine what specific evidence there was to justify for inclusion in the literature review (Rew 2010, 66.). Article inclusion criteria included peer-reviewed articles on the topic of single-bed patient rooms, articles published in English and Finnish within a ten-year timeframe (2010 – 2020) and free, full text availability for Jyväskylä University of Applied Science students.

4.3 Article selection process

Using the PICOS (Population, Intervention, Comparison, Outcome, Study) method, the research question: "What experiences have inpatient ward nurses

had when caring for patients in single-bed rooms?", was deconstructed into keywords for each PICOS element:

- P (Population) Nurses in inpatient hospital wards.
- I (Intervention) Caring for patients in single-bed rooms.
- C (Comparison) Experiences and perceptions.
- O (Outcome) Not applicable.
- S (Study)Published 2010 to today, peer-reviewed journals, full text available, English, German, Finnish

The keywords yielded the following search parameters used for the literature review:

Nurse AND (Inpatient OR Hospital OR Ward OR Unit) AND (Patient room OR Single patient room OR (Private room OR Room design) AND (experience OR perspective)

The literature search was conducted by digital search for peer reviewed scholarly journals on the Cinahl with full-text nursing journals database, combined with Medline database, as well as Pubmed. Expanders for the search mode were search terms and apply search terms to equivalent subjects.

The search was limited to scholarly, peer reviewed journals to maintain the focus on evidence-based data. Further, the search was restricted to the past ten years, for dates of publication from 2010 – 2020. Languages were restricted to those the author had sufficiently proficient understanding of, which included English, Finnish and German. The search results, after using above search parameters were: Cinahl + Medline: 153 articles (n=153). PUBMED: 1,024 articles (n=1,024). Total: 1,177 articles (n=1,177).

The database results were then filtered manually, removing any duplicate articles (n=2), articles not concerned with nurses' perspectives or only asking about patients' experience, not concerned with hospital care and/or not applicable to topic (n=1,167). The above method left a total of eight articles for further analysis. (n=8) A more detailed summary of the search methodology was included below as a PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) chart. (Moher et al. 20019)

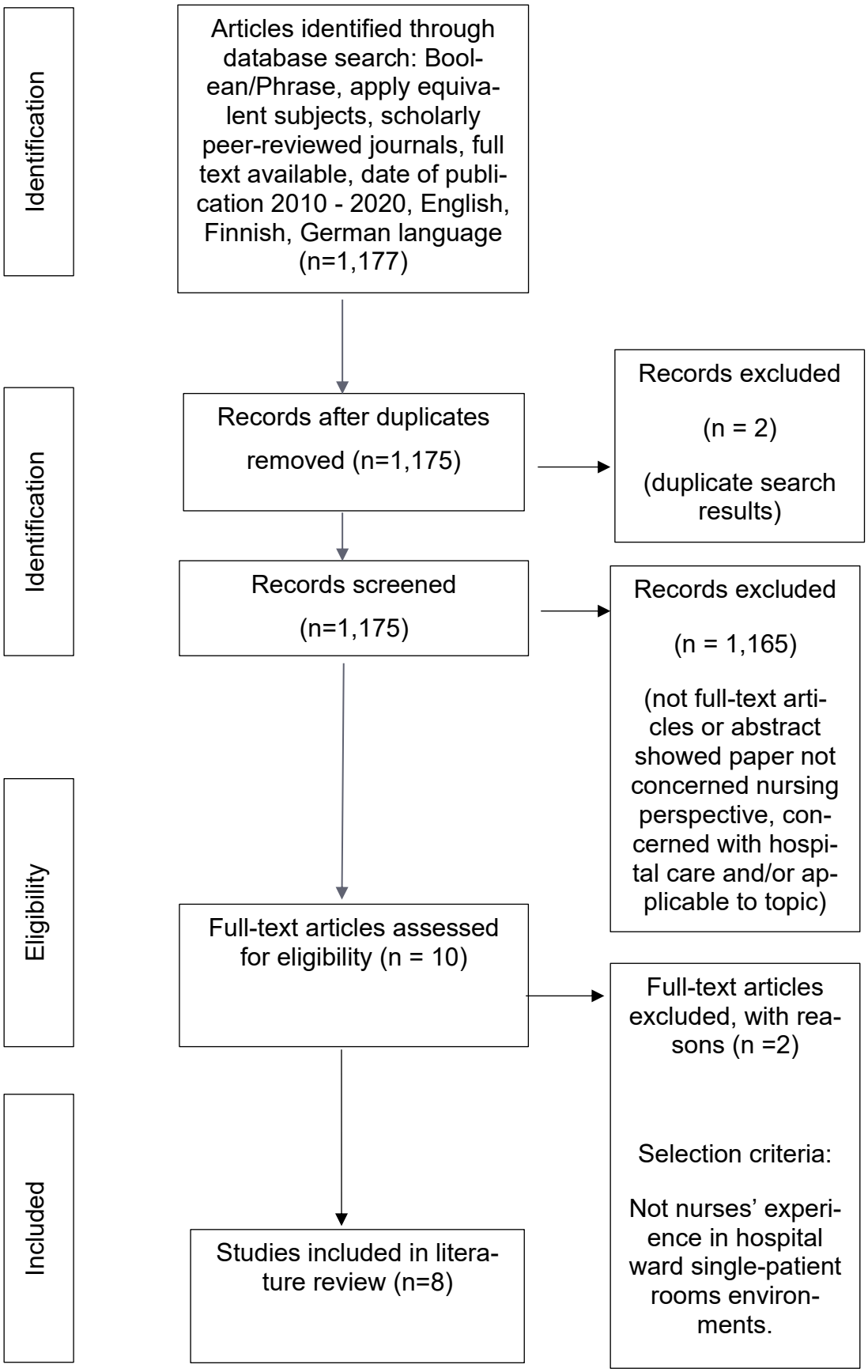

Figure 1: Inclusion and exclusion criteria, resulting search.

The articles selected were further subjected to analysis using the Hawker scoring method for the systematic review of qualitative literature. (Hawker, et al 2002) For the articles selected for final quality analysis see *Appendix 1. Table of articles*.

The articles were scored on scale of one to four, from very poor (1 point) to good (4 points) on nine dimensions:

1) Abstract title: Did the title present a clear description of the study.
2) Introduction and aims: Was the background informative and the objective of the study clear.
3) Methods and data: Were the data gathering methods used in the study well explained?
4) Sampling: Was an appropriate sampling strategy employed?
5) Data analysis: Was a sufficiently rigorous data analysis performed?
6) Ethics and bias: Were the study's ethical implications and potential bias explained?
7) Results: Was there a clear statement of the study's findings?
8) Transferability or generalizability: Were the study's findings transferrable to a wider population?
9) Implications and usefulness: How important were the findings to policy and practice?

Ultimately, the minimum Hawker score for inclusion in the literature review, from a maximum possible of 36 points (4 x 9) was 18 points. The lowest article score was 28 points. The highest quality article scored 35 points. The mean, average appraisal score for the eight selected articles was 31,5 points. For a breakdown of the quality scores for the selected articles, see Appendix A. Table of articles. For the selected articles' de-tailed ratings, using the Hawker scoring method, see *Appendix 2. Quality of the articles*. (Hawker, et al 2002).

4.4 Data analysis and synthesis

In this literature review the content analysis method was employed. One advantage of the content analysis approach was that of its common usage in nursing research. It could focus on non-quantitative issues like patients' or

healthcare workers' experiences and feelings about the issue being studied. (Elo & Kyngäs 2008, 107-115; Moule et al. 2017, 55-63.)

In the analysis of the qualitative data it was important to ensure that the data could be compared to each other, to identify any emerging themes, patterns and causal relationships. To perform data extraction from the selected articles, the information was coded according to main thematic groupings and thematic subgroupings that were based on the weight of the evidence and relevance to the topic. Ideas and issues that were like one another were grouped together so their relationships could be shown and analysed in more depth. Finally, a conclusion about the efficacy of the information was drawn based on evidence gathered. (Rew 2010, 67; Whittemore 2005, 550, 551.)

5 Results

Following from the research question of the literature review, "What experiences have inpatient ward nurses had when caring for patients in single-bed rooms?" the selected articles were analysed for common themes relating to the research question. A total of four main themes were identified from the common themes found in the literature: Effective communication on the single-patient ward, patient safety and monitoring in single-bed rooms, holistic nursing and patient care and stressors and stressors and the nurses' working environment. The categorization process, from original research article analysis, definition of thematic subcategories to main themes was included in *Appendix 3. Categorization table.* An illustrative overview of main and subthemes was pictured below.

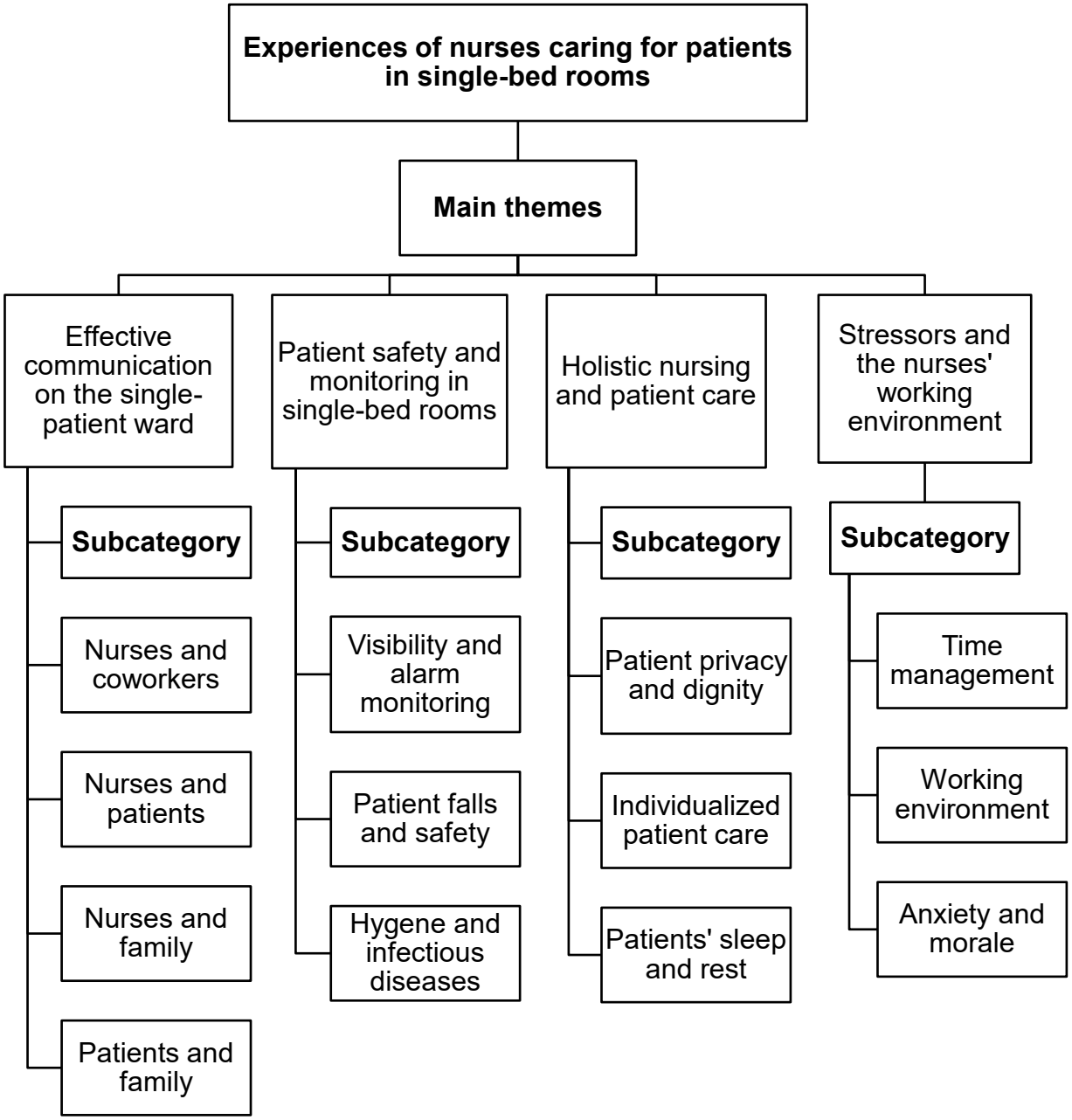

Figure 2: Themes and sub-themes identified in analysed articles.

5.1 Effective communication on the single-patient ward

A common theme in the literature addressed the effects that single-bed environments had on effective communication between nurses and other healthcare staff, nurses' interactions with patients and patients and family members amongst each other. Research conducted in hospital wards found that nurses, having moved from a multi-bed ward environment, generally perceived communication with fellow nurses and other co-workers, like physicians to be more challenging in single-bed family room environments. (Domanico, Davis, Coleman & Davis 2010, 347. Maben et. al. 2015, 103, Smith 2015, 863)

Nurses also emphasized the difficulty of maintaining teamwork in the ward. After moving to single-bed environments nurses felt more isolated, said they were less in touch with their colleagues and not as aware of the overall picture of what was happening on the ward. Nurses reported that one of the biggest challenges was to find fellow nurses to ask for information or call for help in emergencies. Nurses said that they would spend time to search for colleagues in other rooms or needed press the patient's nurse-call button to get help with nursing tasks. (Maben et. al. 2015, 103, Smith 2015, 867, Ferry, Zygun, Harrison & Stellfox 2015, 4).

The overall quality of teamwork in single-bed wards was described as lower by nurses who experienced that they had fewer interactions with co-workers. This, in addition to fewer learning opportunities was said to lead to less mutual trust and co-operation between nurses, nurse trainees and supervisors. Many nurses pointed out difficulties with training and assisting junior nurses due to not being visually aware if they were overburdened with their tasks. Informal learning was also perceived as being impacted by the single-room environment. Whereas in a multi-bed ward one could watch and learn how other nurses were treating their patients, this was more difficult when separated by walls. (Maben et. al. 2015, 104, 111, Smith 2015, 863) To counteract the sense of isolation, decentralized work environment and lack of big-picture understanding of what was happening on the single-bed wards, ward managers

felt that central handover reports for the staff at the beginning of the shift was important (Donetto, Penfold, Anderson, Robert & Maben 2017, 8).

In the studies analysed, communication between nurses and patients were found to benefit from the single-bed room environments (Donetto, Penfold, Anderson, Robert & Maben 2017, 2). However, researchers also discovered challenges to nursing-care arising from changing power dynamics and patient's expectations of care in single-bed rooms (Donetto, Penfold, Anderson, Robert & Maben 2017, 7-8). For instance, nurses felt that patients were more demanding of them, as patients were not seeing all the work nurses were performing in other rooms. Nurses also thought that patients took more of their time, were treating their hospital stay was a hotel room experience and often calling them for trivial matters, such as passing something that was right in front of them. (Donetto, Penfold, Anderson, Robert & Maben 2017, 7-8)

Effective communication for nurses in the single-bed room ward also necessitated greater reliance on electronic communication and remote monitoring which, especially older nurses who had less experience with and had not received specific training in, found especially challenging to work with. (Domanico, Davis, Coleman & Davis 2010, 348)

In most cases, nurses were welcoming of the opportunity to spend more time communicating with patients on a one to one basis. However, some nurses cautioned that this also meant that they were consequently neglecting other patients. Nurses were also concerned about patients being isolated in their rooms, especially patients who had longer hospital stays, were older and less independent. They described that without other patients keeping them company, older patients would become withdrawn, depressed and less interested in working with nurses (Donetto, Penfold, Anderson, Robert & Maben 2017, 8, Maben et. al. 2015, 101, 111).

Nurses perceived communication between patients' families, where for example a child's parents could give each other support, to be more difficult in single-patient room wards (Domanico, Davis, Coleman & Da-vis 2010, 350). However, nurses experienced that the calmer environments in single-bed wards made family members more willing to communicate with nurses and engage them in a more relaxed way (Ferri, Zygun, Harrison & Stelfox 2015, 6)

The topic of nurses having difficulties with prioritizing patient care, while simultaneously being able to reassure patients who would need to wait, was brought up in the literature. For example, in multi-bed rooms a nurse could simply ask a patient to wait and the patient would see that the nurse was busy helping another patient. Nurses experienced that single-bed rooms made this form of visual and auditory communication much more challenging. (Donetto, Penfold, Anderson, Robert & Maben 2017, 4).

5.2 Patient safety and monitoring in single-bed rooms

Another common thread in the reviewed literature highlighted nurses' concerns, either real or imagined, about the safety of their patients and the relative difficulties of monitoring them in single-bed rooms, as compared to the traditional Nightingale ward environment.

Patients either being alone and falling in their rooms and the prevention of falls caused by the challenges of keeping an eye on high-fall risk patients was a common theme found in the literature. (Donetto, Penfold, An-derson, Robert & Maben 2017, 4, Ferry, Zygun, Harrison & Stellfox 2015, 4, Maben et. al. 2015, 111). For example, in Maben et. al. *all nursing staff interviewed in the study* felt that not being able to see patients lead to an increased in falls after moving to single-bed units and that it had been easier to prevent falls in multi-bed units by monitoring patients for warning sings, like agitation or getting out of their beds. Also, nurses that moved from multi-bed to single-bed room wards said they missed the help that other patients would give them, by alerting them when a fellow patient in a room was at risk of falling. Nurses described that they would keep single-bed room doors open or open window blinds, to better monitor at-risk patients, thereby mitigating advantages to infectious disease control. (Maben et. al. 2015, 98, 111).

Donetto et. al. found that how well nurses could see and hear their patients on the ward had a dramatic impact on their sensory experience (Donetto, Penfold, Anderson, Robert & Maben 2017, 4). The inability to see patients was also found to be linked to the nurses being unable to see and hear each other, therefore reducing their overall ability to work as a team. (Donetto, Penfold, Anderson, Robert & Maben 2017, 4). For instance, having moved to a single-bed room ward plan, nurses experienced that having workstations located in

wall recesses, outside the single-bed patient rooms made observation of patients and alarms more difficult. (Smith 2015, 867)

Domanico et. al found that, in the neonatal intensive care unit ward environment, nurses perceived the opportunity for early crisis detection and management of intensive care patients to less favourable in single-bed rooms. Interestingly, the same study also pointed out that, despite the perception of less patient safety, the measured patient outcomes in the study were better in the single-patient rooms than multi-bed patient rooms. (Domanico, Davis, Coleman & Davis 2010, 350)

Finally, more positive experiences of safety of single-patient wards were brought up by nurses who believed that prevention and control of infectious diseases was indeed better and hygiene practices significantly improved in single-bed room wards. (Ferry, Zygun, Harrison & Stellfox 2015, 4).

5.3 Holistic nursing and patient care

Many studies relayed the positive aspects of caring for patients in single-bed rooms. For example, nurses felt that single-bed rooms greatly benefited patients regarding their privacy, their personal dignity and confidentiality (Maben et. al. 2015, 108, 111). Some went so far as to say that they would *hate to re-tur*n to treating patients behind privacy curtains in multi-bed wards, especially when dealing with toileting issues in gastric patients who could not reach the toilet in time (Maben et. al. 2015, 84).

Paediatric care nurses also reported a preference for single-bed room design, especially in respects to patient privacy legislation compliance and parents' opportunity for bonding and breastfeeding their child in peace (Domanico, Davis, Coleman & Davis 2010, 350). Meanwhile nurses experienced in end-of-life care said that, in their view, providing a calm and peaceful environment in a single-patient room was the ideal way to provide for a good death while patient's family could come and leave as they pleased (McCallum & McConigley 2013, 29,30).

Study participants perceived that the patient care provided in single-patient rooms could be more individualized (Ferry, Zygun, Harrison & Stellfox 2015, 4). Nurses felt that the privacy that single-bed rooms provided helped them

forge closer relationships with patients that would help individualizing their care (Maben et. al. 2015, 84). Nurses interviewed in the studies reported that single-patient rooms provided better environments for family members to stay with patients and move freely in and out of the patient-room (Smith, 2015, 867, McCallum & McConigley 2013, 29).

Nurses also perceived single patient rooms as helping patients sleep better at night and promoting more optimal sleep-wake cycles. Nurses felt that being in better control over light and noise levels produced by alarm monitors and other background noise helped the patients sleep better in the single-patient room (Kudchadkar, Beers, Ascenzi, Jastaniah & Punjabi 2016).

5.4 Stressors and the nurses' working environment

Nurses experiences with single-room ward design were significantly impacted by the degree to which they were aware of their colleagues' workload on the ward. Furthermore, not being able to see their patients, especially patients who were prone to falling, could be a source of anxiety and work dissatisfaction for nurses (Donetto, Penfold, Anderson, Robert & Maben 2017, 4-5). Nurses related being fearful of patients falling and felt that monitoring at-risk patients in single-bed rooms increased the demands placed on them (Maben et. al. 2015, 98). Single-bed ward nurses would institute documented room-check procedures, to reduce the risk of patients falling. Nurses felt that the resulting added documentation was difficult to enforce and added to their workload. (Maben et. al. 2015, 98)

Nurses experienced higher physical demands in caring for patients in single-bed rooms, such as long walking distances to get to their patients throughout their workday, which would affect the time for patient care they could give, as well as their well-being. (Smith 2015, 867, Ferry, Zygun, Harrison & Stellfox 2015, 4, Maben et. al. 2015, 110). Nurses also felt concerned about patient care quality in single-bed rooms. (Smith 2015, 867). For instance, nurses described their feelings when caring for patients to be affected by the single-room environment. Nurses related that they were uncomfortable to go into a room where a patient had visitors. They said that they felt they were intruding on the patient or being on show when relatives were present. (Donetto, Penfold, Anderson, Robert & Maben 2017, 8).

Nurses described being concerned about the social isolation of older, less mobile patients and felt that isolated patients were more likely to be less compliant, needed more attention and were more demanding of nurses. Isolated patients would keep nurses in their rooms to talk to them, which increased feelings of tension with nurses who wanted to help their patients but felt that they did not have enough time speak with them.

Nurses also felt dissatisfaction and frustration about the perceived lack of time for giving the care that they wanted to patients after having moved to a ward with single-bed rooms. (Maben et. al. 2015, 103, 111) However, nurses reported fewer feelings of annoyance by the noise levels in single-patient rooms and sound, for example made by patient monitors, caused significantly less stress to nurses working in single-patient rooms than those working in multipatient rooms (Kudchadkar, Beers, Ascenzi, Jastaniah & Punjabi 2016, 100).

6 Discussion and conclusions

6.1 Discussion of the main results

In the articles surveyed for this literature review (n=8) the main themes that emerged were: the impact that single patient-rooms had on effective communication, patient safety and monitoring, holistic nursing care, stressors and the nurses' working environment. Studies repeatedly brought challenges to the forefront that single-patient rooms posed to communication between nurses, nurse supervisors and other medical staff.

Nurses mentioned it being more difficult to find help from other nurses, seeing less from their colleagues and feeling isolated from them (Maben et. al. 2015, Domanico, Davis, Coleman & Davis 2010, Donetto, Penfold, Anderson, Robert & Maben 2017, Ferri, Zygun, Harison & Stelfox 2015, Smith 2015). Besides impacting the quality of teamwork in the single-bed wards, nurses felt that it was more challenging to get to know their colleagues outside of work. (Domanico, Davis, Coleman & Davis 2010, Donetto, Penfold, Anderson, Robert & Maben 2017). Single-patient rooms also presented challenges to training new hires and learning new skills from colleagues (Maben et. al. 2015, Smith 2015).

However, communication with patients could be positively impacted by single-patient ward design. Nurses felt that it was easier to have difficult conversations with patients in the privacy of single-bed rooms and as a consequence, they felt that this allowed patients to be more open with them (Donetto, Penfold, Anderson, Robert & Maben 2017). On the other hand, patients and their families not being aware of the amount of work nurses were doing made nurses caring for these groups perceive them as more demanding, difficult and even selfish (Maben et. al. 2015). Also, the working space affected communication with nurses and patients' families, as they were portrayed as making increased demands on nurses (Maben et. al. 2015). Nurses explained that the relationships between patients among each other and visiting family were affected as well, as it was seen to be more difficult for patients and families to support each other (Donetto, Penfold, Anderson, Robert & Maben 2017, Domanico, Davis, Coleman & Da-vis 2010).

Patient safety and monitoring was addressed by nurses in many of the studies. Most were concerned with matters of visibility: Not being able to keep and eye on their patients, difficulties in detecting patient emergencies early and locating patient alarms (Curtis & Northcott 2017, Maben et. al. 2015, Donetto, Penfold, Anderson, Robert & Maben 2017, Ferri, Zygun, Harison & Stelfox 2015).

The most pressing challenge in patient safety was perceived to be the matter of patients falling in their rooms. Nurses were highly concerned about not being able to detect and prevent falls by identifying patients most at risk of falling. (Maben et. al. 2015, Donetto, Penfold, Anderson, Robert & Maben 2017) However, most nurses interviewed in the studies perceived single-bed wards to be better for reducing the risk of infections and controlling infectious diseases (Maben et. al. 2015, Ferri, Zygun, Harison & Stelfox 2015).

The greatest advantages that nurses perceived in single-patient rooms concerned holistic and individualized patient care. Nurses felt that single rooms allowed nurses to focus on their patient and be more in touch with their emotional frame of mind due to fewer distractions from monitor alarms and other noises (Maben et. al. 2015). They also relayed the benefits that single-patient rooms had on patients ability to sleep and rest better and having their families

visit whenever they wanted (Donetto, Pen-fold, Anderson, Robert & Maben 2017, Kudchadkar, Beers, Ascenzi, Jastaniah & Punjabi 2016, Maben et. al. 2015, McCallum & McConigley 2013). Nurses experienced with caring for the dying specifically pointed out the advantages that single-patient rooms had for patients' dying in a dignified way (McCallum & McConigley 2013, Maben et. al. 2015). The negative aspects to holistic patient care were exemplified by nurses perceiving patients, especially those older and infirm, to become isolated in their single-patient rooms and having less social interactions with other patients (Maben et. al. 2015).

Ultimately, from the literature reviewed it was difficult to make a clear assessment on whether the single-patient ward was a more, or less demanding working environment for nurses. On one hand, nurses feel less stressed by patient alarms, other background noises and were able to concentrate better when working in single rooms (Kudchadkar, Beers, Ascenzi, Jastaniah & Punjabi 2016, Ferri, Zygun, Harison & Stelfox 2015). They also appreciated the extra space to work in during routine care, as well as in emergency situations (Ferri, Zygun, Harison & Stel-fox 2015). The drawbacks of single-patient rooms were perceived to be higher demands on nurses' time and work resources. Walking distance were portrayed as longer and patient interactions took longer in single-patient wards (Maben et. al. 2015, Donetto, Penfold, Anderson, Robert & Maben 2017, Smith 2015). While some studies found that moving to single-patient wards improved nurses perceptions of their working environment and reduced their feelings of stress, (Kudchadkar, Beers, Ascenzi, Jastaniah & Punjabi 2016), in other studies many nurses complained of feeling more anxious: They were concerned about confused and elderly patients being alone in their rooms and falling (Maben et. al. 2015). They felt more isolated from their colleagues and having to deal with more demanding patients and their family members (Maben et. al. 2015, Curtis & Northcott 2017, Donetto, Penfold, Anderson, Robert & Maben 2017). Nurses work morale was also theorized to be affected with the challenges of working in a more isolated setting, seeing less of their co-workers and being less able to form friendships with fellow nurses outside work (Donetto, Penfold, Anderson, Robert & Maben 2017).

6.2 Further research

A common theme in the literature reviewed was the amount of additional time management demands that nurse perceived when working in the single-patient ward environment. Nurses struggled with being able to keep track of and divide their attention to all patients they were caring for (Maben et. al. 2015). While new communication tools, patient monitoring devises and information technology could help nurses be aware of the overall situation on the ward and communicate with their colleagues, more in-depth studies on the topic of communication in the single-patient ward could be of great benefit to both nurses and healthcare decision makers in understanding the requirements and demands that the environments place on hospital nurses.

6.3 Limitations

The scope of this literature review did not concentrate on a single type of inpatient ward, which in retrospect would have made reproduction and comparison of its results more achievable in the long run. There were worlds of differences between paediatric, intensive care unit and surgical wards, both on the demands they placed on nursing staff and the patient profiles they treated. The single-patient room environment made different demands depending on which type of patient a inpatient ward nurse was treating. Therefore, the results of this review were limited to an overall, generalized picture that hospital, inpatient-ward nurses appear to share. Also, due to financial and time management considerations, the scope of the literature review was limited to full-text sources that were available in print and online using University of Applied Sciences of Jyväskylä credentials. As a side note, the literature review was conducted during a state of national emergency caused by the coronavirus pandemic of 2020. Nurses' attitudes toward single-patient room design may have significantly changed in a short time frame thereafter, due to the an understanding of the increased importance of treating and isolating patients with infectious diseases, both from a patient as well as a nurse-safety perspective. The time frame may also have presented challenges to comparing data from pre-pandemic to a post-pandemic timeframe. Finally, the process of analysing the quality of the literature, the extraction of data and the selection of what

would be included in the study was done by a single person, leading to the possibility of methodolical selection bias.

6.4 Ethical considerations

Due to the nature of the literature review, no patients or other respondents participated in the study. The information is relayed here to the best of the author's knowledge and understanding of the original research studies. In accordance with the Jyväskylä University of Applied Science guidelines, to avoid plagiarism this literature review was submitted to the Urkund an electronic plagiarism detection system.

6.5 Summary

In conclusion, nurses' experiences when working in single-patient rooms agreed with the consensus view that patient privacy and confidentiality was best served by providing care in single-patient rooms (Maben et. al. 2015, Domanico, Davis, Coleman & Davis 2010, McCallum & McConigley 2013). Nurses also pointed out the benefits to infection prevention and control (Ferri, Zygun, Harison & Stelfox 2015, Maben et. al. 2015). Single-patient rooms were said to have provided more opportunities for individualized patient care and gave more space for families to take part in patient care (McCallum & McConigley 2013). However, there were significant drawbacks that needed to be addressed when nurses experienced a change from the traditional Nightingale ward to a single-patient ward layout. Walking distances were longer and without significant investment in communications solutions there were challenges to nurses working in effective teams on the ward (Smith 2015, Maben et. al. 2015, Domanico, Davis, Coleman & Davis 2010). Nurses felt more isolated when working on the ward and were worried about their patients being isolated as well (Maben et. al. 2015). Most studies strongly pointed to a lack of visibility in patient rooms and the importance for alternative approaches to monitor patients, especially those at high risk of falling (Maben et. al. 2015, Donetto, Penfold, Anderson, Robert & Maben 2017, Domanico, Davis, Coleman & Davis 2010, Ferri, Zygun, Harison & Stelfox 2015).

As single-patient wards were becoming more common, time and further research would tell if the perceived benefits that single-patient rooms brought to

patient care would outweigh nurses' anxieties about communication difficulties, higher workloads and fewer opportunities for learning from colleagues when caring for patients in the single-bed room inpatient ward.

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8 Appendices

8.1 Appendix 1. Table of articles

Table of Articles						
Authors, (Year), Country	Purpose and Aims of the Study	Research Methods or Instrument	Sample (*n*)	Validity / reliability	Main results	Critical appraisal (Hawker et. all 2002)
Smith, T. 2016, USA	Research on advantages of single-bed rooms compared to multi-bed rooms in a neonatal intensive care unit compared to other types of pediatric intensive care units.	Staff nurses' activities were analyzed. A response survey was scored and staff comments about care quality and challenges were collected.	Observation of staff in pre-occupancy 128 nursing staff and post-occupancy 127 nursing staff.	Limited data collection period, sample size, misunderstandings, researcher's lack of familiarity in procedures, low survey response rate.	Challenges in extending benefits of private room designs on occupancy and patient care quality on other pediatrics units outside of neonatal ICU.	32
Kudchadkar, S., Beers, C., Ascenzi, J., Jastaniah, E. & Punjabi, N. 2016, USA	Surveying changes in nurses' perceptions about the environment of a pediatric critical	Cross-sectional survey of nurses before and after moving to a new	All PICU nurses. 100 respondents.	Anticipation of new PICU may have affected perceptions. Heterogenous	Single-patient rooms rather than multi-bed rooms improved nurses'	31

	care unit for patient sleep and the nurses' work experience after transition from multibed rooms to single-bed rooms.	hospital with only single-bed rooms for pediatric patients.		ages and experience levels. Survey not previously validated tool. No quantitative data to correlated light and sound levels.	perceptions of the pediatric intensive care unit environment for promoting patients' sleep and the nurses' own work experience.	
McCallum, A. & McConigley, R. 2013, Australia	Qualitative description of end-of-life care in an open critical care unit.	A descriptive, exploratory approach using structured interviews.	Five registered nurses.	Small sample size in a single care setting. Cannot be generalized to other critical care environments.	The care environment affects the nurse's role and poses challenges to end-of-life care.	28
Domanico, R., Davis, D., Coleman F., Davis, B., 2010, USA	Surveying the satisfaction of family members and healthcare staff in different neonatal intensive care units.	Groups of parents and nurses surveyed using validity-tested survey tool.	61 parents. 48 healthcare staff.	Study focused on perceived satisfaction of design. Different outcomes for survey group respondents.	Staff perceptions were affected by role and hospital work experience.	30

Maben, J., Griffiths, P., Penfold, C., Simon, M., Pizzo, E., Anderson, J., Robert, G., Hughes, J., Murrels, T., Brearley, S. & Barlow, J., 2015, UK	Studying the effects of moving to a new acute care hospital with single-bed rooms only on care delivery, working practices, staff and patient experiences.	Mixed methods study to compare pre and post move to single-room environment.	55 staff surveys and pedometer data. 24 staff interviews. 32 patient interviews.	p< 0.05.	Significant change in proportion of time spent on different activities. Nurses needed to adapt working practices significantly. Significant implications on the nature of teamwork. Need for training and rehearsal of practices.	35
Ferri, M., Zygun, D., Harrison, A., Stelfox, H. 2015, Canada	Describing end-user perceptions and experiences in intensive care unit built using evidence-based design.	Qualitative study including individual interviews with end-users.	39 end users.	Recall bias, selection bias, personal biases in interviews.	Evidence based design effective in building intensive care unit. Pleasant atmosphere, attention to	29

					tradeoffs in space and size, family support areas to encourage family participation in care.	
Donetto, S., Penfold, C., Anderson, J., Robert, G. & Maben, J. 2017, UK	Analyzing the sensory experiences of nursing staffs' working practices.	Secondary, thematical analysis of interviews with coding approach using grounded theory principles.	25 individual interviews.	None reported.	All single room environments limit staff's abilities to draw on peripheral information.	34
Curtis, P. & Northcott, A. 2017, UK	Explore whether single and shared hospital rooms affect family centered care.	Qualitative, ethnographic, thematic analysis of interviews conducted with children, their parents, as well as nursing and hospital support staff.	17 children, 60 parents/caregivers, 60 nursing and support staff.	Parents who were able to stay with children during daytime over-represented. No ethnic minorities.	Room layouts withing hospital wards affected the relationships between nurses, children and parents.	33

		Focus group discus-sions.				
					Mean, average ap-praisal score	31,5

8.2 Appendix 2. Quality of the articles

Appendix C. Quality of the articles (Hawker et.al. 2002)

Author	Title	Abstract /title: Clear description of the study?	Introduction and aims: Background and introduction of aims?	Methods and data: Appropriate method explained?	Sampling: Appropriate sampling strategy?	Data analysis: Sufficiently rigorous data analysis?	Ethics and bias: Ethical and bias issues addressed?	Results: Clear statement of findings?	Transferability or generalizability: Transferrable to wider population?	Implications and usefulness: How important are findings to policy and practice?	Hawker score
Smith, Thomas J.	Occupancy and patient care quality benefits of private room relative to multi-bed patient room designs for five different children' s hospital intensive and intermediate care units	Good. Clear overview and description of the study. Explains what was studied and where.	Good. Thorough background discussion and rationale for the study: Workplace design quality may influence job performance.	Good. In-depth analysis of nursing tasks, perceptual response survey and collection of nurses' comments.	Good. Relatively large sample size. Responses detailed.	Fair. Data analysis well described. However, lack of detail why methods were chosen.	Fair. Limitations of the study were detailed. No conflict of interest reported.	Good. Detailed discussion of results using graphs and tables.	Fair. Difficult to generalize to whole hospital staff.	Fair. Specific advantages and disadvantages inherent in single-room NICU rooms highlighted.	32
Kudchadkar, Sapna R.; Beers, M. Claire	Nurses' Perceptions of Pediatric Intensive Care Unit Environment and Work Experience After Transition to Single-Patient	Good. Concise overview. Immediately clear what, who and where.	Fair. Clear description of background and purposes of study. Research topic is mixed. Objective split between impact on patients' sleep	Good. Detailed explanation of methods. Questionnaires included.	Good. Ample sample size and explanation for targeting. Survey done online only, which may have skewed respondents	Fair. Satisfactory explanation of the data. Good presentation.	Fair. Author interests are detailed. No separate discussion of ethics.	Good. Thorough discussion of research findings.	3Fair. Unclear that findings can be transferred to other types of units.	Good highlighting of specific issues in patient room design relating to sound and light-levels.	31

Appendix C. Quality of the articles (Hawker et.al. 2002)											
Author	Title	Abstract /title: Clear description of the study?	Introduction and aims: Background and introduction of aims?	Methods and data: Appropriate method explained?	Sampling: Appropriate sampling strategy?	Data analysis: Sufficiently rigorous data analysis?	Ethics and bias: Ethical and bias issues addressed?	Results: Clear statement of findings?	Transferability or generalizability: Transferrable to wider population?	Implications and usefulness: How important are findings to policy and practice?	Hawker score
Amanda McCallum, Ruth McConigley	Nurses' perceptions of caring for dying patients in an open critical care unit: a descriptive exploratory study	Good. Describes who was studied, where and how.	Fair. Purpose/aim of study somewhat vague.	Fair. Concise explanation of methodology used.	Poor. Small sample size of nurses interviewed.	Fair. A few paragraphs devoted to data collection methodology.	Fair. Ethical considerations and bias discussed. No issues reported. Data privacy ensured.	Good. Thoughtful discussion of nurses perceptions and experience in end of life care.	Fair. Primarily concerned with end-of-life care in an open unit. Reviews nurses perspectives on care in private-patient rooms.	Good. Issues highlighted in the study provide good background for further qualitative, as well as quantitative research.	28
R. Domanico, DK. Davis, F. Coleman, BO. Davis Jr	Documenting the NICU design dilemma: parent and staff perceptions of open ward versus single family room units	Fair. Uses hospital specific acronym. Does not mention that parent and staff satisfaction was compared.	Fair. Brief overview of previous research and starting point for the study.	Good. Through discussion of the survey methods employed.	Good. Adequate sample size for this type of study.	Good. Data analysis shown and explained using detailed graphs.	Poor. Single sentence declaring no conflict of interest. No discussion of ethics.	Fair. Study results somewhat inconclusive. Respondents perceptions changed over time.	Fair. Issues inherent to nurses working in NICUs can be studied in other settings-	Good. Differing viewpoints between patients and staff on NICU room design issues brought to light.	30

Appendix C. Quality of the articles (Hawker et.al. 2002)											
Author	Title	Abstract /title: Clear description of the study?	Introduction and aims: Background and introduction of aims?	Methods and data: Appropriate method explained?	Sampling: Appropriate sampling strategy?	Data analysis: Sufficiently rigorous data analysis?	Ethics and bias: Ethical and bias issues addressed?	Results: Clear statement of findings?	Transferability or generalizability: Transferrable to wider population?	Implications and usefulness: How important are findings to policy and practice?	Hawker score
Maben, J. Griffiths, P. Penfold, C. Simon, M. Pizzo, E. Anderson, J. Robert, G.Hughes, J. Murrells, T. Brearley, S. Barlow, J.	Evaluating a major innovation in hospital design: workforce implications and impact on patient and staff experiences of all single room hospital accommodation	Good. Clear presentation of study.	Good. Very detailed discussion for rationale of the study, background and previous research.	Good. Extensive analysis of data gathering methods used in the study.	Good. Good survey sample size for study.	Extensive discussion about the data gathering methods used.	Ethical concerns are addressed in the study and its appendix. Little discussion about researchers own inherent bias.	4 – Good. Findings are presented in-depth and highly accessible.	Good. Large scale research that can be extended to other hospital facilities.	Good. Very relevant findings that can be used by any policymakers when planning and designing new, or existing healthcare facilities.	35
Mauricio Ferri, David A Zygun, Alexandra Harrison and Henry T Stelfox	Evidence-based design in an intensive care unit: End-user perceptions	Fair. Title somewhat vague: Definition of end-users broad.	Fair. Brief discussion of background and study purpose. Could benefit from more examples of evidence based design in healthcare.	Good. Clear presentation of what methods being used in the research and how they were used.	Fair. Adequate sample size interviewed.	Fair. Traditional qualitative analysis methods used.	Fair. Brief discussion of ethics board approval for the study.	Good. Clear presentation of study's findings and limitations.	Fair. General inferences about end-user satisfaction made that can be broadened to other wards outside the	Fair. Findings useful to decision makers, although broad as includes all end-users of single-bed rooms.	29

Appendix C. Quality of the articles (Hawker et.al. 2002)											
Author	Title	Abstract /title: Clear description of the study?	Introduction and aims: Background and introduction of aims?	Methods and data: Appropriate method explained?	Sampling: Appropriate sampling strategy?	Data analysis: Sufficiently rigorous data analysis?	Ethics and bias: Ethical and bias issues addressed?	Results: Clear statement of findings?	Transferability or generalizability: Transferrable to wider population?	Implications and usefulness: How important are findings to policy and practice?	Hawker score
S. Donetto, C. Penfold, J. Anderson, G. Robert, and J. Maben	Nursing work and sensory experiences of hospital design: A before and after qualitative study following a move to all-single room inpatient accommodation	4 - Good. Clear statement of the content of the paper.	4 - Good. Excellent review of research being done so far on single-bed rooms and the study's new contribution to ongoing research.	4 - Good. Appropriate explanation of the methods used in the study.	3 - Fair. Somewhat low sample size for study.	4 - Good. Qualitative information presented at length.	3 - Fair. Ethical bias issues addressed.	4 - Good. Findings stated clearly in a thought provoking way.	4 - Good. Can be extended beyond hospital wards studied.	4 - Good. Authors evaluate the situation in respect to 100% single-bed room design in hospitals and their effects on staff.	34
Curtis, P. and Northcott, A.	The impact of single and shared rooms on family centred care in children's hospitals.	4 - Good. Clear and concise description of study.	4 - Good. Thoughtful writing on the background issues being studied.	4 - Good. Methods discussed at length.	4 - Good. Large sample size over extended period of time.	4 - Good.. Data analysed thematically, conversations transcribed and commented on by researchers.	3 - Fair. Declaration of no conflict of interest included. Ethical considerations discussed.	3 - Fair. Presents somewhat anecdotal evidence that points towards areas of future research.	3 - Fair. Study can be extended in the context of paediatric, hospital care.	4- Good. Authors make recommendations about applicability to clinical practice.	33

8.3 Appendix 3. Categorization table

Categorization table			
Study	**Content analysis**	**Subcategory**	**Main category**
Curtis & Northcott 2017	Space influenced experience of interaction between family and nurses.	Nurses and family	**Effective communication on the single-patient ward**
Maben et. al. 2015	Less chance of embarrasment if family are visiting patient in single-bed room	Nurses and family	
Maben et. al. 2015	Family not seeing the nurses actual work incresed the demands they were making on them	Nurses and family	
Maben et. al. 2015	Patients less likely to know what nurses were doing. Patients in sinlge rooms seen as demanding , difficult and selfish.	Nurses and patients	
Domanico, Davis, Coleman & Davis 2010	More diffiult to prioritise and reassure patients calling for help	Nurses and patients	
Domanico, Davis, Coleman & Davis 2010	Patients in single-bed rooms were less understand and patient.	Nurses and patients	
Donetto, Penfold, Anderson, Robert & Maben 2017	Nurses commented that it was easier to have diffiult and sensitive conversations with patients, which also allowed patients to be more open with nurses.	Nurses and patients	

Donetto, Penfold, Anderson, Robert & Maben 2017	Patients less aware how busy staff was, making them feel neglected	Nurses and patients	
Donetto, Penfold, Anderson, Robert & Maben 2017	Less opportunities for patients to support each other when nurses were not available	Nurses and patients	
Domanico, Davis, Coleman & Davis 2010	Single-rooms significantly decreased opportunites for families to support each other.	Patients and family	
Maben et. al. 2015	More difficult to find help from other nurses	Nurses and coworkers	
Maben et. al. 2015	Seeing less from their colleagues. Feeling isolated from other nurses	Nurses and coworkers	
Maben et. al. 2015	Quality of teamwork decreased in single-bed wards.	Nurses and coworkers	
Maben et. al. 2015	More difficult to learn skills and train new nurses.	Nurses and coworkers	
Maben et. al. 2015	Single room wards disrupted communication with other professionals.	Nurses and coworkers	
Domanico, Davis, Coleman & Davis 2010	Single-rooms significantly decreased staff communication.	Nurses and coworkers	
Domanico, Davis, Coleman & Davis 2010	Reduced ability to work in teams	Nurses and coworkers	
Donetto, Penfold, Anderson, Robert & Maben 2017	Less easy to see when a fellow nurse needs help	Nurses and coworkers	

Donetto, Penfold, Anderson, Robert & Maben 2017	More difficult to have informal conversations with colleages in single-bed wards unless able to take breaks together, which rarely happened. Impacted the ability to make friendships with other nurses.	Nurses and coworkers	
Donetto, Penfold, Anderson, Robert & Maben 2017	Reduced opportunities for informal learning	Nurses and coworkers	
Ferri, Zygun, Harison & Stelfox 2015	Concers about calling for help from inside the patient room	Nurses and coworkers	
Smith 2015	Staff percieves overall lower quality patient care team interaction in single-patient rooms.	Nurses and coworkers	
Smith 2015	Increased sense of isolation.	Nurses and coworkers	
Smith 2015	Reduced ability to supervise new nurses.	Nurses and coworkers	
Curtis & Northcott 2017	Easier to keep watch over patients in multi-bed rooms	Visibility and alarm monitoring	**Patient safety and monitoring in single bed-rooms**
Maben et. al. 2015	Reduced visibility, difficulties monitoring and keeping paients safe.	Visibility and alarm monitoring	
Donetto, Penfold, Anderson, Robert & Maben 2017	Inability to eyeball patients	Visibility and alarm monitoring	
Domanico, Davis, Coleman & Davis 2010	More difficult to detect patient crisis early	Visibility and alarm monitoring	

Ferri, Zygun, Harison & Stelfox 2015	Perceived difficulty in hearing alarms	Visibility and alarm monitoring	
Maben et. al. 2015	Lack of visibility contributed to increase in falls	Patient falls and safety	
Donetto, Penfold, Anderson, Robert & Maben 2017	Concerns about being able to prevent falls	Patient falls and safety	
Maben et. al. 2015	Reduced risk of infections	Hygiene and infectious diseases	
Ferri, Zygun, Harison & Stelfox 2015	Better for infection prevention and control	Hygiene and infectious diseases	
Maben et. al. 2015	Nurses emphasised benefits of privacy and confidentiality for patients	Patient privacy and dignity	**Holistic nursing and patient care**
Maben et. al. 2015	Nurses respect the patient's privacy more	Patient privacy and dignity	
Domanico, Davis, Coleman & Davis 2010	Better compliance with patient privacy regulations.	Patient privacy and dignity	
McCallum & McConigley 2013	More privacy afforded in single rooms for patients and families.	Patient privacy and dignity	
McCallum & McConigley 2013	Single rooms were seen as the best environment for caring for dying patients.	Patient privacy and dignity	

Maben et. al. 2015	Single-rooms allow patients to die in peace	Patient privacy and dignity	
Maben et. al. 2015	Conflicting results on spending more time with patients and giving personalised care	Individualized patient care	
Maben et. al. 2015	Single rooms allow nurses to focus on the patient and respond appropriately to emotions	Individualized patient care	
Maben et. al. 2015	Less likelyhood of being interrupted or distracted when caring for patients	Individualized patient care	
McCallum & McConigley 2013	Single rooms peaceful and quiet where families can come and go when they want.	Individualized patient care	
Maben et. al. 2015	Nurses interviewed said that social isolation was a disadvantage of single room wards.	Individualized patient care	
Donetto, Penfold, Anderson, Robert & Maben 2017	Reduced noise that disturbed patient's sleep or rest.	Patients' sleep and rest	
Kudchadkar, Beers, Ascenzi, Jastaniah & Punjabi 2016	Single rooms helped patients sleep better at night and promoted better sleep-wake cycles.	Patients' sleep and rest	
Maben et. al. 2015	Single-rooms allow patients to rest with fewer disturbances.	Patients' sleep and rest	
Curtis & Northcott 2017	Nurses perceived single-patient rooms to increase family support needs.	Time management	**Stressors and the nurses'**

Maben et. al. 2015	Cofused and patients with dementia were diffiult to safeguard from falling. Single-room environments placed additional demands on nurses to monitor them.	Time management	**working environment**
Maben et. al. 2015	Nurses struggled dividing their attention to all patients they were caring for	Time management	
Maben et. al. 2015	More task and less patient oriented care reduced job satisfaction	Time management	
Donetto, Penfold, Anderson, Robert & Maben 2017	Interactions with patients feeling neglected more time consuming.	Time management	
Smith 2015	Feeling that patient care demands are higher in single-patient rooms	Time management	
Maben et. al. 2015	Improved, spacious working environment.	Working environment	
Smith 2015	Requirement for too much walking	Working environment	
Ferri, Zygun, Harison & Stelfox 2015	Single rooms provided better space to work during routine and emergency care.	Working environment	
Maben et. al. 2015	Nurses felt hospital was large with long walking distances	Working environment	
Ferri, Zygun, Harison & Stelfox 2015	Fewer interruptions and better concentration due to less noise.	Working environment	

Kudchadkar, Beers, Ascenzi, Jastaniah & Punjabi 2016	Less annoiance and stress from noise from alarms and talking in single-patient rooms	Working environment	
Kudchadkar, Beers, Ascenzi, Jastaniah & Punjabi 2016	More satisfied with sunlight exposure in single-patient ward.	Working environment	
Maben et. al. 2015	Nurses expressed anxiety and fear of having patients fall.	Anxiety and morale	
Donetto, Penfold, Anderson, Robert & Maben 2017	Anxiety about not seeing patients	Anxiety and morale	
Donetto, Penfold, Anderson, Robert & Maben 2017	Ability to form friendships with fellow nurses helps keep up morale and stress under control	Anxiety and morale	
Donetto, Penfold, Anderson, Robert & Maben 2017	Nurses felt uncomortable going into patients' private spaces	Anxiety and morale	
Kudchadkar, Beers, Ascenzi, Jastaniah & Punjabi 2016	Moving to single-patient rooms improved nurses' perceptions of their working environment and reduced stress.	Anxiety and morale	