Design Matters For Nurses
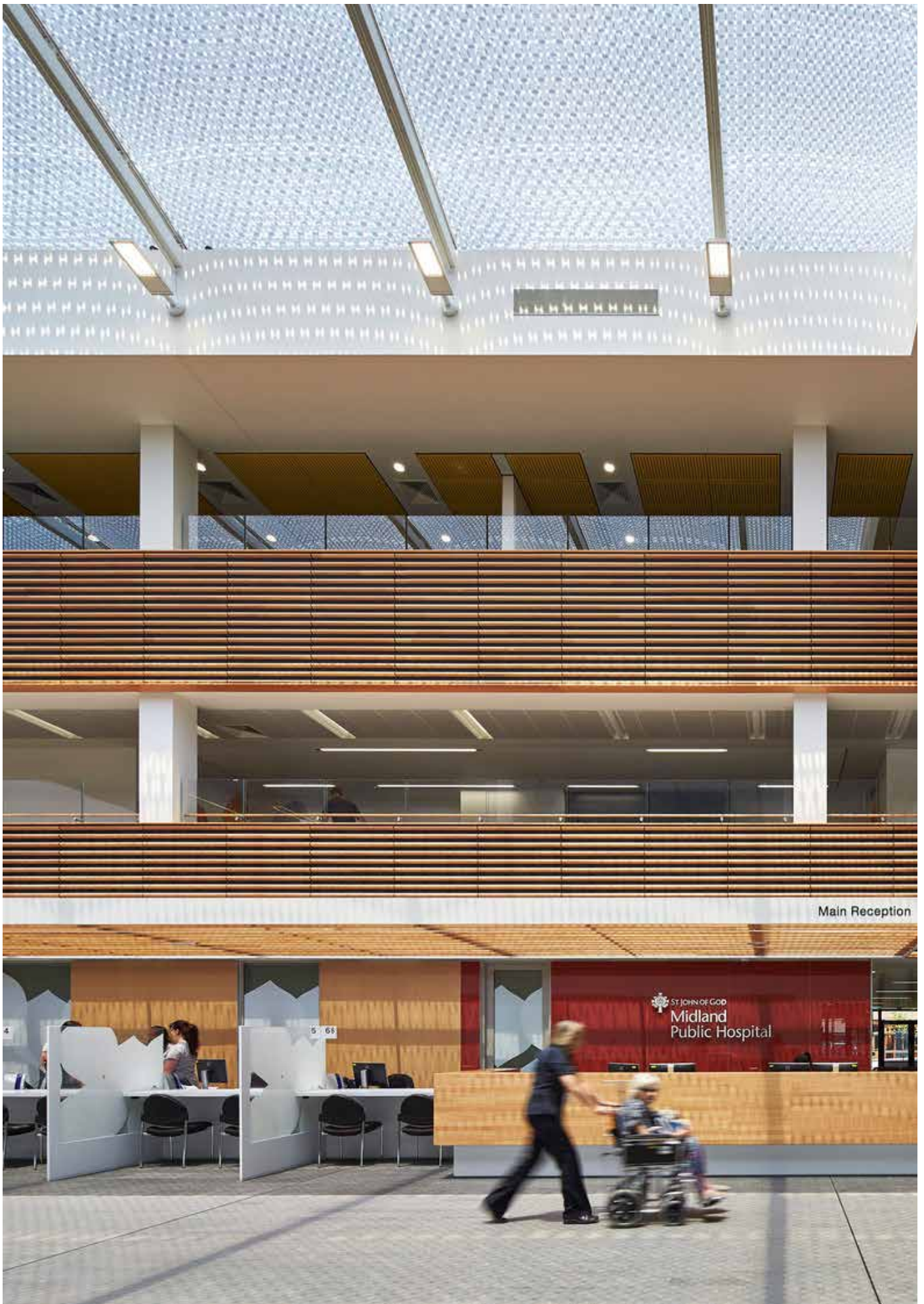
Hospital Design for Nurse Attraction and Retention

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Hassell

Main Reception

St John of God
Midland
Public Hospital

Content

Gold Coast University Hospital, Southport, Australia. Photography by Christopher Frederick Jones

INTRODUCTION

Nursing staff attraction and retention are currently significant issues in healthcare worldwide[1] and are likely to be exacerbated by the growth in health services needed to meet the demands of the ageing global population, and as the burden of healthcare shifts to lifestyle related diseases.[2] Prevailing hospital design is contributing to the difficulty of attracting and retaining nurses.

In 2015, Hassell partnered with the University of Melbourne Health Systems Workforce Unit to determine how hospital workplace design affects nurse attraction and retention in Australia and the United Kingdom.

Previous research has identified a number of individual and organisational factors that affect the job satisfaction and productivity of nurses.

While the role of the physical environment is less well understood, studies have uncovered links between hospital workplace design and efficiency, patient and staff health and safety, and staff morale.[3,4]

By analysing existing research and new data from nurses currently working in hospitals, we explored elements of the physical environment that most affect nurses in their daily tasks.

We also examined how better design maybe able to assist in the development of a happy and sustainable nursing workforce.

The research findings suggest that workplace design can make a meaningful contribution to a hospital's staff attraction and retention strategy in an increasingly competitive sector.

Aim and method

The aim of the research was to identify hospital workplace design solutions to improve nursing staff attraction and retention.

The project included a literature review, a series of focus group discussions, and a design response.

The literature review identified 160 articles relating to hospital nurse attraction and retention, of which 22 were reviewed. Twelve focus group discussions were held with staff from four large metropolitan teaching hospitals – two in Australia and two in the United Kingdom.

The opinions of 74 nurses and nurse managers about how their physical environment related to job satisfaction, staff attraction and retention, were analysed.

In response to the findings, Hassell explores in this report the potential for both subtle and bolder changes to nursing workplaces through the design process and final built outcomes.

WHAT DID WE FIND?

Hospital workplace design appears to directly influence how nurses experience their work, and indirectly influence workforce attraction and retention.

Nurses are the cornerstone of hospital care delivery. [5] Yet stress, burnout and staff turnover are common issues that undermine the ability of hospitals to provide a happy and sustainable nurse workforce. Our research uncovered a wealth of insights into the working lives of nurses in a variety of settings.

The dedication of nurses to high quality care emerged as the participants discussed the barriers and opportunities for better workplace environments that would contribute to attracting and retaining nursing staff.

The major finding of our research is that hospital workplace design appears to directly influence how nurses experience their work, and indirectly influence workforce attraction and retention.

1. Design does matter

The ability of a hospital to attract and retain nurses is influenced by a complex combination of factors, including workplace design. There are two separate, but related, issues that affect how nurses feel about their workspaces - functional design, and the symbolic expression of the value of nurses.

2. Nurses just want to get their work done

Poor hospital design can contribute to a culture that de-values what nurses do and how nurses work. This affects job satisfaction, and in turn, staff attraction and retention.

A perceived lack of appreciation can be countered by providing an effective, efficient and comfortable workplace. The three design features that matter most to nurses in their daily tasks are:

→ Space to work, learn and rest
→ Proximity to staff, patients and equipment
→ Indoor environmental quality

3. Attraction and retention factors are different

Factors that influence attraction and retention are not the same. Attraction factors generally relate to the appearance of the workplace. Retention factors relate to how design supports workplace efficiency and effectiveness.

4. Good design takes time and effort from everyone

An inclusive design process coupled with a strong organisational culture can positively influence the effectiveness and longevity of a workplace's design, and lead to more satisfied nursing staff.

Design Matters For Nurses

1. Penrith Health Campus, Sydney, Australia.
   Photography by Brett Boardman
2. Shoalhaven Cancer Centre, Shaolhaven, Australia.
   Photography by Michael Nicholson

DESIGN DOES MATTER

In 2016, the UK will have a shortage of 47,000 nurses.
92% of acute hospitals have daily shortages of nurses[2]

In 2016, Australia will have a shortage of 13,000 nurses.
By 2025 this could be 109,000 or 27% of the workforce[6]

The Nursing Shortage

The current and projected global shortage of nurses will be a persistent problem for many healthcare facilities.[6] The most obvious and important of these is that inadequate staffing can lead to patient health and safety issues.

There is also a signifcant financial impost on health systems: the cost of nurse turnover has been estimated at up to 150 per cent of the nurses' annual pay, depending on the type of job, level of experience and clinical skills.[7]

But it is not an easy problem to solve, because despite a concerted effort over recent years to address it, the attraction and retention of nursing staff is influenced by a complex combination of factors.

While pay and responsibility have significant influence,[1] people, teamwork and management (collectively, organisational culture)[8] and workplace design features also contribute.

Design And Organisational Culture Are Part Of The Solution

If left unchecked, the current nurse shortage will lead to intense competition for appropriately trained staff as workers weigh job merits, including the physical design of the spaces they work in.[9]

Demonstrating how highly a hospital values its nurses plays a major role in attracting and retaining the best nurses.

A comfortable, effective and efficient workspace is both a symbolic and practical demonstration of that value, as indicated by the comments from the nurses in our focus groups, noted throughout this paper.

Organisational culture is sometimes overlooked but has also been found to be a factor in nurse turnover.

Our research explores the link between a strong organisational culture and the potential for good hospital workplace design, and finds that the careful alignment of these two factors can have a significant influence on the attraction and retention of high quality nurses.

Fiona Stanley Hospital, Perth, Australia. Photography by Peter Bennetts

"Nursing pay, although important, is not as critical to preventing turnover as is a positive workplace culture that facilitates teamwork, encourages continuous learning, accountability, trust and respect, and flexible scheduling" [10]

NURSES JUST WANT TO GET WORK DONE

The three elements of workplace design that most significantly affected nurses were space, proximity and indoor environment quality.

When you've got a job to do, you need the space, time and environment to get it done.

Getting these elements right can directly affect nurses' efficiency, the quality of care they provide, and staff morale. And these, in turn, can indirectly affect staff attraction and retention.

The study found that the three elements of workplace design that most significantly affected the nurses in their daily tasks were space, proximity and indoor environment quality.

1. Midland Health Campus, Perth, Australia.
   Photography by Peter Bennetts
2. WA Comprehensive Cancer Centre, Perth, Australia.
   Photography by Mark Douglas Black

Space

→ Storage
→ Education and training
→ Staff amenities for rest, meals and learning
→ Patient and family areas

Proximity

→ Walking distances
→ Storage close to patient rooms
→ Lines of sight
→ Related hospital units or wards

Indoor environment quality

→ Access to natural light
→ Variable temperature
→ Noise
→ Odour
→ Maintenance

These findings support existing research on the topic. Issues relating to space, proximity and indoor environment quality are not new, or surprising, and none can be resolved in generalities – each ward design is unique to its location, infrastructure, models of care and other variables.

They are fundamental issues that designers address in every design project.

However, the regularity with which deficiencies appear in nursing research indicates that there is still much work to be done to improve the daily working experience of nurses.

This work begins with the need to take a more user-centric view of the design briefing process by including nurses at the beginning of hospital design projects, and challenging assumptions and existing practices to suit evolving models of care.

SPACE

Hospital Spaces Must Evolve

In the tight budgetary and physical constraints of hospital management, space is precious. Regulations and standards provide guidance on how much space each area, each function, and each person may need.

But as models of care and technology now change much faster than published guidelines, the provision of space for various functions becomes conflicted and potentially compromised.

The design challenge is to provide more space - either by capturing space efficiencies elsewhere, and/or making process changes to support working in less space - for example, robotic medication delivery to allow less storage on the wards.

Education and training

Nurses are expected to pursue professional development and update their skills regularly. While some of this can be provided externally, hospitals also have their own internal programmes.

"There's not a designated teaching area or seminar room, so at the moment we use our staff room... it's supposed to accommodate 14 people plus an educator plus equipment, and it just doesn't work."

Spaces dedicated to seminars, meetings, and access to online education platforms are increasingly important in the hospital workplace, but allowing adequate space for these activities is difficult.

Patient and family areas

When a patient arrives in a ward, often they bring with them an ongoing stream of family and friends, as well as a team of health professionals that require bedside access with the accompanying requirements for treatment, privacy and socialising.

In addition to the bedside space requirements, a number of focus group participants lamented the lack of space for families.

"Space for patients, between patients. Appropriate space where you can have difficult conversations with patients and relatives in confidence."

In the absence of adequate waiting areas for congregating visitors, the corridors and nurses' stations fill with people, which can impede efficient work.

Adequate and appropriate storage

Appropriate storage is a key element of successful workplaces, and in the healthcare environment particularly. Convenient access to medication, and supplies, as well as larger equipment, were the most commonly cited issues in the focus groups.

"I've noticed over time that a lot of the areas that were used for patients have become storage areas."

"Our equipment is in a bathroom, so if a patient wants to use a bathroom, you pull out about three commodes, a wheelchair and a big Monash chair.... it's ridiculous."

The appropriation of spaces in hospitals for uses other than the original intention is common: treatment areas become offices, corridors become waiting areas, bathrooms become store rooms.

Many of the items requiring storage are bulky healthcare aids that are awkward to store, yet need to be readily accessed. Inadequate storage often results in ward bathrooms becoming improvised storage spaces.

Penrith Health Campus, Sydney, Australia. Photography by Brett Boardman

Centralised storage

A move to centralised storage of equipment with a team that maintains, cleans and distributes equipment as it is needed has been implemented successfully in many new hospitals, including the Gold Coast University Hospital in Australia.

This type of system allows more efficient hospital-wide use of equipment, less duplication, and more patient time for nurses.

Nurses spend a considerable amount of time as hunters and gatherers - walking from patient rooms to the nurses' station and other areas.[4] This was reflected in a number of comments in the focus groups about quick access to medications and other consumables.

In addition to the trends in storage for large equipment, the storage of small consumables in hospitals is changing.

With the advent of "just in time" supply and delivery of stock, there is a move to provide bulk storage space for trolleys pre-packed with the day's requirement of consumables.

"Storage at or near the bedside, or close to the four bed rooms would save having to have big storage rooms, and nurses' time going to get things."

Bulk storage is usually located centrally and is controlled by swipe card. While enhancing security of medications, this requires staff to walk to this central location many times in a day.

Automated medication stations with finger print access are also a new development intended to overcome issues of medication security.

At the New Karolinska Hospital in Stockholm, large storage areas will not be required in wards as equipment, consumable and medications will be ordered digitally, and delivered either by pneumatic tube or by remote controlled robots.[11]

This type of trade-off between security of medications and proximity is not uncommon in hospital planning.

These examples serve to remind hospital planners and designers that models of care and management can have significant ramifications for nursing staff, and their methods of working, and should be carefully considered in the early phases of design.

Figure 1.
Decentralised storage model

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Figure 2.
Centralised storage model

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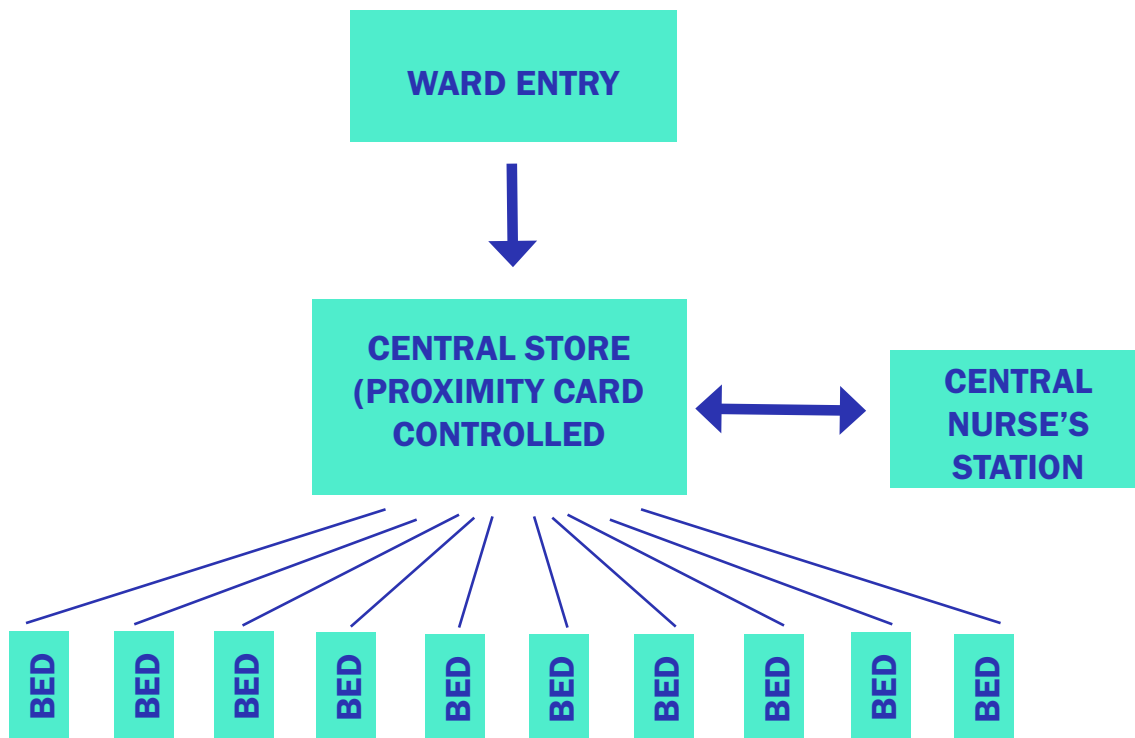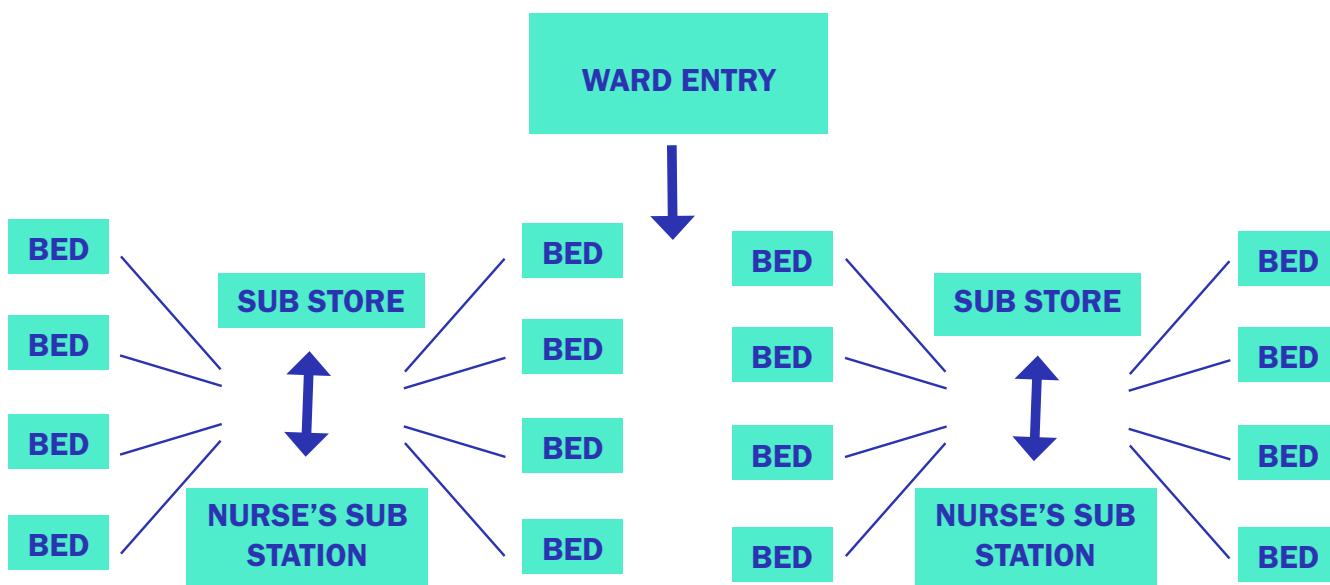
Staff amenities

One of the key themes emerging from the focus groups was that poor hospital design can contribute to a culture that de-values what nurses do and how they work. This affects job satisfaction, and in turn, staff attraction and retention.

The psychological contract - an unspoken understanding of mutual obligations between employers and employees [12] is under threat in hospitals.

Nurses perceive a lack of respect for their work as hospitals pursue business models focussed on cost control and patient throughput.

Our research suggests that one of the expectations of nurses in their psychological contract is the provision of a safe, comfortable and effective workspace, for the benefit of both the patients and staff.

Time out for nurses

Nurses repeatedly noted the lack of space away from the immediate demands of patients for paperwork, learning and meal breaks.

High rates of staff turnover in the nursing profession are linked to stress and burnout, and consequently staff morale, productivity, medical error and patient satisfaction. [10,13]

The provision of comfortable areas for meal breaks (close to, but separate from, the clinical area) are an important inclusion to combat the intense nature of work that nurses confront daily.

Yet some hospitals do not provide the most basic break facilities. Adequate space for documentation tasks, handover meetings, or online training is also a visible demonstration that the hospital respects and values the important work that the nurses do.

Lessons from other sectors

Hassell has introduced spaces into new healthcare environments based on our learning from the education, research and commercial office sectors, where employees are increasingly benefitting from centralised spaces that blend social, work and learning functions.

At the Rockhampton Hospital in Australia, administrators recognised the importance of providing a large and inviting staff space to attract and retain highly skilled staff to a regional facility.

At the Critical Treatment Hospital in Hampshire, UK, the Central Staff Zone is based on the concept of an airport lounge with changing areas and toilets provided, as well as flexible seating, working and education space.

These types of spaces provide much needed respite from the daily stresses of healthcare, but also encourage staff interaction and demonstrate to staff the value the hospital places on their contribution.

PROXIMITY

Proximity for nurses means a variety of things – safety, efficiency, comfort, and reliability.

The nurses in our focus groups repeatedly raised the need for proximity, both physical and visual, to optimise lines of sight to patients and staff and walking distances to storage, nurses stations and related units.

> "Wards I have worked on have had lovely big windows and space, but how much is too much space? You've got heaps of storage at the front but that means you've got to walk three kilometres to get to your patients. It's about finding that balance, isn't it?"

Fast access to equipment and staff in an emergency can be crucial. Visual connection for surveillance of patients can help to reduce falls, and consumables stored close to where they are needed saves tired legs at the end of a shift.

But growing space requirements for technology, equipment and patients regularly challenge designers to maintain a workable balance.

Technology

Technology increasingly has a role to play in improving connections with patients and staff, with the use of mobile devices to track the nearest staff and equipment, as well as patient records and identification.

Nurses at the Texas Children's Hospital use a smartphone to text, talk, access resources, receive alarm queues, and determine staff availability.[15] Electronic whiteboards in patient rooms are also becoming common for communication between staff, patient and families.

Walking distances

Studies have shown that nurses can spend up to a third of their time walking around the ward.[4] This can cause fatigue, and detracts from time spent with patients. Proximity to beds, administration, storage and other related units can all make a difference to a nurse's work day.

Nurses' stations

Major decisions relating to how care is coordinated will influence design outcomes. This is particularly true of the epicentre of nurse work - the nurses' station, a space that was raised often in the focus groups, particularly in relation to proximities.

There are two approaches that can be adopted: a de-centralised model and a centralised model (see diagrams next page).

Neither model solves all the issues, and both can be seen to have significant benefits.

The alignment of the model with the prevailing organisational culture within a hospital (or even an individual ward) must be considered during the early phases of design to ensure that the most appropriate setting for both the staff and the patients is provided.amenities and storage.

De-centralised nurses' station

The nurse station is often not occupied as nurses are delivering their care. A full time administrative Ward Clerk is required at reception to ensure patients' families are able to locate staff.

Advantages

→ Shorter walking distances
→ Quieter and more discreet
→ Less physical barriers between staff and patients
→ Clusters of patients provide nurses with more autonomy

Disadvantages

→ Junior staff may not have access to role models or fast assistance
→ Staff can spend more time searching for colleagues
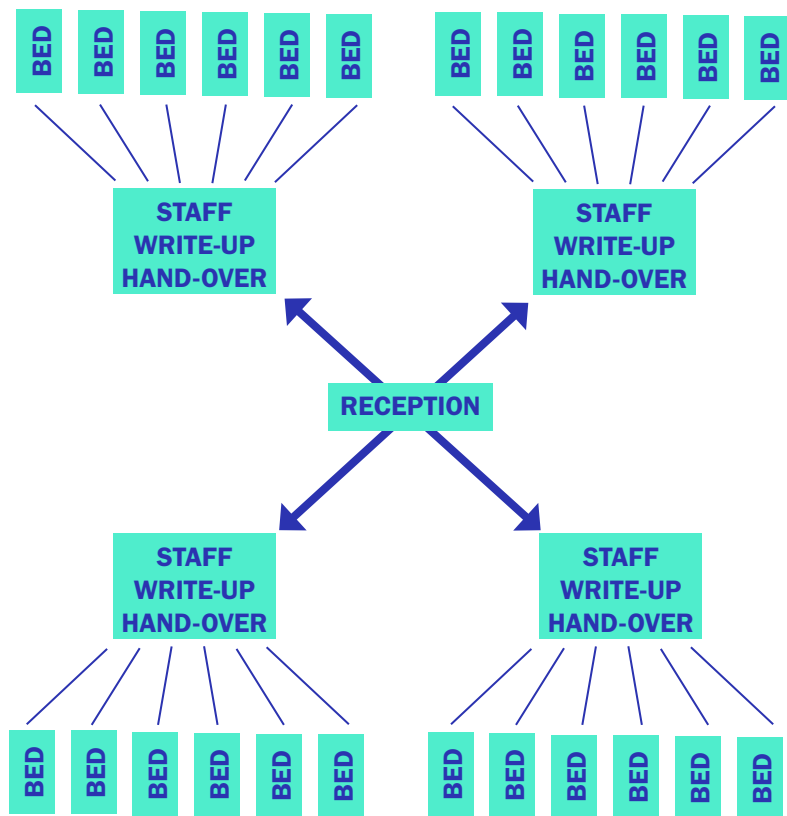→ No central point of contact if ward clerks are absent after hours

Figure 4.
Decentralised Nurses' Station

Centralised nurses' station

The centralised nurses' station provides a focal point for all care activities, and storage for the key clinical records.

Advantages

→ Supports collegiate information sharing
→ Obvious staff point for visitors
→ Easier managerial oversight of staff

Disadvantages

→ Sightlines to bedrooms more difficult to achieve
→ Patients can feel left alone if staff congregate at central point
→ Staff must walk back to central location to access information
→ Busy and potentially noisy
→ Nurses may feel less autonomyous
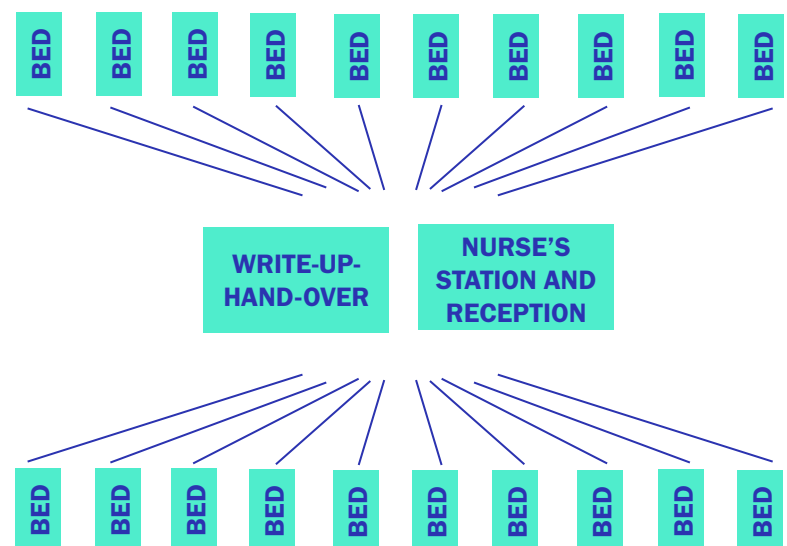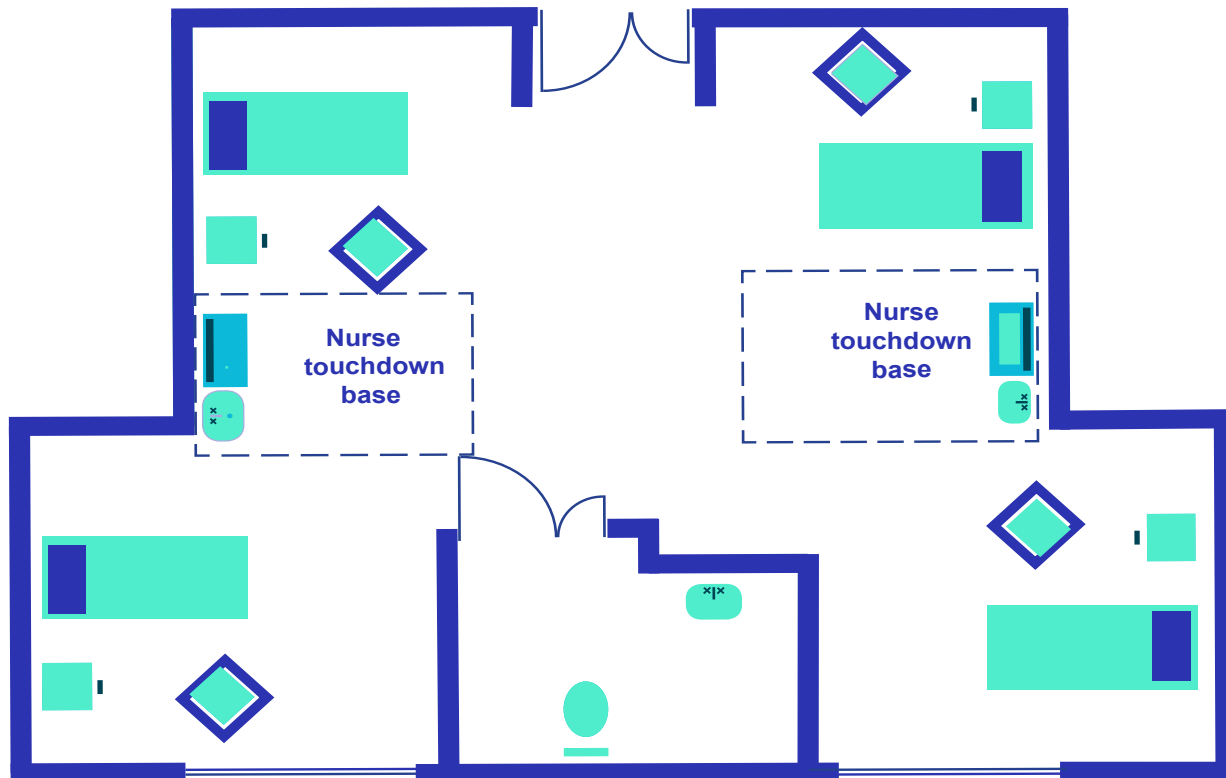→ Promotes a process-orientated approach that may not match staff values

Figure 5.
Centralised Nurses' Station

Figure 3.
Multi-bed Rooms, Critical Treatment
Hospital, Hampshire, UK

Lines of sight to patients

While there is still debate about the cultural, social and spatial benefits of multi-bed patient rooms, the number of single-bed rooms in new hospitals is increasing on the basis of evidence of shorter patient stays, reduced infection rates and medical errors, and improved privacy.[3]

The single-bed room has helped to deliver patient-centred care, but has come at a price: nurses walking further to attend to patients, and restricted sightlines.[14]

Nurses understand and largely support single bed rooms, but worry about the safety of patients when lines of sight are interrupted.

In response to these concerns, the Hampshire Critical Treatment Hospitalwill have multi-bed rooms that maximise visibility and maintain privacy levels.

The beds are located in niches that provide a visual barrier. The beds are located in niches that provide a visual barrier between patients without compromising general surveillance.

"Touchdown bases" with the necessary equipment and technology are located strategically between the beds to enable direct sightlines between patients and nurses.

INDOOR ENVIRONMENT

Nobody really wants to visit a hospital. It usually means someone is sick, but also recalls our collective memories of older hospitals - long corridors smelling of disinfectant, the murmur of discomfort, and a lack of windows.

Indoor environment quality

For hospital staff, the aesthetics and maintenance of the workplace serve as a daily reminder of the value their employers place on their work.

Nurses identified a number of environmental qualities that affect their daily work experience, including temperature, noise, odour and colour, but the main factors were:

→ Access to natural light
→ Maintenance

Natural light

Hospitals are challenging environments to build and maintain, but access to natural light is a crucial element in a well designed facility. Green field and new build hospitals present opportunities to provide this type of design element, albeit within budgetary constraints.

" You couldn't see any natural light at all. It just felt really oppressive."

The refurbishment, rebuilding and extension of older hospitals presents very real challenges, particularly in achieving natural light penetration within often labyrinthine existing spaces.

Narrow floor plates, courtyards and atriums are common design elements that seek to provide staff and patients with much needed access to natural light.

"I like how you can walk along different corridors and almost at any point you can actually see outside, and there's natural light."

Maintenance

It is hardly surprising to learn that nurses want their workplace to look neat, clean and attractive - most people do.

"It just looked really messy... disorganised and chaotic. Almost as if nobody cared."

A recent post occupancy study of a new Australian hospital[16] found that the cleanliness and ease of maintenance was important to staff. In particular a large and open atrium space at the entry point provided a welcoming start to the working day.

The degenerating condition of one of the hospitals in the study was a significant source of concern for nurses - particularly for patient safety, but also as a measure of how much hospital management valued staff.

Comparisons to another (newly built) site were numerous and pointed, and indicated that the level of maintenance of a facility reflected the standard of care those within its walls would receive.

"If we want to look like we care about our people we need to look like we care about our house."

ATTRACTION AND RETENTION FACTORS

Our research suggests a subtle difference between what design factors initially attract nurses to a hospital for a job, and what factors help to retain them at the workplace over time.

It's Got To Look Good, *And* Work Well

Essentially, aesthetic and observable layout issues were important for those who were not familiar with the work enviornment (i.e. at interview stage). Once employed, workplace and operational issues that were less visible became more important

"I'm not sure environment impedes our ability to attract staff. Having said that, it has an effect once they arrive on the ward in terms of how satisfied they are."

Attraction

Attraction factors generally relate to the appearance of the workplace:

→ Internal public spaces including the foyer and entrance
→ Ward level environment - natural light and pleasant colorsUnit space – accessibility
→ Unit layout – walking distances
→ External environment –near or in a shopping precinct

"We have a brand new space which has been a big attractor for staff."

"When you're showing people around, you are a bit embarrassed when the area doesn't really reflect the type of thing you want."

Retention

Retention factors related more to workplace effectiveness:

→ Unit space – storage, staff, patient and family amenity
→ Unit layout – corridor length, and related unit proximities
→ Unit visibility – staff and patient lines of sight
→ Ward environment – natural light, variable temperature, noise level

Some nurses stated the physical workplace was not a factor in their decision to stay in a job, but there were differing opinions, and these highlight the dedication to care. Others hinted at the damaged psychological contract.

"You don't take into account where all the equipment goes when you're interviewing for a job. But, then when you see other wards, they've got a whole alcove for their stuff and we're putting ours in an old bathroom. How is that fair?

GOOD DESIGN TAKES TIME AND EFFORT

The issues identified in our research are widespread because quality healthcare is predicated on a highly functioning hospital environment.

While hospitals have evolved over time, and many significant issues (infection rates, privacy etc.) have greatly improved, changing models of care and new technologies ensure a need for constant review of the physical workplace.

Hospital design is complex, occurring over a long period of time with a large number of participants - clients, users, designers, funders, regulators and contractors, sometimes with conflicting objectives and priorities.

Opportunities for misalignment of expectations and errors are numerous. Changes in management, funding, politics and personnel can (and often do) occur, causing compromises in the best design intentions.

As a result, there is a continuum of possible outcomes, from good design to bad, and instances of these were put forward by a number of nurses in the focus groups.

1. Good design

Design that produces an environment that accommodates everyone to an acceptable level of satisfaction.

"We pretty much got our ideal on our new ward."

2. Good design gone bad

Design that was satisfactory to begin with but unintended consequences, or changes in models of care, staffing or funding render the design impractical or redundant.

"We have moved to a ward with ensuites. The staff are now saying the patients don't get up and walk around, so we're seeing an increased length of stay because we've changed to ensuites rather than patients walking down the corridor to the toilets."

3. Informed compromise

Client and designers are aware of the limitations of the design, but must work within the parameters that the project imposes.

"Money is the big challenge... You're constrained by your budget, so it's like, you want to do this? What are you going to sacrifice?"

4. Poor design

Ill-considered briefing, planning, funding, or design significantly impedes the hospital in its aims.

"I wouldn't have a ferret in a box without a window, so why would you have an employee in a box without a window?"

The link between organisational culture and good design

An inclusive design process coupled with a strong organisational culture can positively influence the longevity and effectiveness of a design, and lead to more satisfied staff. The research suggests that the success of a project depends on the relationship between the organisational culture and the design process over time. A hospital project that maximises its potential to improve nursing staff attraction and retention requires a number of elements: continuity, planning and clear briefing.

Continuity of principles

Hospital projects take a long time. A committed client and design team, coupled with a consistent approach from government (even in the face of a change of government) allows good intentions and ideas to stand the test of time. Strong project governance is also vital, with clearly defined avenues to escalate design impasses if and when they arise.

Planning within an optimal organisational culture

Change can be difficult. Team based working and strong managerial support provide the foundations for effective communication and ongoing commitment to any workflow, behavioural or other changes that a new facility may bring with it. If a strong organisational culture does not exist, a client side cultural change agent should be engaged as part of the design process.

It is also beneficial to have a client leader with a genuine interest to support design outcomes that improve a design beyond pragmatic clinical issues. This champion should have sufficient authority to address project blockages.

A strong organisational culture will help in the involvement of frontline nursing staff. These participants in the process should be design literate (the ability to understand and apply knowledge), and have the opportunity to experience the design via a proof of concept (mock up) phase.

A clear brief

The alignment of both project and organisational objectives and expectations of all the stakeholders - investors, management, and healthcare workers - can be streamlined with a comprehensive consultation process.

The brief should contain an identified and fixed budget with clear principles that underpin the design response and cannot be diluted. For example, the identification and agreement of key design drivers such as access to courtyards, atrium spaces or natural ventilation can provide vital early design direction.

Identification of changing patient demographics, service demands and workforce projections will also assist in the design of a facility fit for both current and future purpose.

Successfully addressing these elements can have a profound effect on the built outcome. Designers struggle to deliver effective designs that unlock the full potential of a new facility without strong leadership and support for cultural change.
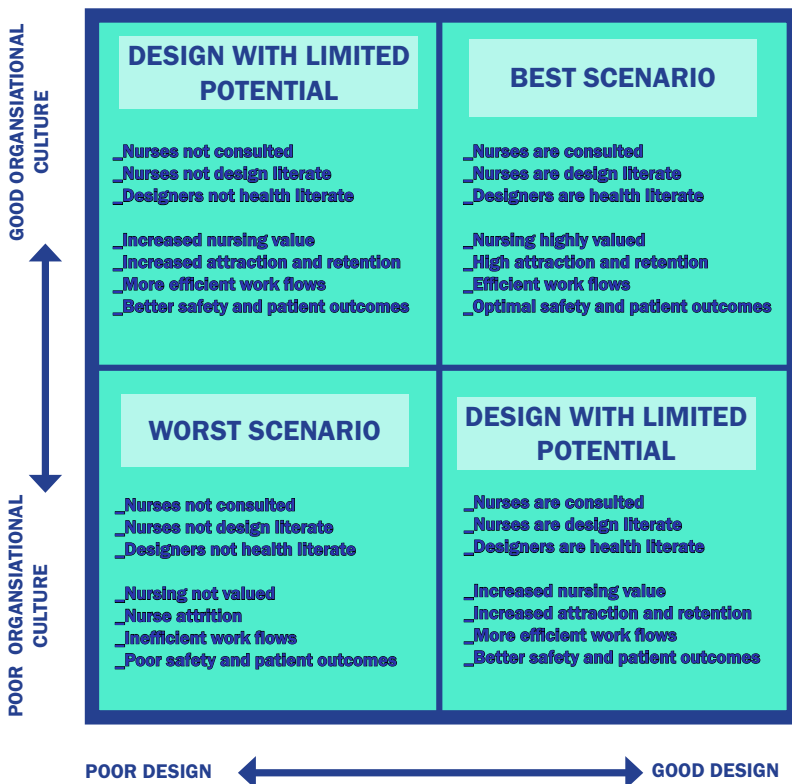

Figure 4.
Relationship beween design and organisational culture

Nurses want to help

Involving nurses in design is important because their experiences are an invaluable guide to efficient and effective work practices, but also because they feel more valued if their opinions are sought and explored.

There are challenges of course - not least of all time, but also the design literacy of nurses, and, conversely, the health literacy of designers.

Co-design

A sound understanding of the work processes of the various professions (i.e. nurses, designers, management, administrators) involved in a hospital project aids good design by allowing unambiguous communication of the advantages and limitations of ideas.

Accommodating nurse user groups in the briefing process is a well established practice, but designers are increasingly acknowledging the expertise of end users as part of a movement towards co-design processes, where user experiences are recognised and called upon throughout the design phase.[17]

Health and design literacies

While it is unreasonable to expect nurses to have knowledge of design drawing conventions, a basic understanding of the design process and how it is communicated can be useful in engaging nurses in the process. It is also important for designers to provide clear explanations of ideas through three dimensional modelling and other visualisation techniques.

'It's quite challenging involving staff. Nurses are not architects. We are trying to imagine what it's going to be like working in something we have never worked in before. If you're unsure it's less likely that you'll be speaking out."

Mock-up space, Critical Treatment Hospital. Hampshire, UK.

The flow of knowledge should not be one way, from designers to nurses. Health literacy of designers is equally important. While prior experience in designing hospitals is beneficial, evolving models of care, treatments and technology ensure that designers will have something new to learn on each new project.

The value of mock-ups

The co-design process involves more than canvassing opinions at user group meetings: designers, managers and nurses are brought together in a co-operative and deliberate process to identify problems, propose solutions and to test them before implementation.

Physical space mock-ups are a particularly effective method of communicating the intent of a design. Innovation firm IDEO encourages the use of prototypes as a means to facilitate organisational change - low impact and frequent prototyping failures that occur early in a project allow fast learning and encourage experimentation with new behaviours.[18]

Hassell used the mock-up method of "taping out" room dimensions for the Critical Care Hospital in Hampshire and the Jersey Hospital in the UK. This allowed nurses to provide feedback on layout issues and to consider possible changes in their work processes, after which a more comprehensive walled mock-up of the room was provided for fine-tuning.

"The hospital went down into their basement with cardboard and paper and fitted out the environment and worked in it for a week. They actually changed the configuration of the birthing suites."

CONCLUSION

Our research suggests that improving hospital nurse attraction and retention will require hospital project teams to focus on design features - specifically, space, proximity and indoor environment quality - that enable nurses to do their work, and demonstrate that their work is valued.

However, the design of an effective workplace is reliant not only on the provision of well considered spaces, but also on the management of those spaces and the people within them.

Actively involving nurses in the design process, particularly in the briefing stage before space constraints are set, with a view to providing comfortable, adequate and appropriate space is likely to have a positive effect on nursing staff attraction and retention.

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