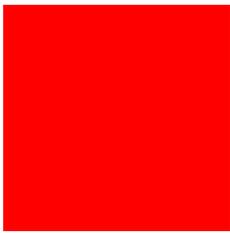


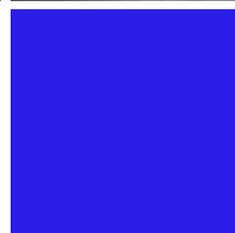


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Hospital bed room configurations: private, semi-private or shared?



A health planning white paper



Hospital bed room configurations: private, semi-private or shared?

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TAHPI is a health planning and design firm operating from offices around the world with the philosophy to provide the “A to Z of Health Planning” underpinning its provision of professional services to the healthcare development sector. TAHPI undertakes a range of investigations into best practice planning and development in healthcare around the world to ensure continuous quality improvement and sustainability of its practices. This White Paper is one of a series of reports developed by the Health Service Planning team to better inform TAHPI’s clients and employees.

Introduction

The issue of single-bedded or private rooms compared to multi-bedded rooms in hospital planning, design and delivery has been ongoing since the late 1960’s. A societal shift has facilitated the change of hospital room allocations from large, multi-bed wards with the capacity for as many as 20 patients, to 4-bed rooms, double- and single- rooms. Debate continues around the world as increasingly, government and national bodies are adopting policy mandating or promoting the construction of single-patient rooms within hospitals, including in England, the United States of America, Scotland and France (Van de Glind et al., 2007, Premier Inc, 2014b, Dowdeswell et al., 2004, Zimmerman, 2011, Stall, 2012a, Stall, 2012b, Pennington and Isles, 2013, Landro, 2006, Maben et al., 2012). With new infrastructure designed and built with up to a 60 year life, the evidence and justifications supporting the push for single rooms must be carefully examined as the decision has long lasting quality and cost consequences. Furthermore, the optimal ratio of private rooms to double or semi-private rooms and shared-rooms should also be explored, taking into account the benefits and limitations of the various room types.

Literature and Evidence

The justification for single room allocations can be broadly classified into 4 major factors (Dowdeswell et al., 2004):

Science based decisions relating to clinical care of patients particularly safety and infection control

1. Value based judgements about the nature of healthcare and society’s expectations
2. Operational requirements
3. Economic considerations

Science based justifications relating to clinical care of patients, safety and infection control

Table 1 Level of evidence designations for scientific research, adapted from NHMRC(2000)

Level of evidence	Study design
I	Evidence obtained from a systematic review of all relevant randomised controlled trials
II	Evidence obtained from at least one properly-designed randomised controlled trial
III-1	Evidence obtained from well-designed pseudo-randomised controlled trials (alternate allocation or other)
III-2	Evidence obtained from comparative studies (including systematic reviews of such studies) with concurrent controls and allocation not randomised, cohort studies, case-control studies, or interrupted time series with a control group
III-3	Evidence obtained from comparative studies with historical control, two or more single arm studies, or interrupted time series without a parallel control group
IV	Evidence obtained from case series, either post-test or pre-test/post-test
Unclassified	Expert opinion and consensus from an expert committee

Many benefits have been cited for single-rooms, including the improved control of hospital acquired infections, shorter recovery times, and therefore shorter length of stays, and better patient safety due to decreased falls and medication errors. Though single rooms are believed to confer better patient outcomes, it is important to consider the evidence and literature available on the benefits of single rooms for patients. A literature review conducted by Van de Glind et al. (2007) found robust evidence in the area of research of single rooms lacking.

The widely cited report, “The Role of the Physical Environment in the Hospital of the 21st Century: A Once-in-a-Lifetime Opportunity” conducted by Dr. R. Ulrich (2004), reviews a plethora of articles on hospital design, including

room occupancy, noise and lighting characteristics, ventilation, ergonomic designs and layouts to improve patient outcomes supporting single bed accommodation. It should be noted that comparisons made in this report were between single-bed and multi-bed rooms, rather than double-bed rooms. The negative pressure feature common in some single rooms produced the clear advantages of the isolation rooms reducing airborne transmission, but the inclusion of this feature may bias comparison of non-negative pressure single rooms to double rooms. This, along with other inherent features such as surfaces not being in frequent contact with other patients and staff, and higher sink to bed ratios (as single rooms generally have a sink conveniently located within the room), all contributing to the justification of the advantages of single rooms (Ulrich et al., 2004, Reiling et al., 2008).

Hospital infection rates

A case-control study of care practices, colonisation and infection of patients in an open unit intensive care unit converted to single-bed isolation rooms concluded that there was no significant difference in colonisation and hospital acquired infections when using single isolation rooms (Preston et al., 1981). Each isolation room was equipped with an individual sink, but it was observed that hand washing practices before and after patient-staff interactions were not altered by the room design; Preston et al. (1981) argue that factors such as proper hand hygiene have greater impacts in the prevention of infections than single rooms. This view was supported by the authors of another review studying the influence of hospital architecture and design on hospital acquired infections (Dettenkofer et al., 2004). A more recent comparative study performed by Teltsch et al (2011) produced opposing results showing that conversion to single rooms in the intensive care setting can substantially reduce the colonisation of patients by infectious organisms.

A systematic review producing a moderate level of evidence, explored the interventions for prevention and control of MRSA. The authors concluded that screening and isolation of MRSA positive patients, rather than isolating all patients, provided an adequate response to reduce MRSA outbreaks (Loveday et al., 2006). The systematic review of architectural design of hospitals and its influence on nosocomial infection rates identified 178 scientific articles, none of which used meta-analysis, systematic review or randomised controlled trial methods (Dettenkofer et al.,

2004). The majority of articles had a non-classifiable level of evidence, and were based on expert opinion or consensus from expert committees not arising directly from scientific investigation (National Health and Medical Research Council, 2000)

The prevailing hypothesis of a decrease in infection rates associated with single rooms has not been sufficiently and consistently proven (Van de Glind et al., 2007). Other empirical research presenting a weak level of evidence, suggest no difference in hospital acquired infection rates exist between the types of ward configurations (Dettenkofer et al., 2004).

Recovery rates

Consistent research classified as being of a strong to moderate level of evidence (National Health and Medical Research Council, 2000) does not exist to determine the true impacts of private-rooms for patient safety issues and recovery rates. Moderate to strong opinions are, however, reported by experts and authorities, with beliefs of single rooms being associated with decreasing medication errors, decreasing length of stay due to decreasing complications, hospital infections and improved rest conditions (Van de Glind et al., 2007).

Value based judgements about the nature of healthcare and society's expectations

Patient Satisfaction

It is claimed that patient satisfaction with care improves in more private rooms. Comparative studies exploring patient satisfaction show positive impacts from single rooms, resulting in positive evaluations of care and service aspects (Van de Glind et al., 2007, Swan et al., 2003, Janssen et al., 2000), the methods employed in the research are classed as level III, or of a moderate to weak level of evidence. Moreover, the single rooms in one study included several rooms with double occupancy and the remainder single occupancy, compared to multi-bedded rooms (Janssen et al., 2000).

Privacy and dignity

Studies of a moderate to weak level of evidence show evidence that patients experience an increase in privacy and dignity in single rooms (Van de Glind et al., 2007). Numerous articles advocate for single rooms on the basis of

an expected increased patient satisfaction and perception of privacy. Whilst some studies conclude that single rooms are conducive to better quality of sleep for patients (Van de Glind et al., 2007, Doğan et al., 2005), this has not been linked to patient recovery rates or shorter lengths of stay.

Patient surveys give inconsistent results (Pennington and Isles, 2013, Lawson and Phiri, 2004, Persson and Määttä, 2012); influenced by a number of factors including previous experiences, reason for admission, age of patient and other societal factors. Surveys administered to inpatients of in the US and Scotland found a preference for private rooms for the sake of privacy (Ehrlander et al., 2009), as well as an increasing preference for shared accommodation with age and length of stay (Florey et al., 2009).

An observational study conducted by Van de Glind (2008) found that although time spent by physicians with patients in single rooms was greater than that spent with patients in a shared room, there was no difference in the content communicated, particularly with regard to intimate subjects.

Operational requirements

Increasing the distance between patients with single rooms is suggested to decrease the productivity of clinical staff, who spend more time walking between patients (Boardman and Forbes, 2011, Detsky and Etchells, 2008). An increase in staffing costs can be calculated to account for the additional time spent in transit, this has been performed in an infectious disease ward composed of only single rooms and calculated to equate to an additional 122 nursing hours per year per patient bed (Boardman and Forbes, 2007). The increase demand in human resources created by single rooms can potentially result in a reduction in access of patients to hospital beds if carried out in the extreme approach of a hospital wholly made of single rooms for patients (Pinker and Tezcan, 2013).

Single rooms have been associated with improvements in hospital operations due to reductions in the necessity to transfer patients (Ulrich et al., 2004, Phiri, 2003, Lawson and Phiri, 2004) from roommate incompatibilities (Lawson and Phiri, 2004). Roommate incompatibilities result from cultural, social or religious beliefs, as well as the clinical status of the patient including their colonisation, infection and immunity profiles. The need to transfer patients can largely be overcome in all rooms by ensuring they are acuity adaptable (Premier Inc, 2014a). Acuity adaptable

rooms have the technology, facilities and clinician expertise available to keep patients in the same room from admission until discharge, regardless of the patient's acuity level; from intensive care to palliative care in the same setting (Agency for Healthcare Research and Quality, 2008, Detsky and Etchells, 2008).

Economic considerations

Capital costs of single rooms are greater than double or shared rooms, as are operating and staffing costs (Boardman and Forbes, 2011, Phiri, 2003, Lawson and Phiri, 2004); and operating costs of hospitals are significantly greater than its capital costs (Chaudhury et al., 2005). Single rooms require more space, have higher construction costs, and require greater maintenance and higher housekeeping costs. A North American analysis found that the cost between wholly single or double rooms is US\$182,400 and US\$122,550 per patient, respectively (Chaudhury et al., 2004). Another report found that the initial construction cost differences for single rooms are recovered quickly through high premium charges and greater occupancy rates due to preferences for room type, typically seen within the U.S. health system (Premier Inc, 2014a, Fairhill et al., 2014, Detsky and Etchells, 2008).

Discussion

Strong evidence-based research on the benefit of single hospital rooms is scarce and where moderate or weak level evidence exists, it is usually found in the US context, reducing the application of the findings to the healthcare system of other countries. The limitations of conducting research on specific design features of the hospital and their impacts on healthcare outcomes are evident, including the inability to control confounding variables with changes in the physical environment (Zimring et al., 2008). It is difficult to justify the allocation of beds to purely single rooms based on the published reports of anecdotes and opinions, instead of sound science. There are numerous calls from advocates for more robust and rigorous research on the issue of hospital room configurations, particularly in relation to:

- Infection control rates
- Patient preferences specific to the context and culture
- Patient satisfaction measures
- Patient safety
- Effects on staff, and management and processes of care provided

- Conversion costs of existing infrastructure to single rooms
- Operational costs

In addition to the absence of high quality scientific evidence supporting the exclusive use of single rooms, most research is also single room focused, with little thorough investigation into the advantages and disadvantages of shared rooms, particularly double rooms (Fairhill et al., 2014). A comprehensive longitudinal mixed methods case study is currently being conducted in the UK to explore the potential impacts of 100% single room design in hospitals for care delivery and clinical practice, staff and patient experiences (Maben et al., 2012). The results of this study will contribute to the research in this domain and provide additional exploration of the costs and benefits offered by 100% single room design for hospitals.

In recognising the limited availability of high quality evidence, it is necessary to critically examine the drivers behind this trend and appropriately place them within the context of new hospital developments. Political, societal and cultural factors are markedly contributing to the surge of the single bed movement, supported by key opinion leaders from the medical field. Just as importantly, economic considerations must be taken into account including the more recent rapid and escalating growth in health expenditure experienced worldwide, but particularly in the U.S. with healthcare accounting for more than 17% of gross domestic product (GDP) or 2.6 trillion dollars (The World Bank, 2014), 31.4% of which is in hospital care and an additional 5.7% in investment, made up of research, structure and equipment, including hospital construction (National Center for Health Statistics, 2013).

Contrast the spending of the U.S., which has an increasing proportion of single rooms in hospitals, to the controlled and gradually decreasing percentage of GDP expenditure on healthcare by countries such as Singapore (The World Bank, 2014). Singapore's highly regulated healthcare market mandates a requirement for the provision of minimum proportions of single and multi-bed rooms in hospitals (Ministry of Health, 1993), but despite the requirements for all hospitals to have a provision for multi-bed rooms, Singapore still consistently achieves better health

outcomes than the U.S. in relation to adult and infant mortality rates, and greater life expectancies (Haseltine, 2013). No recent studies compare hospital performance indicators of Singapore and the U.S., but self-reported information states that one in seven hospital patients in Singapore picks up an infection in the hospital ward (Singapore General Hospital, 2013), and one in 20 in the U.S. has an infection caused by receiving medical care (Centers for Disease Control and Prevention, 2013). These figures are difficult to compare as measurement and reporting protocols differ as well as the lack of any clear analysis of the factors contributing to the result.

Conclusion

The optimal mix of single, double and shared rooms for a hospital is not easily determined; it requires healthcare managers and planners to consider the societal and cultural context, clinical factors, economic costs and benefits, and the political driving forces behind such a decision. Whilst it is acknowledged that some single room provision is imperative in a hospital for clinical reasons, strong scientific evidence for construction of a hospital wholly made up of single rooms remains absent. International consensus on the matter is also lacking.

In consideration of the available evidence and the strength of expert opinion on the matter, it is recommended that single rooms be considered for the specialties of intensive care, infection and isolation, maternity, paediatric intensive care, dementia and psychiatry. It is also important to point out that several patient groups may benefit from double and shared rooms including paediatrics, rehabilitation, orthopaedics and elderly patients.

There is a clear movement towards single rooms with good reasons such as privacy, patient satisfaction and infection control, though lacking in strong evidence. However, for other reasons such as patient surveillance, socialisation and capital costs, a provision for a mix of single, double and shared rooms is justifiable and appropriate.

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