

**Intensive care unit organisation and its impact on patient and
nurse outcomes: a cross-sectional study of two models**

The 'hot-floor' study

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CERTIFICATE OF ORIGINAL AUTHORSHIP

I certify that the work in this thesis has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree except as fully acknowledged within the text.

I also certify that the thesis has been written by me. Any help that I have received in my research work and the preparation of the thesis itself has been acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

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My experience as a Nurse Manager grappling with the challenges of a new intensive care hot-floor service instigated this PhD. Patient activity and complexity was steadily growing and I was responsible for 300 clinical staff. I searched for guidance to meet these challenges but found very little. I decided to explore how organisational characteristics of the hot-floor impacted on patients and staff with the view of informing better health service management.

The road to completion has been long, difficult and convoluted but I have grown personally and intellectually. I have never been strong academically but I am tenacious and organised, both essential to realising this professional goal. If it were not for my supervisors' guidance, teaching and perseverance in raising my academic rigour I would not have succeeded. I have learnt so much on this journey, thank you.

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PEER REVIEWED PUBLICATIONS AND PRESENTATIONS

Peer reviewed publications:

Abbenbroek, B., Duffield, C.M. & Elliott, D. 2014, 'The intensive care unit volume–mortality relationship, is bigger better? An integrative literature review. *Australian Critical Care*, vol. 27, no. 4, pp. 157-64.

Abbenbroek, B., Duffield, C. & Elliott, D. 2014, 'Selection of an instrument to evaluate the organizational environment of nurses working in intensive care: an integrative review', *Journal of Hospital Administration*, vol. 3, no. 6, pp. 143-62.

Abbenbroek, B., Duffield, C. & Elliott, D. 2017, 'Intensive care unit organisation and nurse outcomes: A cross-sectional study of traditional and “hot-floor” structures', *Journal of Hospital Administration*, vol. 6, no. 3, pp. 67-76.

Conference presentations:

Abbenbroek, B. Evaluating the impact of the intensive care ‘hot-floor’ model. 5th International Conference on Safety, Audit, Quality and Outcomes Research in Intensive Care, Hunter Valley, Australia, August 2011.

Abbenbroek, B., Duffield, C., & Elliott, D. Intensive care unit volume-outcome relationship: Is bigger better? ANZICS/ACCCN 36th Intensive Care Annual Scientific Meeting, Brisbane Australia, October 2011.

Abbenbroek, B., Duffield, C., & Elliott, D. Intensive care unit volume-outcome relationship: Is bigger better? 11th Congress of the World Federation of Societies of Intensive and Critical Care Medicine, Durban South Africa, September 2013 (Poster).

Abbenbroek, B., Duffield, C., & Elliott, D. Selection of an instrument to evaluate the organizational environment of nurses working in intensive care: an integrative 12th Congress of the World Federation of Societies of Intensive and Critical Care Medicine, Seoul South Korea, September 2015 (Poster).

ABSTRACT

Aim: To explore the organisational effectiveness and impact on patient and nurse outcomes of two alternative closed Intensive Care Unit (ICU) models in Australia.

Background: Internationally the demand for critical care is increasing. Solely increasing bed capacity is not feasible due to high resource requirements and burgeoning costs. Consolidation of conventional 'stand-alone' ICUs into large multi-specialty integrated service models, the ICU 'hot-floor', is a preferred organisational strategy. Assumed benefits include improved patient throughput and resource utilisation, concentrated expertise and enhanced operational flexibility. The effect on patient and nurse outcomes however, is not well understood. Balancing efficiency and effectiveness is fundamental to high organisational reliability and sustainability.

Design and method: This study compared a general ICU within a hot-floor service and a conventional general ICU with similar service level and workforce characteristics. Patient throughput measures and outcomes were retrospectively investigated in a sample of 1000 randomly selected patient records during 2013. In 2014, a sample of 145 clinical nurses, split between both units, completed a structured questionnaire that incorporated validated instruments to examine the work environment, satisfaction and burnout.

Outcome measures: Patient mortality, unplanned extubation, catheter associated blood stream infections, pressure injury, venous thrombosis prophylaxis, length of stay, after-hours discharge and unplanned readmission, and unit level access, occupancy and volume were collected. The Practice Environment Scale-Nursing Work Index and Maslach's Burnout Inventory, along with supplementary questions on work perceptions, were used to collect nurse outcomes.

Results: The hot-floor model achieved higher patient throughput and a lower after-hours discharge rate, with no significant differences in patient outcomes. Patients were however more exposed to the risk of an adverse event such as deep vein thrombosis due to lower compliance with routine clinical prophylaxis protocols. Front-line nursing management, education, clinical support and senior medical staff were shared across the hot-floor service, resulting in less dedicated resources allocated to the general ICU. Nurse manager support was less effective and nurses expressed lower personal accomplishment. High patient turnover and paid overtime

compounded nurse workload, though greater internal hot-floor operational flexibility reduced nurse redeployment to external wards.

Conclusion: Improved demand management achieved through greater operational flexibility is a key driver for the hot-floor model. Efficiency gains need to account for the work environment to optimise nurse outcomes, reduce turnover and mitigate patient risks. Adequately resourced front-line nursing management and education are required for high organisational reliability and long-term sustainability.

Keywords: Burnout, intensive care, nurse, organisation, outcome, patient, practice environment