

NURSE STAFFING LEVELS, CARE LEFT UNDONE,  
& PATIENT MORTALITY IN ACUTE HOSPITALS

THESIS FOR DOCTORAL DEGREE (Ph.D.)

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## ABSTRACT

Failures in the care provided in hospitals may threaten patient safety. Research since the 1980s has established an association between lower registered nurse (RN) staffing levels and higher risk of death in acute hospitals. When RNs have more patients to care for, there is also a greater chance that some nursing care is missed. Yet despite the volume of research undertaken we have little empirical evidence about how or why RN staffing impacts on mortality and studies have rarely directly considered the contribution of medical and support staffing alongside RNs.

The research in this thesis has investigated the relationships between RN staffing levels, nursing care that is left undone (also termed 'missed care'), and patient risk of death in general acute hospitals. Using an observational design with cross-sectional data, the research examined RN staffing and mortality, concurrently with medical and support worker staffing, before going on to study the part played by care left undone as a potential consequence of nurse staffing, other factors associated with care left undone, and care left undone as a predictor of patient mortality.

The EU funded study 'RN4Cast' was the primary data source used with additional analyses based on routinely reported national data. Nurse staffing, nurse-rated quality and safety, and care left undone were assessed through a survey of RNs on medical and surgical wards. Mortality and patient risk factors were identified from administrative data sources.

In Study I better ward-based RN staffing levels were associated with a lower risk of mortality for medical patients, in regression models controlling for both medical and support worker staffing for the 31 RN4Cast NHS hospital trusts in England (RR 0.89,  $p=0.001$ ). There was no difference in support worker staffing and risk of medical patient mortality. Higher support workers levels were associated with poorer outcomes for surgical patients (RR 1.01,  $p = 0.053$ ).

Necessary nursing care was reported as being missed due to lack of time by 86% of RNs surveyed in England and 74% in Sweden. (Study II, Study III). Lower levels of missed care were associated with more positively rated quality of care and patient safety environment. (Study II). When RN staffing levels were lower, the risk of care being missed was increased. (Study II, Study III). However, higher levels of support workers were not associated with less care being left undone by RNs in England (Study II). Despite some differences in the care context between England and Sweden, the same fundamental relationship between care left undone and RN staffing was found in both countries, and in an analysis of data from nine EU countries. (Study II, III, & IV).

Care left undone was significantly associated with case-mix adjusted 30-day mortality following common surgical procedures (OR 1.16, CI 1.04-1.29) in Study IV, which examined case-mix adjusted mortality in 300 hospitals in nine countries. Care left undone mediated the relationship between RN staffing and patient mortality following surgery. Care left undone offers a plausible causal pathway between RN staffing levels and patient mortality. (Study IV).

This is the first study to demonstrate that nursing left undone is on the causal path between low staffing levels and higher mortality. Taking this research together with the studies that have preceded it, this study provides evidence that higher RN staffing levels is causally linked to reduction in the risk of fatal harm to patients.