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Overcrowding, understaffing and infection in hospitals.

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Overcrowding, understaffing and infection in hospitals



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Infections acquired in hospitals or healthcare-associated infections (HCAI), caused by methicillin-resistant *Staphylococcus aureus* (MRSA) and other pathogens, have risen to the top of the political and healthcare agenda in recent times. There is unease that, rates of MRSA such as measured by the proportion of bloodstream isolates of *Staph. aureus* that are methicillin-resistant, are unacceptably high by European standards. Factors that contribute to high levels of HCAI and MRSA include inappropriate and excessive prescribing of antibiotics, the absence of or the inadequate provision for infection control teams in hospitals and healthcare institutions, poor facilities for the care of patients, e.g. overcrowding and inadequate numbers of isolation rooms, sub-optimal professional practice such as in the area of hand hygiene and finally, poor standards of hospital hygiene. While improvements in hospital hygiene and better compliance with hand hygiene recommendations are essential in controlling and reducing HCAI, more fundamental changes are required. In particular, consideration needs to be given to the role that overcrowding and inadequate staffing levels, especially amongst nursing staff, play in HCAI rates.

The design and layout of many of our acute hospital facilities have not kept pace with developments in medical care, such as in the provision of treatment for malignancies previously incurable, and in the expansion of solid organ transplantation. Many hospital wards contain too many patients in too small a space. Recent national guidelines on the control of MRSA recommend at least 2.9 metres between the centres of adjacent beds and a minimum of one isolation room for every 6 to 7 general acute beds.¹ In a recent survey of infection control resources and facilities in Irish acute hospitals, there was a median of one isolation room for every 16 hospital beds and in only nine hospitals were isolation rooms with negative pressure ventilation available (Robert Cunney, Personal Communication). Where hospitals have specialist units the facilities need to take account of this in terms of the provision of additional single rooms. The practice of housing six patients, often with quite different clinical conditions and needs, in the one room with shared toilet and bathroom facilities, is outmoded. Adequate space between patients is essential to interrupt the transmission of infection, to facilitate cleaning and to provide a working environment in which staff can adequately care for patients.

High bed occupancy rates have an impact on HCAI and MRSA. Borg monitored MRSA incidence and bed occupancy in a 900-bed facility in Malta. He recorded a significant positive correlation between bed occupancy rates and the number of new MRSA cases identified.² Data collected between 2001 and 2003 inclusive from all 12 acute hospitals in Northern Ireland showed a positive correlation between bed occupancy and MRSA rates per 1000 bed-days of patient episodes.³ When an additional bed was added to a four-bedded bay in a hospital in London, Kibbler and colleagues noticed that the risk of MRSA colonisation in the new five bedded area was three times that of the four bedded bay.⁴ This study demonstrates that increasing the number of beds in a fixed area heightens the risk of cross infection with MRSA.

The impact of nursing staff levels and working conditions on the control of infectious diseases, including HCAI, have been well reviewed recently.^{5,6} Reducing the rapid turnover rate amongst nurses in many countries and enhancing the skill mix are all important in improving healthcare generally and in contributing to the prevention of infection.⁵ When assessing the evidence for the role that nursing staff levels have on HCAI, it is often too difficult to separate the impact of other factors such as overcrowding or poor standards of professional care.

Vicca reviewed the staffing levels and the incidence of new cases of MRSA over 19 months in an intensive care unit in a large tertiary referral centre in the UK.⁷ The incidence of new cases of MRSA correlated with peaks of nursing staff workload and times of reduced nurse/patient ratios within the unit. Poor patient-to-nurse ratios also contributed to an increased incidence of central venous catheter-associated bloodstream infections in a neonatal intensive care unit in the USA.⁸

Grundmann and colleagues reviewed the risk factors for the transmission of MRSA in an adult intensive care unit in Nottingham, UK and found that exposure to relative staff deficits was the only factor significantly associated with potential transmission.⁹ They also found that a 12% improvement in adherence to hand hygiene might have compensated for these staff shortages. When investigating the factors contributing to a cluster of infections due to *Enterobacter cloacae*, it was found that the use of multi-dose vials together with understaffing and overcrowding were significant factors.¹⁰

Rates of MRSA are lower in the Netherlands and in the Scandinavian countries than in the UK and Ireland. However, even in areas where MRSA is relatively uncommon, understaffing and overcrowding contribute to increased MRSA rates. An outbreak of MRSA in a neonatal intensive care unit occurred over a two month period in Norway and the use of epidemiological tools and molecular methods of bacterial typing revealed that increased clinical activity, understaffing, inappropriate skill mix, i.e. 42% of staff were untrained, and overcrowding were significant contributory factors.¹¹

While the relationship between overcrowding, high bed occupancy rates, understaffing and HCAI including MRSA, is complex, all are important. Much of the literature in this area deals with intensive care and neonatal units, areas of a hospital with high HCAI rates, rather than other clinical areas such as general wards. Nonetheless, in any environment with inadequate facilities, high bed occupancy rates and staff shortages, it is likely that compliance with recommendations on hand hygiene will be poor. Heseltine has argued that many outbreaks are the tip of the iceberg and cross-infection control programmes need to draw on several simultaneous strategies to create a safer clinical environment.¹² The components of a successful programme are likely to include a well-designed unit with sufficient hand washing sinks or hand hygiene facilities, sufficient personnel to cohort or isolate patients and feedback to staff about their practices.¹³

Many public hospitals in Ireland struggle to provide modern facilities for acutely ill patients who are vulnerable to MRSA and HCAI. Moreover, the expectations of patients and the public are much greater than in the past. When designing new clinical facilities, the provision of adequate space and facilities, not only to prevent cross-infection but also to facilitate staff in complying with best practice, are critical. For current facilities that are inadequate, there needs to be a capital investment programme to upgrade these within a reasonable timeframe. Overcrowding, whether in the Accident and Emergency Department when patients are waiting to be allocated a hospital bed, or in clinical areas if additional beds are placed there, will further exacerbate our efforts to control and prevent HCAI and MRSA. Finally, avoiding inadequate nursing staffing levels is also critical in achieving this.

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