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Personal protective equipment in an influenza pandemic: a UK simulation exercise

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Summary There is limited experience of both operational and financial impacts that adoption of UK pandemic influenza infection control guidance will have on the use of personal protective equipment (PPE), patients and staff. We attempted to assess these issues from a live exercise in a hospital in north-west England. During this 24 h exercise, all staff on an acute general medical ward wore PPE and adopted the procedures described in the UK pandemic influenza infection control guidance. Teams of infection control nurses observed and recorded staff behaviour and practice throughout the exercise, including staff attitudes towards the use of PPE. Although World Health Organization recommendations on the likely use of high-level PPE (FFP3 respirators) proved to be excessive, more gloves and surgical masks were used than expected. Despite pre-exercise training, many staff lacked confidence in using PPE and following infection control measures. They found PPE uncomfortable, with even basic tasks taking longer than usual. Large quantities of clinical waste were generated: an additional 12 bags (570 L) per day. The estimates of PPE usage within this exercise challenge assumptions that large amounts of high-level PPE are required, with significant implications for healthcare budgets. A programme of ongoing infection control education is needed. Healthcare in a pandemic situation is not simply a case of applying pandemic influenza infection

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control guidance to current practice; hospitals need to consider changing the way care and services are delivered.

Introduction

During an influenza pandemic, healthcare staff delivering patient care may be at increased risk of infection through occupational exposure, although direct evidence for this is lacking. Appropriate infection control measures are required to reduce the risk of healthcare-associated spread of infection. In October 2005, the Department of Health, England and the Health Protection Agency issued infection control guidance to the National Health Service in preparation for an influenza pandemic.[1] These measures relate to hospital and primary care settings and include healthcare facility configuration and administrative controls to effect triage, isolation and cohorted care. The guidance also includes infection control principles and precautions such as hand hygiene and use of personal protective equipment (PPE) when working with patients assumed to have influenza.

Many of the measures outlined involve major changes to the way care is currently delivered and the use of infection control measures and PPE on a scale far beyond that experienced in the recent past. Few currently employed healthcare workers have experience of a pandemic and the lack of detailed operational data makes implementation of the current guidance challenging. Uncertainty is most evident in relation to procurement and supply. The current 'just in time' supply strategy, with minimal reserves, would be unsustainable during a pandemic; and consumables, most notably PPE, need stockpiling well in advance. If PPE stockpiles are to be based on more than simple guesswork, with serious implications for the safe delivery of healthcare on one hand, and financial wastage on the other, robust operational assumptions are needed. At the time we were unaware of any studies which attempted to address this question.

We therefore carried out a real-time pandemic simulation exercise on a typical general medical ward to identify operational issues and to quantify PPE usage around the provision of cohorted care to influenza patients in accordance with current UK guidance.

Methods

Wirral University Teaching Hospital NHS Foundation Trust identified an acute medical ward on its campus with a predominantly respiratory and gastrointestinal case-mix, receiving mainly acute and some elective admissions. Although not wholly designated for respiratory patients, the ward is typical of the sort that might be designated to provide cohorted care to influenza patients during a pandemic. The ward comprised 29 beds, arranged in three six-bedded bays, two four-bedded bays and three side rooms, two of which were supplied with negative pressure ventilation. The total complement of nursing staff comprised 14 trained nurses, five healthcare assistants and four domestic staff. Three of the trained nurses were male, the rest female. Four consultants have 'allocated' beds on the ward (two respiratory physicians and two gastroenterologists).

For the exercise, the ward simulated operating at the height of a pandemic, i.e. providing cohorted care for patients with influenza and influenza-like illness. All staff working or visiting the ward were required to wear PPE in accordance with national guidance (Table I) and the amount of PPE used was recorded hourly. Staff were excused participation where unmasked face-to-face contact was considered best practice for compassionate reasons, e.g. counselling for terminal cancer. In such situations, the PPE that should theoretically have been used, was recorded. The ward stock control system was used to quantify the usual use of PPE for comparison purposes, and the domestic supervisor provided information on the amount of clinical waste that would usually be generated over a 24 h period. The exercise ran for 24 h from 11:00 to allow time for staff briefings, ward preparation and a 'hot' debrief at the end. Patients and their visitors were not included in the exercise.

The proposal was discussed with the Chair of the hospital research ethics committee who was satisfied that the exercise did not fall within the remit of the committee. Key managers and clinicians were involved in planning meetings and all staff within the hospital were made aware of the exercise. Patients and their visitors were given written information about the purpose of the exercise and an opportunity