Isolating infectious patients: organisational, clinical and ethical issues

Running title: Isolating infectious patients

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Summary

Background: Isolating infectious patients is essential to reduce infection risk. Effectiveness depends on identifying them, transfer to suitable accommodation and maintaining precautions.

Methods: Online study to address identification of infectious patients, transfer and challenges maintaining isolation in hospitals in the United Kingdom.

Results: Forty nine responses were obtained. Decision to isolate is taken between infection prevention teams, clinicians and managers. Respondents reported situations where isolation was impossible because of the patient's physical condition or cognitive status. Very sick patients and those with dementia were not thought to tolerate isolation well. Patients were informed about need for isolation by ward nurses, sometimes with explanation from infection prevention teams. Explanations were often poorly received and comprehended, fuelling complaints. Respondents were aware of ethical dilemmas associated with isolation undertaken in the interests of other health service users and society. Organisational failures could delay instigating isolation. Records were kept of demand for isolation and/or uptake but quality was variable.

Conclusion: Isolation has received greatest attention in countries with under-provision of accommodation. Our study demonstrates reasons for delays identifying patients and isolation failure placing others at risk that apply in any organisation regardless of availability and highlights ethical dilemmas of enforcing isolation.

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Introduction

Isolation is the segregation of infectious/potentially infectious patients to prevent transmission of antibiotic resistant pathogens, highly contagious pathogens and those causing serious infection and those who are at particular risk of infection, such as neutropenic patients (1). It is integral to any infection prevention programme but in some countries, notably the United Kingdom (UK) and much of Europe isolation accommodation is in short supply, with competition from patients who are noisy and those receiving end of life care (2, 3, 4, 5). Even where single rooms are the norm in general wards, patients who are most sick and on specialist units (e.g. critical care) are often nursed in shared areas to facilitate observation. Single rooms are sometimes assumed to reduce infection risk but evidence of ability to contain spread is equivocal (6, 7) and a recent study in an all-single-room hospital has not demonstrated lower infection rates than hospitals where most care is in open bays (8). Pathogens spread by airborne and contact routes contaminate general ward areas (9). Possible reasons are breaches in isolation: doors left open failure to cleanse hands or use personal protective equipment (PPE) and patients leaving the room (5). Failure to identify infectious/potentially infectious patients and inefficient procedures to transfer them to isolation accommodation might also contribute but no studies to explore these issues appear to have been reported, although transmission from asymptomatic patients is likely (10).

Methods

We explored procedures to identify infectious/potentially infectious patients and transfer to isolation accommodation in UK hospitals. It was planned in conjunction with an Expert Panel of five infection prevention leads in National Health Service (NHS) trusts selected because of their experience and interest in isolation, the NHS being the UK public health system which is largely free at the point of care, and which is used by most UK citizens, each of which has a lead clinician responsible for infection control. They helped decide questions, format of the data collection tool and commented on findings. Open questions were used because of the lack of previous research concerning isolation (11). They generate less standardised data than fixed response formats and are more challenging to analyse but avoid risk of obtaining responses perceived to be expected or desirable (12). Questions were sent to potential respondents electronically via their professional networks adopting an approach called 'purposive sampling' (13) to obtain 'rich information' from individuals targeted because they can provide detailed information about the topic of enquiry (14). This method can obtain

qualitative data as effectively as conventional survey methods (15). The study was classified as a quality improvement initiative not requiring ethical approval.

Data from each question and from across the dataset were analysed inductively using conventional content analysis to generate codes based on recurrent themes (16). Coding was undertaken independently by two members of the research team with third party arbitration in cases of disagreement. The frequency that codes appeared was documented to quantify key information (17).

Results

Forty nine responses were obtained. Size of employing organisation varied and estimates were given rather than precise numbers. One was an 18 bed facility providing end of life care, one was a 20 bed private hospital and two specialised in mental health. The remainder were large acute general NHS trusts with up to 2,000 beds admitting elective and emergency cases. Median number of beds was 708 (interquartile range 250-1,000). Number of patients requiring isolation varied: in a typical acute NHS trust with 1,000-2000 beds 100-200 patients were reported to need isolating for infection per month. One respondent gave very precise information. In an organisation with 500 beds, 75 patients required isolation on the day of data collection. Thirty five (71.4%) respondents reported lack of isolation facilities as a major problem. Even where cubicles were available they often lacked en suite facilities. There was no statistically significant relationship between size of organisation and reported ability to find isolation accommodation for the 48 units reporting these data (Exact Wilcoxon Rank Sum Test: W = 86.5, p=0.07). Logistic regression of bed numbers against reported ability also failed to show any significant relationship: OR =1, 95 CI 0.99 to 1 p=0.137. Only two (4.1%) respondents reported never having difficulties finding isolation accommodation. They were employed in newly refurbished premises with a high proportion of single en suite facilities. The remainder described 'putting up barriers' in open bays, cohort nursing or using temporary isolation 'pods'. Solutions were reached through prioritisation when more than one patient needed a single room, although only four (8.2%) respondents reported using a formal prioritisation tool. Two respondents worked in organisations soon to be refurbished with more isolation rooms. Another worked in a newly refurbished facility where opportunity to increase single room capacity had not been taken when upgrading was commissioned.

Potential need for isolation was initially identified by clinical staff (n= 21, 42.8%), the infection prevention team (n=15, 30.6%), jointly between both (n=12, 24.55%) and in one case according to local policy. There was no relationship between staff responsible for decision-making and size of organisation (Kruskal-Wallis: H=1.77, *df* 3 p=0.62). Shared decision-making was complex and drew on multiple sources of information with communication between infection prevention teams, clinicians (mainly nurses) and laboratory staff. A typical response is reproduced below:

'Results are made available to clinical staff (either from the lab or reported by infection prevention staff or microbiologists). We use an 'isolation matrix' within trust policy to guide the decision. The infection prevention team is used as a resource to provide advice about isolation, particularly when prioritisation is required.' The policy referred to here being the hospital or organisations infection control policy.

Multifaceted decision making typically involved 3-4 different approaches per response. The most commonly mentioned were risk assessment (n=17, 28.8% reports), additional, more involved discussion between clinicians and infection prevention teams (n=16, 32.6% reports) and assessing clinical symptoms (n=15, 30.6% reports). Eight (16.3%) obtained a history from the patient or family suggesting high risk of infection (e.g. recent overseas travel, admission from a nursing home or transfer from another hospital with a known cluster of infections). Availability of isolation accommodation and alerts on patients' paper or electronic records were each identified seven (14.3%) times. Four respondents (8.1%) mentioned use of an isolation prioritisation tool. Mode of transmission was considered important in three responses (6.1%): in these accounts patients suspected to have airborne infection received priority. One respondent considered 'local epidemiology' in decision-making. Emergency patients represented the greatest challenge. Wherever possible they were moved to a cubicle in the emergency department or straight to ward isolation accommodation. Thirty respondents (61.2%) reported 'bed shuffling' between frontline staff, infection prevention teams and bed managers to locate suitable accommodation. Where prioritisation tools were used, they were perceived to be especially valuable during bed shuffling.

Final decision to isolate was made by the infection prevention team in nine (18.4%) organisations, clinicians in three organisations (6.1%) and according to

trust policy in one organisation. In the remaining 36 (73.4%) joint decisions were reached between infection prevention teams, clinicians (usually nurses) and staff responsible for bed management. Clinicians took greater responsibility for less complex cases featuring patients with more commonly encountered pathogens and at night and weekends when the infection prevention team was less available. One respondent explained how their team provided education to clinicians to enable them to make decisions safely. It was usually possible to identify patients with meticillin resistant *Staphylococcus aureus* (MRSA) and *Clostridium difficile* through alerts on the notes but not other less commonly encountered pathogens, especially when differential diagnosis was possible. Delays obtaining laboratory reports or patients not giving a complete history on admission occasionally resulted in delay. Nearly half (46.9%) respondents reported communication problems causing delays with housekeeping services, delivery of PPE, other equipment necessary to 'put up barriers' and isolation signs for doors.

Deciding to isolate and ability to sustain isolation depended on patient-related factors in addition to risk of spreading infection: acute illness or behavioural issues could result in a decision not to isolate or once instigated, isolation procedures breaking down:

'Managing patients safely in isolation impacts on our ability to isolate, especially in critical care.'

'Due to mental health problems some patients are unable to comply with restrictions. In this case … arrangements are put into place to allow limited access to designated ward areas (outside the room) under supervision.'

Respondents from organisations admitting large numbers of patients with cognitive impairment were aware that legislation in the UK prevents them being detained against their will unless it is their own best interests to be protected from harm, pointing out that this could prevent isolation being instigated if such patients were unwilling or unable to co-operate.

Respondents were asked what happened once the decision to isolate had been made and occurrences of isolation failure. They reported that the 'alert' status of elective patients was usually known before admission, allowing ward staff to plan in advance. They were aware that ward staff sometimes failed to check or

overlooked electronic alerts. Ward staff favoured alternative explanations to infection where these were plausible: they were more ready to attribute gastrointestinal symptoms to diet or overuse of aperients than infection. This was attributed to concern about moving patients outside their clinical speciality:

'If patients have complex care needs, moving them out of their specialist area to get an isolation room brings safety risks.'

Patients and families were told about the need for isolation by ward staff, sometimes with additional explanation by the infection prevention team. There was no relationship between staff responsible for giving information and size of organisation (Kruskal-Wallis: H=1.27, *df* 2 p=0.53). Explanation was usually given verbally but leaflets were mentioned by a few respondents. There was evidence that information-giving could be improved. For example, poor understanding was a frequent cause of patient complaints and explaining necessity for isolation was often omitted:

'The clinicians are responsible for explaining the need for isolation … although in reality it often doesn't happen. The patient is moved into a single room and no-one explains why.'

Giving information could be challenging:

'Some patients do not tolerate isolation well - those who are confused. They have to be given information about what isolation involves to work out if they will tolerate it.'

Discontinuing isolation involved similar processes to the initial decision to isolate and as before was often pragmatic, based on availability of accommodation. It was generally less complex however: nature of the infection was established and for some infections there were clear pathogen-specific 'rules' (e.g. obtaining negative swabs on consecutive, pre-determined number of occasions).

Over half the organisations failed to maintain records of patients needing or receiving isolation. Detailed records were kept in five (10.2%) organisations. These respondents were confident they could extract precise data. Eighteen (36.7%) attempted to maintain records but admitted they were of variable quality and utility. Information documented varied. Some organisations audited

uptake of single rooms, others uptake by infectious patients either manually or with electronic surveillance systems developed in-house or available commercially. There was some confusion about ability of commercial systems to generate isolation data. One respondent was confident they could extract reliable information while others using the same system thought that such data could not be obtained without considerable user effort or would be impossible to extract. Four (8.1%) respondents audited records and of these one undertook root cause analysis which demonstrated that failure to isolate patients with MRSA and *C. difficile* seldom occurred. In other organisations failure to isolate was supposed to be recorded as a patient safety incident but was often overlooked.

When invited to state how isolation could be improved 63.9% (n=32) respondents suggested better accommodation: more single rooms with en suite facilities. Education of ward staff and better communication between services were each mentioned seven times (14.3%). Improved audit to document demand and use of isolation accommodation and availability of a prioritisation tool were each mentioned three times (6.1%).

Discussion

Effectiveness of isolation depends on the pathogen concerned and clinicians' adherence to isolation precautions once isolation has been initiated (18, 19). Ours appears to be the first study exploring procedures used to identify infectious patients, organisational and ethical issues. Although of particular interest in countries where under-provision of isolation facilities is challenging (2, 3, 4, 5), its findings are of wider interest. Isolation involves much more than accommodating patients in single rooms. Recent evidence suggests that they have no impact on infection rates (8) and do not prevent contamination of general ward areas (9). As in previous studies that have collected qualitative data in online surveys we obtained a good volume of in-depth data (16). We established multiple reasons for isolation failure that help explain these findings. They are pertinent to any organisation where isolation might be necessary, regardless of availability of accommodation. Isolation imposes 'costs' on patients in terms of liberty and human rights for public health benefit (20), as well as the benefits of privacy, personal storage, and an individualised environment (21). Unless identified before or soon after arrival, infectious patients may occupy communal admission areas, use shared facilities (e.g. dining and day rooms) or receive treatment in common areas. Problems are compounded with asymptomatic patients (10) and will increase as a result of demographic trends:

asymptomatic carriage is most prevalent in older people who are the most frequent recipients of health care. In particular, asymptomatic carriage of *C. difficile* is linked to use of proton pump inhibitors and is likely to increase because they are used to counteract side-effects of non-steroidal inflammatory analgesia for chronic pain (22) and there are more patients having immunosuppressive treatments.

We established that ward staff frequently identify need for isolation. They are not always well equipped to identify infectious patients, placing others in the hospital environment at risk. Educating frontline staff is important but it is unrealistic to expect them to identify patients who have less commonly encountered pathogens, especially when differential diagnosis is possible. For many pathogens mode of transmission is still debated. There is emerging evidence that those traditionally thought to be spread by contact are also transmitted by droplet and aerosol while pathogens spread by airborne routes can also be spread by contact (23). Decision-making in relation to isolation should be a multidisciplinary activity with close liaison between clinical and specialist infection prevention teams, especially when it is necessary to prioritise isolation accommodation. Greater involvement of infection prevention teams could also help avoid communication failures between the many departments that help organise isolation.

An additional complication is that of official targets such as those in the UK that state that 95% of patients attending A&E departments should be discharged, admitted or transferred within four hours of their arrival (24). While this is clearly beneficial for most patients, and improves the quality of the service it may also lead to rushed decisions. Other pertinent managerial issues would appear to include staffing levels, the availability of equipment to prevent sharing between patients, and adequate levels of cleaning services. Although not specified by statutory or professional regulators most nursing staff would have mandatory annual training in infection control, and have a professional responsibility to remain trained and competent in this area (25).

In addition to the above findings this study has identified important issues concerning education of patients and the public and highlighted tension between need to involve patients and families in decisions about care and wider safety-related issues (26, 27). Isolation is intended to protect health service users, staff and the public but may conflict with what patients consider to be their best interests and can have negative consequences. Isolated patients experience more

depression, anxiety, adverse events and make more complaints than the general patient population (28). The findings of this study corroborate earlier research showing they do not tolerate isolation well (29) They may resent the loneliness of enforced incarceration, relatives having to wear PPE especially if staff do not adhere to infection prevention precautions and impact of isolation on opportunities for rehabilitation outside the room (e.g. physiotherapy). Decision to isolate introduces ethical dilemmas: balancing its benefits and risks for individuals against needs of the wider population; the extent that healthcare users should be informed of these risks and can be expected to share responsibility for controlling them; of a causal evidence base on which to base isolation decisions; how to prioritise resources; and the extent that staff have an obligation to care for patients with potentially transmissible diseases (30).

Antisocial behaviour associated with poor adherence and increasing incidence of dementia and delirium in the aging and acutely sick populations are challenges that need addressing by multidisciplinary teams, with infection prevention specialists playing a major role. Our findings suggest that clinical staff would welcome greater support from infection prevention teams when it is necessary to explain need for isolation to patients and families. International policy emphasises the need for all health workers, patients and the wider public to be aware of the risks of antimicrobial resistance and the importance of infection prevention to contain it (31, 32). The best way of educating lay people about their contribution including isolation, is an issue that policy-makers and infection prevention experts have yet to address. Preventing infection and reducing risk of antimicrobial resistance requires people to understand the balance between what suits the individual and the interests of other patients and society. Staff and patients need to be convinced that their actions will make a difference (21).

In the UK under-provision of isolation accommodation should eventually be reduced by national policy to increase single room provision to at least 50% in all new hospital buildings (33) but our findings indicate that many of the other challenges will be ongoing. Local guidance states that the provision of single-bed rooms with en-suite sanitary facilities is vital for effective isolation (34), however in countries such as the UK there has been a historic shortfall in this provision in public hospitals compared to private hospitals in the UK and more generally elsewhere (21). In the UK and other countries where accommodation is in short supply, it may be helpful to audit demand and supply to inform commissioning when new buildings are planned and providing commercially available isolation

'pods' at times of greatest pressure. The facilities required for single-rooms might include en-suite sanitary facilities; a lobby or space for personal protective equipment and its disposal; basins for handwashing in the room and in the lobby; the ability to observe the patient; and facilities to improve the patient experience such as windows. For those with airborne infections adequate ventilation is also needed (35). Prioritisation tools can enhance decision-making but must be quick and straightforward to apply. They were not widely used in our study perhaps because application can be complex and time-consuming although they were valued in organisations where they had been implemented. Other strategies might include cohorting of patients with the same infection, but this calls for a discrete cohort area and a relatively high level of decision making due to the resources involved such as potentially 'blocking' empty beds to new admissions.

Study limitations

Extracting numerical values from data generated by open questions is a valuable means of quantification in exploratory studies but does not equate with more precise measurement possible with large scale, randomised surveys (17). Purposive samples can reduce external validity but have the advantage of increasing depth and quality of data and increased the credibility of our findings (14). Content analysis can jeopardise external validity if key information is missing from the data (16). Members of the Expert Panel independently agreed that our findings reflected their experience of how decisions about isolation are undertaken however, and corroborated the challenges of isolation reported by respondents. Many respondents commented on the importance of the study and the lack of information and facilities to support isolation and all supplied detailed information, supporting completeness and validity of the data. Range of healthcare organisations represented was wide (acute, mental health and community facilities) further increasing external validity.

CONCLUSION

Isolation has received greatest attention in countries with under-provision of accommodation but there are many reasons for isolation failure that apply in all organisations regardless of availability. These need to be addressed. Important issues revealed in our study are the moral and ethical dilemmas associated with segregating acutely ill and frail older people in the wider interests of health service users and society and the imperative to educate patients and the public

about their contribution to infection prevention and containing risks of antimicrobial resistance.

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Author contributions

DJG conceived the study and developed the data collection tool. NW collected the data. M-FK, EP and JC undertook literature searches and reviewing. DJG, and M-FK analysed the data. ND provide advise on law and ethics. All authors contributed to manuscript preparation.

Conflict of interest

No conflicts of interest are declared