

An audit found that more than one in 10 patients prescribed antimicrobials missed at least one dose and examined the reasons why medication was delayed or missed

Audit of missed or delayed antimicrobial drugs

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Abstract Wright J (2013) Audit of missed or delayed antimicrobial drugs. *Nursing Times*; 109: 42, 11-14.

Although the National Patient Safety Agency published a Rapid Response Report on reducing harm resulting from omitted or delayed medication in 2010, omitted doses continue to occur frequently. The Francis report raised awareness of the problem and its potential impact on care.

This article discusses the findings from a multicentre point-incident collaborative audit, focused on antimicrobials. We reviewed records from 6,062 patients prescribed 21,825 doses of antimicrobials; 13% were affected by omitted doses.

Some doses are omitted in patients' best interests, but organisations need to identify those that occur for no acceptable reason and target them as a priority.

We need national initiatives, strong local nursing leadership and multidisciplinary engagement to support a range of targeted interventions to achieve effective, sustained improvements. The tools developed from this study may help others to begin tackling this issue.

Omitted or delayed doses of prescribed drugs can have serious consequences, yet the problem continues to occur frequently in hospital settings. During the Mid Staffordshire inquiry, Robert Francis QC found patients were prescribed medicines that they were not necessarily receiving. His report recommended frequent checks to ensure all patients receive

what they have been prescribed and need, particularly when they are moved from one clinical area to another (Francis, 2013).

Concerns over omitted and delayed doses are not new. A recent systematic literature review reported dose omissions are a common administration error (Keers et al, 2013) and omitted and delayed doses are one of the most frequent causes of medication incidents reported to the National Patient Safety Agency (NPSA) (Cousins et al, 2011). In an audit of 271 patient records in one hospital on two separate days, Green et al (2009) found 20% of prescribed medications were omitted, affecting 17% of the patients included in the study. The most common reasons given for drugs being omitted were:

- » Drug not available (38%);
- » Patient nil by mouth (32%);
- » Patient refused (10%).

No reason was given in 19% of cases, while the patient was away from the ward in only 0.3% of cases.

A rapid response report on reducing harm from omitted and delayed medicines in hospital from the NPSA (2010) made several recommendations (Box 1). Its recommendation for organisations to undertake comprehensive audits of all omitted and delayed doses would be time consuming.

The report found that the largest number of serious incident reports from omitted medication were associated with antimicrobial drugs (NPSA, 2010). These included several deaths from severe sepsis, which occurred because patients had not received prescribed antimicrobials. A retrospective review of antibiotic-related adverse drug events at one hospital over a two-year period (2009-2011) found medication omission was the most commonly recorded adverse event (Hamad et al, 2012).

5 key points

1 Reducing omitted doses is likely to become a national priority

2 Delays and omissions of antimicrobial drugs are common, particularly the first dose

3 Patients have a right to refuse medication, but staff should ensure they understand the implications of doing so

4 Improvements should concentrate on critical, time-sensitive medicines and on omissions occurring for no reason

5 Trusts should implement checks and procedures to minimise delays when patients are transferred



Timely administration of some drugs, such as anticoagulants, is critical

Audit

In December 2010, we conducted a collaborative point-incident audit of delayed and omitted antimicrobial doses across the east and south east of England. We aimed to quantify its extent, and identify the main causes and areas for improvement.

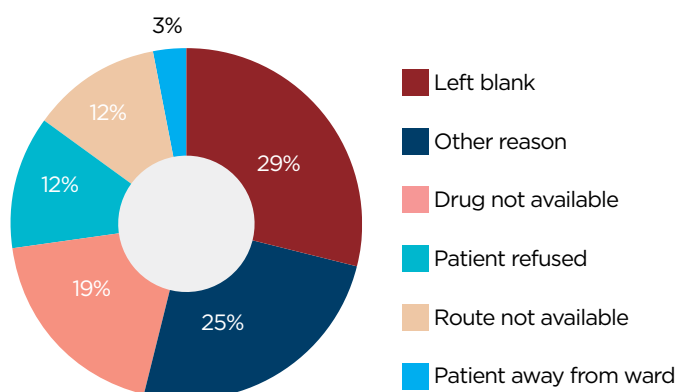
All trusts from the four strategic health authorities in the study area (East of England, London, South Central and South East Coast) were invited to participate. We designed a multicentre collaborative point-incident audit that allowed trusts to benchmark themselves against others and identify areas of weakness; they could use this information to plan improvements.

The data collection tool was designed (and refined after pilot use) so data could be recorded over a 24-hour period on a day of choice; trusts were provided with detailed guidance on data collection and recording. Omitted doses were allocated to one of six categories of reasons for omission, based on common recording conventions used on inpatient drug charts by nurses. This included a category for recording when a blank space had been left in the administration record grid, as this is usually regarded as unacceptable. Data collectors attempted to follow up reasons recorded as “drug not available” or where the record had been left blank. Local coordinators nominated by each trust inputted data into a master spreadsheet. We then collated and interpreted this data centrally.

Results

In total, 45 acute trusts, four community health trusts and five mental health trusts submitted data (Table 1). Records from a

FIG 1. REASONS RECORDED FOR OMITTED DOSES



total of 6,062 patients prescribed 21,825 antimicrobial doses were reviewed.

Overall, 5.3% (n=1,151) of doses had been omitted and 13.2% (n=802) of patients had missed one or more prescribed doses. In addition, 6.3% (n=565) of doses were delayed and 7.7% (n=467) of patients were overdue a dose. Nearly all delayed doses occurred in acute trusts; 28% (n=157) had been delayed up to one hour, 26% (n=145) up to two hours, 27% (n=152) up to four hours and 19% (n=108) for longer than four hours.

A higher proportion of patients in acute trusts were prescribed antimicrobials, but a higher proportion of missed doses and patients missing at least one dose were found in mental health trusts (Table 1).

Findings

In 29% (n=335) of cases of omission, the administration box had been left blank. Although this implied that the dose had

not been given, in 22% (n=73) of these cases data collectors were able to speak to the nurse and confirm the dose had been given but the nurse had forgotten to sign the chart. In 78% (n=262) of cases, the nurse was not available, could not remember if the dose had been given or confirmed the dose had been omitted. It is therefore possible that fewer doses may have been omitted.

An audit of a random selection of drug charts in a large London hospital revealed the main reason for administration boxes being left blank was that the nurse had forgotten to sign the chart (Miller et al, 2013).

In 19% (n=221) of cases, the reason recorded for the omission was “drug not available”. However, data collectors investigated and confirmed that 29% (n=65) of these doses had been available on the ward, but the nurse had failed to locate them. In acute trusts, medicines that were not stocked on wards were twice as likely to be omitted as those that were.

The patient had refused administration in 12% (n=140) of cases.

In 12% (n=134) of cases, the prescribed route was not available. Most frequently this was due to lack of intravenous access or the siting of nasogastric tube.

In 25% (n=292) of cases, a reason not covered by the categories was stated. In most of these cases, the omission was intentional for reasons including waiting for a blood level result, the prescriber requesting a dose to be withheld or because no allergy information was recorded.

The patient was away from the ward in only 3% (n=29) of cases.

First doses appeared to be twice as likely to be omitted as others. Overall, 15% (n=3,312) of the total doses of antimicrobials were first doses and, of these, 9.6% (n=319) were omitted. The omission rate for subsequent doses was 4.45% (n=807). First doses were significantly more likely

BOX 1. NPSA RECOMMENDATIONS

An executive director, nominated by the chief executive, working with the chief pharmacist and relevant medical/nursing staff, should:

- Identify a list of critical medicines where timeliness of administration is crucial, which should include anti-infectives, anticoagulants, insulin, resuscitation medicines and medicines for Parkinson’s disease, and other medicines identified locally;
- Ensure medicines-management procedures include guidance on the importance of prescribing, supplying and administering critical medicines, timeliness issues and what to do when a medicine has been omitted or delayed;

- Review and, where necessary, make changes to systems for the supply of critical medicines within and out of hours to minimise risks;
- Review incident reports regularly and carry out an annual audit of omitted and delayed critical medicines. Ensure that system improvements to reduce harm from omitted and delayed medicines are made. This information should be included in the organisation’s annual medication safety report;
- Make all staff aware (by wide distribution of the rapid response report) that omission or delay of critical medicines for inpatients or patients on discharge from hospital, are patient safety incidents and should be reported.

TABLE 1. EXTENT OF OMITTED DOSES

| Type of organisation | Acute trust | Community health trust | Mental health trust | Total |
|--|--------------|------------------------|---------------------|--------------|
| No of organisations taking part | 45 | 4 | 5 | 54 |
| No of patient records audited | 17,470 | 651 | 1,534 | 19,655 |
| No of patients prescribed antimicrobials (% total patient records) | 5,899 (33.7) | 97 (14.9) | 66 (4.3) | 6,062 (30.8) |
| No of doses prescribed | 21,390 | 265 | 170 | 21,825 |
| No of doses omitted (% doses prescribed) | 1,120 (5.2) | 12 (4.5) | 19 (11.2) | 1,151 (5.3) |
| No of patients missing one or more doses (% prescribed antimicrobials) | 781 (13.2) | 10 (10.3) | 11 (16.7) | 802 (13.2) |

than other doses to be omitted because the drug was not available. In acute trusts, 21% (n=695) of first doses were prescribed as “once only”, usually on a specific part of the drug chart. These doses were significantly less likely to be omitted than those on the routine administration part of the chart.

Enteral doses were significantly more likely to be omitted than parenteral (56% v 44%) in acute trusts, and more frequently marked “unavailable” than parenteral (25% v 11%). However, “route unavailable” was significantly more likely to be recorded as a reason for omission for parenteral doses (17.6% v 7.6%).

Electronic prescribing systems

No significant differences in omitted medication rates were apparent in hospitals with electronic prescribing systems compared with those using a traditional handwritten system.

Other researchers have found that significant numbers of dose omissions still occurred after implementing electronic prescribing systems (Fitzhenry et al, 2007). We found 19% (n=19) of administration records for antimicrobials had been left blank in hospitals with electronic prescribing systems. These findings contradict the widely held belief that electronic systems help improve record keeping and may show failures in the system design or use. Significantly more delayed doses were found in hospitals with electronic prescribing than in those with traditional prescribing (16% v 5.4%). However, this may be because data capture is easier and more accurate with electronic systems.

Discussion

Our audit uncovered a high rate of inadequate record keeping. This is considered unacceptable practice that could leave both patients and nurses vulnerable and it also goes against the Nursing and Midwifery Council code of conduct, which

states “you must make a clear accurate and immediate record of all medicines administered, intentionally withheld or refused by the patient ensuring the signature is clear and legible In addition ... where medication is not given the reason for not doing so must be recorded...” (NMC, 2010).

Accurate recording is also important so reasons for delayed and omitted doses can be understood by other multidisciplinary team members. Hospitals may wish to consider a “zero tolerance to blank boxes” policy as a safety improvement initiative.

Many doses were omitted because the drug was unavailable or thought to be. Patients in acute trusts were almost twice as likely to miss a first dose because it was unavailable than later doses.

Timing of first doses of antimicrobials may be critical, for example in the treatment of sepsis or for surgical prophylaxis. Prescribing first doses as “once only” may result in fewer omissions since it is generally recommended that these doses are administered within one hour of the prescribed time, compared with within two hours for regular doses.

More fundamental is the finding that medicines not stocked on the ward were twice as likely to be omitted as those held as stock. Close working with pharmacy colleagues helps to ensure medicines are supplied in a timely manner, in forms that are easy to administer and are stored so they can be found easily. Enteral doses were more likely to be omitted than parenteral; this may be because greater importance is given to parenteral administration as it implies the patient is more unwell, or that practical problems with the enteral route are more common.

Provided that they are not confused or otherwise unable to give informed consent, patients have the right to decline medication, and 12% of doses were omitted for this reason. Staff must make sure patients are able to make informed choices by doing all

they reasonably can to encourage adherence. It is important to ensure patients understand the benefits of medicine prescribed for them and are fully aware of the consequences of declining it. Perhaps, to comply with the Mental Capacity Act (HM Government, 2005), recording that a patient has declined medication should be accompanied by a statement about their fitness to make this decision.

To avoid omissions that occur because the route of administration is or has become unavailable, nurses need to communicate problems quickly and doctors need to respond promptly. Although only a small proportion of omissions were due to the patient being away from the ward, as the Francis report highlighted, trusts need clear processes for catching up with doses that are omitted or delayed due to transfers (Francis, 2013).

Vogtlander et al (2004) significantly reduced delays in administering antimicrobial doses by using a multidisciplinary team to support a range of interventions including education of nursing and medical staff, making selected antimicrobials more available and the use of reminder stickers. It was acknowledged that frequent audit and feedback of practice would be necessary to sustain this improvement.

A range of interventions introduced at Taunton and Somerset Foundation Trust (2013), targeted at “high-risk” drugs, resulted in a 65% relative risk reduction in the incidence of patients missing one or more doses due to medication being unavailable. These included improving pharmacy ordering processes, increasing the range of stock held on wards and nurse education. A set of interventions targeted at the “nil-by-mouth” policy resulted in an 85% relative risk reduction for patients inappropriately missing preoperative medication. Involving pharmacy staff such as pharmacy technicians (Seaton and Adams, 2010) or pharmacy assistants

Nursing Practice Research

(Barrett et al, 2012) in medication administration has been shown to significantly reduce the number of doses omitted.

Research suggests that patients who self-administer their medicines in hospital make errors, including omissions (Wright et al, 2006). Careful patient selection for self-administration, taking into account changing clinical situations, is crucial, along with accurate record keeping.

A National Medication Safety Thermometer is being developed. This will be based on experience with the classic NHS Safety Thermometer, which records the presence or absence of four harms: pressure ulcers; falls; urinary tract infections in patients with a catheter; and new venous thromboembolisms. The proposed medication thermometer will focus on the most commonly occurring serious errors reported to the NPSA and dose omissions are likely to be included.

Conclusion

Although our study focused on antimicrobials, the findings may apply to other therapeutic areas.

Medication omissions and delays affected 13% of the patients in our study, and several reasons were identified for these. Some were genuine and in the

patient's best interest, but practice can be improved in other areas.

Practice improvement will need to be developed locally and is likely to require a system-wide approach. Nurses will need to take the lead, but cooperation from other professionals, including doctors and pharmacy staff, is essential. We would advise staff and organisations to analyse their practice and identify where improvements can be made. Using point-incident methodology and targeting a priority area could be a manageable way of doing this. **NT**

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