DOUBLE-CHECKING HIGH-RISK MEDICATIONS IN ACUTE SETTINGS: A SAFER PROCESS

Pollyanna Kellett and Mary Gottwald look at the evidence on administration practice in clinical settings to help nurse managers improve patient care

Abstract

There is a need to reduce medication errors, and one way of achieving this for high-risk medications is by double-checking. This article reports the results of a literature review, undertaken as part of an MSc, which examined safe processes for double-checking. The article discusses three themes that emerged from the review: the evidence and processes of double-checking, supportive safety measures and human factors. The review concluded that two people double-checking the entire process enhances and strengthens practice, and that clinical settings and contexts are important to safety in medication administration. The aim of the article is to provide evidence for nurse managers to support their decision making on safe administration practice in clinical settings.

Keywords

Double-checking, high-risk medications, acute care, medication errors, pharmaceutical preparations, human factors

Improving patient safety involves risk assessment, reporting and analysing incidents, learning from them and implementing solutions to minimise their recurrence (National Patient Safety Agency (NPSA) 2007). Patient safety incidents are defined as ‘any unintended or unexpected incident that could have or did lead to harm for one or more patients receiving NHS care’ (NHS England and Medical and Healthcare products Regulatory Agency (MHRA) 2014).

There is a statutory duty on healthcare professionals to improve quality in health care that emerged from clinical governance, defined as ‘a governance system for healthcare organisations that promotes an integrated approach towards management of inputs, structures and processes to improve the outcome of the healthcare service delivery where health staff work in an environment of greater accountability for clinical quality’ (Som 2004).

Medication errors are a significant threat to patient safety, however the figures on patient safety incidents related to these are scarce, old and vary dramatically. Nonetheless, Meadows (2002) identified that 38% of medication errors occur during administration, although administration error rates vary from 0.15% (Ross et al 2000) to 19% (Barker et al 2002). There are nine medication-related never events listed in the NHS England (2013) Never Events List and all relate to medication administration (tinyurl.com/nje6z93).

Administration errors are attributed to processes that allow leeway for errors to occur (Meadows 2002). Verifying or double-checking is a well-established method of reducing administration errors and is regarded as the ‘last barrier’ in error prevention (Armitage 2008, Meadows 2002), yet the effectiveness of double-checking is not well researched (Clifton-Koeppe 2008, Armitage...

The definition of a ‘high-risk’ medication varies and there appears to be little consensus (Conroy et al 2012), but essentially it means:

- Controlled drugs. In acute care settings a second signatory is required for administration of controlled drugs (CDs), and the NMC (2007) states that it is good practice that this person witnesses the entire administration process. The DH (2007) has published limited guidance on the process of a second witness check in the form of a standard operating procedure, but this does not describe a standard process in any depth.

- Intravenous infusions. For intravenous (IV) infusions, a template for a standard operating procedure from the NPSA (2007) is more extensive, but with 63 steps for preparation and 17 for administration, appears to be difficult to follow in practice. The NMC (2007) guidelines state that ‘where possible’ two registrants must check IV medication. In practice, double-checking is extended to other high-risk medications administered via many routes including orally, subcutaneously, intramuscularly, enterally, transdermally, intrathecally, and by any infusion pump or device that can be altered according to patient comfort or physiology (DH 2013).

The process of double checking in practice is poorly defined and its effectiveness is not well researched (Clifton-Koeppel 2008, Armitage 2009). After a review, the limited literature available was examined with the aim of improving standards of care in medication administration in clinical practice through evidence-based recommendations. The central area of interest is why, even with robust systems in place, such as double-checking, and using the well known and recommended ‘5Rs’ standard of checking – right dose, drug, route, date and patient (DH 2004), errors are still made with high-risk medications.

**Literature review**

**Methodology** A critical literature review on double-checking was undertaken by the author (PK) as part of her Master of Science in Leadership in Professional Education and Practice. The review yielded 11 primary research studies that answered the search strategy for ‘nursing’, ‘medication’, ‘double-checking’ and ‘hospital’ (Table 1).

Three themes were identified in the review: evidence for double-checking, processes for supporting double-checking, and how human factors affect double-checking.

**Evidence for double-checking** The evidence for this is sparse, however four pieces of primary research reported that double-checking can contribute to patient safety. Sheu et al (2008) found that actual errors and near misses were mainly discovered through the double-checking mechanism, but that double-checking was not universally carried out as recommended in practice settings. Dickinson et al (2010) only identified 60% compliance with double-checking even though it was recommended best practice in the study site and in their paediatric setting. Other research observed 45% compliance (Smetzer et al 2003) and 80% compliance (Manias et al 2005) with double-checking policies.

Conversely, Jarman et al (2002) concluded that there was no significant difference in error rates between single checking and double-checking and found that only four single checking errors occurred during the study period compared with five when double-checking was the standard. The overall error rates make these conclusions less reliable, and the results have not been confirmed by larger studies.

**Processes to support double-checking** Not all research has broken down or defined the double-checking process, but all concluded that it is important to develop systematic processes that include careful checking before administration; evidence supports independent double-checking for the dosage calculation to reduce error (Ross et al 2000, Smetzer et al 2003, Tang et al 2007, Armitage 2008, Chua et al 2009, Dickinson et al 2010, White et al 2010). The literature review revealed that the process of double-checking is poorly defined, generally recommended in clinical practice, but that there is little evidence to support its use. In addition, there is some evidence that double-checking does not improve the risk of making a medication error (Jarman et al 2002). Conversely, Sheu et al (2008) found that discovering actual errors (30.5%) and near misses (29%) was mainly through the double-checking mechanism.

Finally, where double-checking is recommended it is not widely used, and when it is does not always prevent errors (Jarman et al 2002, Dickinson et al 2010). Despite these inconsistencies, nurses have said that protocols help promote safe practice (Manias et al 2005, Dickinson et al 2010), and that using the 5Rs safety framework (DH 2004) provides the finer detail for safe administration.
Human factors affect double-checking
Dickinson et al (2010) and Armitage (2008) identified that most nurses want to improve and strengthen the process of double-checking, but they also found that nurses might sacrifice this process if they are short of time or qualified staff. Other factors, such as deference to authority (Armitage 2008, Dickinson et al 2010), resulting from the power dynamic inherent in hospital hierarchies; reduction of responsibility (Armitage 2008, Dickinson et al 2010) – a false sense of security and complacency resulting from having a second checker; auto-processing – other factors such as rote verbalisation, giving the answer in advance and fast pace (Dickinson et al 2010) contribute to this; and confirmation bias (Armitage 2008, Henneman et al 2010), where the nurse sees what they expect to see, all contribute to administration errors.

Recommendations
The following recommendations strengthen existing activity to sustain and improve good care, and must be implemented in an
organisational culture that encourages, supports and enables good clinical practice and promotes an ethos in which errors are examined in the context of system failures rather than individual mistakes. Improving quality through a change in culture and behaviour supports the NHS Outcomes Framework (DH 2013), and although a process for mitigating risk is outlined, this is strengthened by culture, behaviour and organisational change.

These recommendations provide the context for implementation of the process for double-checking high risk medications.

- There should be a clear and consistent organisation protocol for checking medications so that all staff know what they are doing; this will ensure the system is followed.

- Organisational error reporting systems must examine systems failures not just human failures. This encourages a culture in which staff can be honest about errors and encourages and promotes reporting. This should increase error reporting and ensure systems failures are not missed, which will make it easier to fully analyse errors and contributory factors.

- Organisations should specify which medications are to be double-checked within and across different clinical areas. This allows discretion for local circumstances; for example, the evidence shows that nurses sacrifice double-checking when they are short of time. Releasing nurses from double-checking an unmanageable number of medications will help ensure that they give appropriate time to double-checking those identified locally as high risk. Using robust resources, such as the NPSA (2007) risk assessment tool, could support this decision making. However, as yet nurses are still bound by professional standards (NMC 2008) and Department of Health (2004) guidelines that mandate double-checking for certain high risk medications.

It is important to develop systematic processes that include careful checking before medication administration (Jarman et al 2002, Manias et al 2005, Armitage 2008, Dickinson et al 2010). In the context of the recommendations described above, the process is as shown in Figure 1.

**Step 1: witnessing the process** Two nurses witness the entire process and, in a clinical area designated for medication preparation, read the drug chart together out loud. A clinical area that supports safe practice reduces environmental factors such as overcrowding, interruptions, competing priorities, workload demands and difficulty in accessing resources and guidelines, which all contribute to system failure (Dickinson et al 2010). Having two nurses engaged in the whole process supports active appraisal of the drug chart, which reduces complacency (Armitage 2008), and this built-in second, or redundant, check strengthens the process within the 5Rs framework.

Dickinson et al (2010) state that the most commonly identified factor associated with nurses
and medication error is failure to pay attention to the 5Rs. Verification by a second checker also ensures both nurses share accountability for the entire process and supports the need to select and check that the medication is correct and right for the patient (White et al 2010). This also ensures the NMC (2007) standard for medication administration is adhered to, by exercising thought and professional judgement.

**Step 2: independently double-check any calculation** After confirming that the medication makes sense for the patient at that time, the two nurses must make the dose calculation separately (Smetzer et al 2003, Manias et al 2005, Sheu et al 2008, Dickinson et al 2010). If two nurses independently make the calculation, then share the answer, the calculation is on the table in front of them and if there is a disparity, they can both re-check. The more junior nurse will not feel that he or she has to agree with the more senior nurse’s calculation simply because they are more experienced. Such deference is a human factor affecting many issues in an organisation that is essentially hierarchical (Armitage 2008).

**Step 3: preparation of medication** Only one nurse need perform this task, which will save time in handwashing and putting on any personal protective equipment (Dickinson et al 2010). To avoid human and system failures, all other steps in the process need two nurses. Once the medication is prepared, both nurses take it to the patient and verify the patient’s identity.

**Step 4: patient identity check** Henneman et al (2010) say that verification involves checking the name band to the patient and the patient to the drug chart. Their research, in a simulated setting using eye-tracking devices, found that even when nurses checked patients’ identities with the drug chart, they still sometimes failed to identify that it was the wrong patient in front of them; this was despite the fact that eye tracking revealed they had read the identity band. This therefore supports the bedside check.

This part of the process is sometimes omitted in clinical practice because of time constraints, however White et al (2010) and Bonnabry et al (2007) found that it only takes an extra 21 seconds to do the identification checks at the bedside. Bonnabry et al (2007) also found that this check at the bedside increased error detection by 65%.

**Step 5: verifying route** This ensures there is no mix up with the prescribed route. Three of the DH’s never events (2013) relate to wrong routes: IV chemotherapy administered into the intrathecal space; oral or enteral medication given IV; and IV administration administered into an epidural. Once the correct route has been identified and confirmed, and administration is under way, the medication chart can be signed (Manias et al 2005, Smetzer et al 2003, NMC 2007).

**Implications for practice**
Lack of built-in redundancy is a contributory factor in many errors in health care (Carayon and Wood 2011); as Wilson (2014) states: ‘There should be redundancy in processes, so that a failure in one area does not lead to catastrophe but is caught by a secondary (redundant) check.’ Redundancy in this instance is using two nurses throughout the entire process of medication administration that requires a double-check, and using the additional safety check of the 5Rs (DH 2004) has been shown to enhance safety (Wilson 2014). Redundant checks can be human or mechanical, through the use of technology such as automated infusion devices – ‘smart pumps’ (Taxis and Franklin 2011), bar coding (Poon et al 2010) and Computerised Physician Order Entry (CPOE) systems (Kazemi et al 2010), which incorporates electronic prescribing with in-built dose calculations, guidelines, alerts and safety messages. The effectiveness of these systems has yielded some impressive results in reducing errors (Franklin et al 2007), but is sometimes limited by increased time (Franklin et al 2007), user frustration with alerts and warnings and resistance to use of computerised systems (Kazemi et al 2010). Mechanical factors can help reduce administration errors in high-risk medications but barriers, particularly cost, further research and monitoring, need to be addressed before widespread implementation (Agrawal 2009, Taxis and Franklin 2014). At ward level the process described above incorporates human and environmental factors and builds in redundancy and safety checks. It also encourages nurse managers to define high-risk medications locally and save double-checking for those medications only. At organisational level these proposals encourage examination of policies, protocols and error-reporting systems, and a plea to examine whether an atmosphere of sharing rather than blame is engendered locally within the workplace. At national level a National Medication Safety Network is proposed by NHS England and the MHRA (2014) to simplify reporting, improve learning, and guide and disseminate practice, and it is hoped this will extend across the UK, and be shared internationally.
Conclusion

The process of double-checking needs to improve to reduce the risk of medication errors, and this article has provided some evidence of a double-checking process that is defined, repeatable, applicable and workable in practice. Using two nurses to check the entire process of medication preparation and administration at the bedside, including independently checking drug and any pump or equipment calculations, and within the 5Rs framework (DH 2004), could improve patient safety when limited to selected high-risk medications.

This allows for autonomy, releases a large and unmanageable array of medications from double-checking, and promotes accountability for those medications that are, within specific settings, deemed safe for single-checking.

References


Conflict of interest

None declared