

Evidence Briefings on Interventions to Improve Medication Safety



Double-checking medication administration

Policy question: Does double-checking by nurses reduce medication administration errors and improve efficiency?

Current evidence shows: There is some evidence that when independent double-checking occurs, errors are reduced. The effectiveness of double-checking lies in it being an independent cognitive task, not a superficial routine task. Many health care organisations have a policy of double-checking. However these often do not contain explicit definitions, and are inconsistently applied in practice, which dilute any potential safety benefits. Double-checking is resource-intensive and a significant burden for nursing staff. Qualitative research suggests nurses perceive some advantages in single-checking related to increased autonomy, better use of resources and reduced interruptions to work.

Background

Double-checking (also known as double-person checking and independent double-checking (IDC)) is a strategy that has been used to reduce errors in the 5 rights of medication administration (right patient, right drug, right dose, right route and right time) ¹. Double-checking has also been advocated as

an important strategy to prevent drug errors in vulnerable patient populations, such as children ^{1,2}.

Despite its seemingly beneficial role, the effectiveness of double-checking continues to be disputed, due to the scarcity of studies demonstrating its effectiveness in targeting errors. A universal definition of double-checking does not exist. The NSW Therapeutic Advisory Group (NSW TAG) defines IDC as “a procedure in which two individuals, preferably two registered practitioners, separately check each component of the work process” and gives an example of two people independently performing the calculation of a medication dose and matching the results, instead of one simply verifying the other’s calculation ³. A policy directive by NSW Health on medication handling is more ambiguous on what entails double-checking, stating that “where, for example, a nurse prepares a medication for administration by a prescriber, the prescriber must check the medication before he/she administers it to the patient” ⁴. In these definitions, it is not explicit what needs to be checked. It is imperative to clearly detail the elements involved in the process of double-checking so as to make it an effective strategy in preventing drug errors. The policy directive is more specific regarding the handling of intravenous medications, stating that “a second person should check the drug, dose, calculation, IV fluid, and the patient’s identity prior to administration” ⁴. Comprehensive explanations such as this would minimise misinterpretations by nurses and any other health professionals who administer medications (Figure 1).

Methods

A literature review was undertaken to evaluate available evidence on the utility of double-checking as a strategy to reduce medication administration errors and its impact on the efficiency of the medication administration process. A literature search was performed in PubMed, EMBASE, Medline and CINAHL using the terms *double-check* and *medication administration*. Articles on medication administration in both children and adult patients were included. Additionally, Google Scholar was used to identify grey literature. Duplicates, review articles, conference proceedings, dissertations, commentaries and letters were excluded.

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Results

A total of 216 potentially relevant articles were identified. Of these, 17¹⁵⁻²⁰ were included in this review. Six studies were conducted in Australia^{8 10-13 15}; seven were from the UK^{1 6 7 9 14 16 20}, and the remaining four studies originated from the US, Sweden, New Zealand and Taiwan^{5 17-19}.

Definition of double-checking and its process

Only two of the 17 studies defined double-checking^{1 15}. Both definitions, in their brevity, failed to elaborate on (i) what exactly constitutes a double-check (i.e. the second person does not simply verify the first person's work; they follow a series of steps to arrive at a conclusion which can then be compared against that of the first person's to ensure that they are in agreement), (ii) the whole process (double-checking during all three phases of the medication process: dose calculation, drug preparation and drug administration) and, more crucially, (iii) the independent nature of such a check (i.e. two nurses carry out the check *separately*). This misconception is illustrated in the study by Conroy et al., where 34% of paediatric nurses explained double-checking as "One nurse performs the task, the other one checks her or his work"; only 40% described it appropriately as "Each nurse performs task independently and answers then compared"¹.

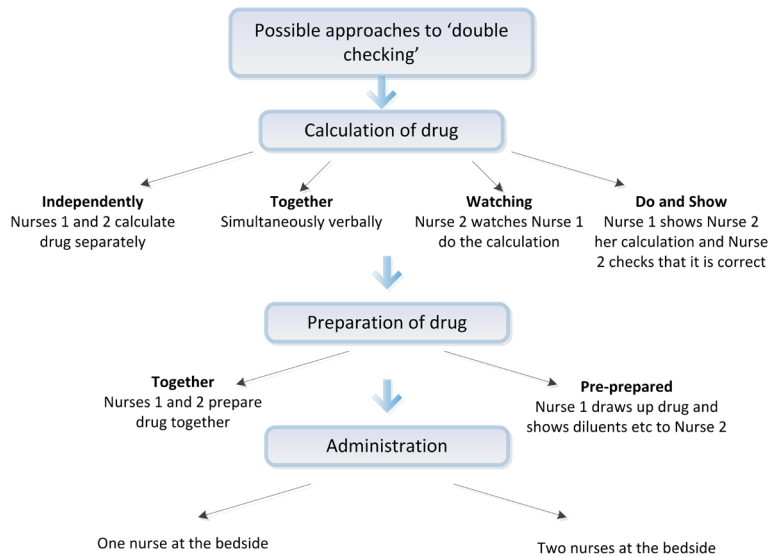


Figure 1. Summary of possible approaches to double-checking (modified from Dickinson et al⁵). Lack of clarity in policy documents regarding what constitutes the most effective double-checking strategy leads to confusion and inconsistent procedures⁵.

Studies have found that ambiguity regarding the definition and process of double-checking also exists in hospital protocols, leaving them open to misinterpretation, especially by junior nurses who are dependent on such policies and guidelines to direct them early on in their practice^{1 10 19}. Consequently, policies on double-checking are often predisposed to violations by nurses. High-alert medications (e.g. insulin, chemotherapy and IV opiates) which

almost always require independent double-checking prior to administration were found not to have been double-checked in 45% of hospitals surveyed in the US¹⁸. A study in a UK children's hospital reported that double-checking was only carried out on 41/141 occasions (16% of patients), despite hospital policy requiring IDC for all medication administrations⁷.

Given the considerable variation in nurses' understanding of double-checking which can be attributed to the existence of unclear hospital policies, it has been recommended that there be a comprehensive definition and explanation of the double-check process in hospital guidelines. Additionally, the role of, and who is suitable as, the second checker should be clarified and, the importance of the *independent* nature of the check, reinforced⁵.

Double-checking vs. Single-checking during medication administration

The efficacy and safety of single-checking (whereby only one nurse checks that the correct medication is given) as compared to that of double-checking was investigated in five studies^{1 11 12 15 20}, four of which were qualitative. The only quantitative study was a single crossover trial in 3 wards of a geriatric assessment and rehabilitation unit in a NSW hospital over two periods of 23 weeks each; the study investigated the effectiveness of double-checking vs. single-checking by determining the frequency of medication errors (ascertained from medication chart audits) when each method was used¹². The medication error rate with double-checking was significantly lower than that with single-checking (2.12 vs. 2.98 per 1000 medications administered; $P < 0.05$), but the

reduction was viewed as too small to be clinically significant (0.86 per 1000 medications administered), especially as over 95% of the errors documented were of minor severity. Additionally, a time-and-motion sub-study conducted over a week estimated that single-checking would result in a saving of 17.1 hours of nursing time per 1000 medications administered. On the basis of a clear lack of improved safety and increased resource use, the authors did not recommend the use of double-checking.

Three of the four qualitative studies indicated that nurses were largely in favour of single-checking, despite the increased level of responsibility^{11 15 20}. In fact, nurses appreciated the increased autonomy that such a process provided and felt that single-checking increased their confidence in both their checking technique and their medication management practice¹¹. Nurses reported taking even greater care when single-checking medications as they were aware that they were solely responsible during the drug administration process¹¹. In a study in an Australian regional acute care hospital, nurses estimated that the average amount of time saved by single-checking during routine medication rounds was 20 minutes; this was a result of not having to locate, interrupt or be interrupted by another nurse for double-checking, which was of even greater significance for nurses who were on night duty¹¹. The same study reported that replacement of the existing double-checking system with a single-checking procedure did not increase the frequency of medication incident reports (5 vs. 4 errors, respectively). However, the number of incident reports in both periods (7 months pre and post-implementation of single-checking) was too small to allow for any valid statistical comparisons.

Another Australian study which surveyed nurses in a medical centre pre and post-implementation of single-checking found that, pre-implementation, the majority held negative attitudes towards single-checking despite not having been previously exposed to such a procedure in practice¹⁵. The nurses were, however, highly supportive of single-checking after its implementation, and welcomed the greater accountability for medication administration it entailed. Nurses felt that single-checking had the potential to improve medication safety as it encouraged

them not only to be more vigilant but also to update their pharmacology knowledge. The time-saving effect of single-checking was one of the biggest factors that the nurses appreciated as it reduced frustration in trying to find a second nurse and enabled them to attend to other patient care needs. Additionally, the nurses felt that more patients were able to receive their medications on time with single-checking, as opposed to double-checking¹⁵.

Effectiveness of double-checking as a strategy in targeting drug administration errors

The effectiveness of double-checking on the identification and prevention of drug administration errors was discussed in only three studies^{13 16 17}. In a retrospective self-report of drug administration errors by nurses, either from their own or others' experiences, double-checking was found to be an effective method to detect administration errors, with 30.5% (79/259) of actual errors and 29% (20/69) of near-misses



Independent double-checking

identified through the double-checking procedure¹⁷. The authors concluded that, despite the validity of the double-checking strategy, universal application of this process for all drugs would not be feasible due to time constraints, and thus suggested restricting it to high-alert medications. Manias and colleagues, who carried out observations over a month, reported that

double-checking prevented one serious medication error¹³. In contrast, a retrospective review of medication errors over a 5-year period in a large UK paediatric hospital found that, of 195 reported errors, 130 (67%) had occurred despite double-checking¹⁶. It was also reported that double-checking was not carried out in 30% (58/195) of cases.

Prevailing views on the benefits, drawbacks and issues surrounding double-checking

The other studies included in this review employed questionnaires, surveys and focus groups to examine the perceptions of nurses and other healthcare professionals on double-checking, as well as to identify factors which serve as facilitators and barriers. Some illustrative quotes, demonstrating the contentious nature of double-checking, are given in the table below.

Conclusion

Double-checking is a strategy employed by many hospitals to help detect and prevent potentially harmful medication errors. However, this process is also associated with increased workload for nurses. There is limited compelling evidence of the effectiveness of the procedure due to the variability in what constitutes double-checking and inconsistencies with the application of this intervention strategy. Double-checking, when performed independently by two people, and carried out selectively (in high-risk situations, patient populations and, with high-alert medications) has been shown to reduce medication administration errors.

Favouring double-checking	
"As a concept, I have no doubt that it is a robust, and if rigorously applied, fairly fail-safe method..." (Anaesthetist) ⁹	
"I feel that double checking of drugs should always take place. Does everybody have to make a mistake before being convinced?" (Theatre Nurse) ⁹	
"You don't need any expensive electronic equipment; all we need are the two people" (Anaesthetist) ⁹	
"You sometimes think I'm not gonna double check it, but when you think about patient safety, it's an extra 30 seconds to really to make sure it's right" (Paediatric Nurse) ⁵	
Opposing double-checking	
"Night shift- double checking...it's less likely to happen (Everyone is busy)... checking is very unrealistic." (Nurse) ¹⁰	
"It allows two people to make a common error rather than one person do it carefully and perhaps be more likely to get it right... I've heard that referred to as the Glanceman test. You find a man and he glances at it for you." (Consultant) ⁶	
"If your process of checking is one person follows the other's calculation, then they will just follow the error..." (Consultant) ⁶	
"My experience of the process was not just that it was time consuming, but that it also became menial and frustrating..." (Anaesthetist) ⁹	
Issues surrounding double-checking which need to be addressed	
Lack of resources	"It significantly reduces the risk... There just ain't enough of us to do it, that's the reality of it. You'd need more qualified nurses." (Senior Nurse) ⁶
Individual responsibility	"I suppose in a way it kind of takes away from your responsibility. If you've got more people checking it, you could become a bit complacent: 'It's been checked by two other people so it must be alright.'" (Registrar) ⁶
Practicality	"In an emergency, it goes straight out of the window, to be honest" (Physician) ⁹
Hierarchy	"I think the most annoying thing with double checking is when you got a new grad and they want to double check the drugs with you... you're like 'come on, we're really busy here, just trust me on this one'" (Senior Nurse) ⁵

Environmental	"Our drug room is tiny... you could have 5-6 nurses squished back to back... you try and double-check with someone, they get you to double-check theirs, and I think that sometimes there is confusion" (Nurse) ⁵
Lack of active processing	"You see nurses double-checking and they're standing together reading things out by rote really..." (Pharmacist) ⁶

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