

McGill University Health Centre: Nursing Research and MUHC Libraries

What evidence exists that describes whether manual double checks should be performed independently or synchronously to decrease the risk of medication administration error?

This report aims to summarize the best available evidence describing the most effective practice for double checking medications in order to reduce the incidence of medication administration errors.

Key Messages:

- Double checking is defined as a procedure carried out by two qualified health professionals, usually nurses, to independently verify the medication before it is administered to the patients.
- The practice of double checking of the medication process is an example of an intervention to identify errors already present in the system and to prevent them from reaching the patient. In most hospitals, manual double checking is considered standard practice.
- In this review, we did not find any study that compared the effectiveness of independent versus synchronous (checking side by side) manual double checks on the risk of medication administration error.
 - All of the evidence found defined manual double checking as an independent and asynchronous process. Meaning, the two health professionals involved conduct the medication administration process and verification apart or alone.
 - In addition, the leading association in safe medication practices endorses double checks that are performed independently in order to reduce the risk of bias or complacency.
- There was a lack of robust and high quality evidence to suggest that independent double checks are effective in the identification of potential medication administration errors.
 - A systematic review concluded that scientific studies were needed to evaluate the double checking of medicines.
 - An observational study demonstrated that double checking of medications in practice prevented less medication administration errors than barcode assisted medication administration.
 - Two editorials papers endorsed the use of double checking of medications despite citing the lack of evidence.
 - These studies failed to provide a detailed description of the double checking process.
- Several articles described the lack of a clearly defined process of independent double checks, variable and sometimes poor adherence by nurses and other professionals in practice, as well as the over promotion of this procedure in practice.
- Considerations for practice included the development of a clear protocol for the independent double checking process, the removal of barriers to improve adherence to practice (such as reminder tools, distraction-free areas to conduct independent double checks), the application of independent double checks for selective high-risk medications only, and having independent double checks as one strategy among a system of checks and balances for safe medication practices.

Who is this summary for?

This summary was requested by Gabrielle Michetti, Interim NPDE, C8 GyneSurgery, as the 2nd place winner in the MUHC Dinosaur Contest.

Information about this summary:

This report covers a broad collection of literature and evidence sources with a search emphasis on systematic reviews.

This summary includes:

Key findings from a broad collection of recently published literature (from 2012-2017) and other evidence sources.

This summary does not include:

Recommendations, additional information, or detailed description of the interventions in the studies.

1. Background:

Preventable adverse drug events commonly involve errors related to the administration of medicines. In fact, the Canadian Patient Safety Institute identified 5 medication administration errors as *never events* for hospitals in Canada.[1] A number of causes of medication administration errors have been identified as well as interventions to reduce these in hospital. The practice of manual double checks is an example of an intervention put into place to identify errors already present in the system and to prevent them from reaching the patient. Double checking has been defined as “a procedure that requires two qualified health professionals, usually nurses, independently double checking the medication before administration to the patients.” [2] This process is considered standard practice in most hospitals. The emphasis in most of the literature is that the process must be independent meaning that each component within the medication administration process is checked alone (asynchronously) or apart (independently) from one another, and then results are compared. There has been no evidence to suggest that manual double checks should be done synchronously.

Contents:

1. Background
2. Summary of findings
3. References

This rapid review will present summaries of the best available evidence that describe the most effective practice for double checking medications in order to reduce the incidence of medication administration errors. A detailed search strategy was developed by an experienced librarian (specific search terms are available upon request). Sources included Medline via Ovid (with the Cochrane Library) and EMBASE via OVID SP. Search concepts included Subject Headings and text words. The search date was June 9, 2017, and was limited to articles published between 2012-2017. Duplicates and out of scope articles were discarded by the librarian. The EIDM-A also searched the Joanna Briggs Library, UpToDate database and Google, which produced 1 relevant source. [3] The EIDM-A reviewed all titles and abstracts and included only those that met the research question (15 articles). After reading the full text, 8 articles were retained and included in the review. Articles that described opinions of nurses about the use of double checking, or that discussed strategies to reduce medication administration errors but did not include manual double checks were discarded. The EIDM-A then reviewed the cited references of the included articles, but no additional titles were retrieved. The analysis of studies, including appraisal and summary, and the final report were prepared by the EIDM-A and reviewed by the librarian, Chair of the Clinical Practice Review Committee of the MUHC, and the MUHC Nursing Research Committee.

One systematic review on the effectiveness of double checking for use in prevention of medication administration errors was found, but was considered of low quality. No randomized control trials were found. The studies included in this review were mainly observation or opinion articles. No article compared independent and synchronous double checking procedures. A table of all the articles found and reviewed is available upon request (sonia.castiglione@muhc.mcgill.ca).

Levels of Evidence (adapted from OHRI KTA Evidence Summary document)

Each piece of evidence presented in this summary is assigned a level.

This assignment is based on the evidence being presented and not on the claim made by the authors.

- ☼ **Platinum:** systematic reviews and meta-analysis
- ✦ **Gold:** Randomized controlled trials
- ★ **Silver:** Observational studies (non-randomized trials, case-control, time-series, cohort studies, case series, literature reviews, qualitative studies.)
- ☆ **Bronze:** Expert committee guidelines, reports or opinions, commentary or editorials.
- **Level of evidence** cannot be determined.

2. Summary of Findings:

a. Studies evaluating independent double checks

☼ *In 2012, a systematic review was conducted to determine the evidence base for independent double checking of medication by two health professionals in reducing medication error rates in dose calculation, dispensing and administration. 16 articles were included in the review; however only one study reviewed used an RCT design to investigate whether independent double checks impacted medication error rates. A decrease in medication error rate was found. The other studies mainly described nurses' perceptions of independent double checks and whether they were perceived as helpful compared to single checking. In 6 of the 9 qualitative studies, nurses preferred double checking and saw them as beneficial. The process used for double checks in the reviewed studies was not described. The authors concluded that "the process of double checking the administration of medicines should be evaluated scientifically." Therefore, this systematic review could not determine whether double check of medications were effective at reducing medication errors. This study lacked some rigour in the methods as the search was not exhaustive, there may have been some bias in the process for the selection of articles to be included in the review and the chosen articles were not appraised for quality. [2]*

★ *A study published in 2016 used practice-based evidence for clinical practice improvement (PBE-CPI) method to compare various approaches to reduce medication error rates. Manual double checks and barcode assisted medication administration (BCMA) were among the approaches studied in 12 critical access hospitals in the USA. A multidisciplinary team familiar with the issue of medication errors was assembled to identify outcomes of interest and all possible explanatory variables and to integrate data collection into routine facility practices. Direct observation began when the nurse prepared for a medication pass and continued through administration and documentation to identify errors. A total of 78 errors of 6497 medications being administered were found (1.2%) where manual double check failed to prevent 9 of these errors, or prevented only 1 of 10 errors. The authors reported that the process of manual double checks was not determined at each hospital and therefore the actual process could have been optimized if necessary. [4]*

b. Articles supporting the use of independent double checks

● *In 2013, The Institute for Safe Medication Practices (ISMP) in Canada reiterated that the "selective and proper use of independent double checks can play a role in medication safety." They advocated for this practice while taking into account the dispute in effectiveness and challenges to adherence. Specifically, they cite that the double checking process must be independent to reduce the risk of bias. They propose that this can happen between two different professionals (pharmacist and nurse) but the preparation and checking of the medication must be done separately. The process should also be performed in a protected area, free from distractions. They urge that Independent double checks are also performed for very selective high-risk tasks or high-alert medications (not all). Further, independent double checks should*

not be used solely as a means to prevent medication administration errors but rather bundled with other risk reduction strategies and system changes. They urge that the process be standardized and that tools be provided to facilitate independent double checks. [3]

★ *A survey was administered to nurses in a children's hospital in 2014 to evaluate their knowledge and perceptions of double checking medicines to reduce errors in medication administration. The survey was developed by the authors but without any report on how this was done and whether the questionnaire was reliable or valid. 48 nurses responded and reported that they were aware of the double checking policy but were unable to describe with accuracy what was involved. In addition, a number of factors were cited as barriers to double checking including staffing and workload issues as well as distractions. Despite this, most of the respondents preferred double checking to single checking as an effective way to prevent medication administration errors. The authors recommended that "more training may be needed to improve nurse adherence to the policy and practice to improve patients safety." No information on actual error rates was reported. [5]*

★ *A prospective observation study, published in 2014, established how closely the steps of the double checking process were followed at one pediatric Children's hospital in the UK. This research observed and documented nurses implementation of the 15 steps in the double checking process on various units, at different times of the day during the weekday and on weekends. 2000 drug doses were observed and administered to 867 children, where adherence to the double checking process was variable between nurses. Adherence rates were greater than or equal to 90% for the 11 steps observed. Adherence to independent double check for drug dose calculations was less than 30%, but no errors occurred during this step. The most common error observed was the nurse not being present when the parent administered medication. Adherence to double checking was also higher on the weekend than on the weekday. Despite variation among nurses, overall there was a high adherence to most steps of the process. The authors believed that administration of medication to children and young people is complex and therefore double checking can ensure a safe administration process. No statistical analysis was done to look at the adherence rates and rate of error. [6]*

★ *In 2013, following the publication of the ISMP report, an editorial discussed the practical applications of independent double checks as a component of system-based strategies to prevent error in medication administration. The authors claimed that although independent double checks are extremely effective when performed correctly, they are often overly promoted as a requirement for all high alert medications. In practice, independent double checks can take time to complete and the practice varies greatly from one nurse to another. The authors also claimed that the double checking process must happen asynchronously (alone or apart) so as not to lead to confirmation bias, where one person agrees with another without a thorough review. The authors recommended that independent double checks should be used for selected high risk tasks or high alert medications only and to be used in combination with other safety strategies to help detect errors. [7]*

★ *An editorial was written in 2014 to stress the importance of the use of independent double checks for patients' safety. The authors acknowledged that little research had been conducted on independent double checks use or effectiveness, but suggested that some evidence demonstrated that if used judiciously could be reduce errors. They identified a number of barriers to judicious use of independent double checks, which related to time to carry out the practice and attitudes towards to the practice. They recommended that a policy should be instituted and to support implementation and that a checklist be created to support nurses in implementing the process. [8]*

★ *In an attempt to improve standards of care in medication administration, an article published in 2015 proposed a process for double checking of high risk medication. This was based on data the authors presented on the evidence and factors affecting double checking of medications. Given the limited and sometimes conflicting evidence of effectiveness, double checking is recommended as standard practice. Adherence to the process is scarce as it is ill defined in the literature with many factors that affects its implementation including lack of time and staff, but other factors such complacency, confirmation bias and cultural realities (deference to authority). The authors recommended the creation and implementation of clear organizational protocol that examines and mitigates system failures as well as human factors in the double checking process, as well as limiting the double checking process to high risk medications only. The process includes 2 nurses double checking together (synchronously) except during the drug dose calculation and pump equipment calculation where it is done independently. This process has not been empirically tested. Given the lack of methodology in this article, it was considered an opinion. [9]*

References:

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