View as "PDF version"

Patient Safety Tip of the Week

March 12, 2024

Double Checks Don't Do It Again

There's a reason that double checks don't make the highly effective level in the hierarchy of effectiveness of interventions – they don't always work!

In our October 16, 2012 Patient Safety Tip of the Week "What is the Evidence on Double Checks?" we reviewed some of the evidence on double checks. Our conclusion was that double checks remain a relatively weak safety intervention and they are prone to errors but, done correctly, the independent double check probably does provide an additional element to our defenses against errors. We recommended that you audit those processes for which you require double checks, see how often you are actually doing them and doing them correctly and truly independently, and then put some structure into your double check process (eg. checklists, forcing functions, etc.). That column and the ones listed below have urged caution in the use of double checks.

Now a new study (Konwinski 2024) analyzed data on independent double checks done on high alert medications in a 24-bed pediatric ICU. They examined 37,968 high-risk medications administrations to 4417 PICU patients over a 40-month period. Compared to those instances using single checks, those using independent double checks did not lower the rates of medication administration events, hospital length of stay, or patient mortality. Each double check took an average of 9.7 minutes, and a single check took an average of 1.94 minutes. Nursing favorability for single checking increased from 59% of nurses in favor during the double check phase, to 94% by the end of the single-check phase. The researchers conclude that performing independent double checks on high-risk medications administered in a pediatric ICU setting afforded no impact on reported medication events compared with single checking and was quite inefficient.

Konwinski and colleagues had actually reported on this study earlier (Konwinski 2021) and nicely described how they got there. Their hospital had done 4 improvement projects looking at adherence to the independent double check process without seeing any reduction in medication events. So, they analyzed their process using SEIPS (Systems Engineering Initiative for Patient Safety) methodology. Once they identified the barriers

and inefficiencies of their independent double check system, they decided to do a pilot study of single-checking these high-alert medications.

Pediatrics is one area in which you'd think double checks would be wise. In pediatrics, medication doses are often calculated based upon patient weight or, in some cases, body surface area. Any time you have to do such calculations, the possibility of error is introduced. Hence, the concept of doing truly independent double checks (where 2 individuals independently do the calculations and then compare their results) is a logical one. But we suspect several factors probably played a role in the Konwinski study's failure to show a positive impact of independent double checks. Most importantly, computers are now likely doing all the calculations and they are probably much better at doing these calculations than humans are. Secondly, this study was in an era where barcode scanning is actually often performing the equivalent of a double check. So, these technology factors have reduced the need to perform double checks in many circumstances.

A third factor may be the way the double checks were being done. It seems they were quite inefficient. Apparently, their electronic medical record (EMR) triggered what it called a "forced dual signoff". When the high-alert medication was scanned, the computer locked that screen until a second nurse would sign off that they double-checked the medication. If a second nurse did not sign off, the computer remained locked, rendering it unusable until signoff occurs. When they did a time study, they found it took nurses between two and 32 minutes, with an average of 7.5 minutes, to find a second nurse! This meant the medication administration was delayed for that amount of time **and** the nurse's computer was locked during this time too! Those two things could themselves contribute to medication errors.

But we can't get complacent. The "**mental double check**" is still important. The attitude that "the computer can't be wrong" can lead to failure to prevent some serious accidents. Barcoding systems and computer calculations are only as good as the data entered. We always give the example where a physician erroneously ordered 100 units of regular insulin instead of the 10 units the patient was actually supposed to receive. The nurse scanned the medication and the patient's ID bracelet and the computer told her that was the right patient, right medication, right dose, and right mode of administration. The nurse did a delayed "mental double check" after she administered the insulin and became concerned that this was an incorrect dose for that patient. She drew blood for a stat glucose and gave a bolus of D50W. The blood glucose confirmed hypoglycemia and review of the patient's outpatient records confirmed his usual dose was just 10 units. Another error avoided by the "mental double check" is when a patient weight is entered into the computer in pounds rather than kilograms and the computer calculates a much higher dose than intended. Konwinski et al. do note that their nurses can still ask another nurse to double check when they have questions.

So, should we abandon the independent double check? There is certainly a reduced need for double checks in most circumstances. But there are others where they should be used. We go back to the Vanderbilt incident where there was inadvertent administration of a

neuromuscular blocking agent (NMBA) with a fatal outcome. In that case, there was no barcoding capability in the area in which the nurse was to administer a medication. Hence, the "double check" that would have been done via barcoding was unavailable. Another example where we think independent double checks can be valuable is in programming infusion pumps that are infusing some chemotherapy agents (though we've even described cases where such infusion accidents occurred despite supposed double checks!).

Note that in last week's column (our March 5, 2024 Patient Safety Tip of the Week "2 ISMP's Update High Alert Medication Lists") we noted both ISMP and ISMP Canada have updated their high-alert medication lists. Both ISMP's still mention independent double checks as potential strategies to avoid errors with high-alert medications. But both stress that use of double checks should be limited. ISMP Canada states "independent double checks can be useful, but a requirement for too many independent double checks may introduce 'checking fatigue'. Rather, such double checks should be implemented at the most impactful point(s) in the medication-use process and should be supplemented by other effective strategies." Good advice.

Konwinski and colleagues are to be commended for challenging the status quo and questioning "that's the way we've always done it". We hope that you'll also go back and read some of our prior columns that have addressed the issue of how well (or not so well) double checks work.

Some of our other columns on double checks:

January 2010	"ISMP Article on Double Checks"
October 26, 2010	"Confirming Medications During Anesthesia"
October 16, 2012	"What is the Evidence on Double Checks?"
December 9, 2014	"More Trouble with NMBA's"
April 19, 2016	"Independent Double Checks and Oral Chemotherapy"
December 11, 2018	"Another NMBA Accident"
January 1, 2019	"More on Automated Dispensing Cabinet (ADC) Safety"
March 5, 2019	"Infusion Pump Problems"
August 27, 2019	"Double Check on Double Checks"
November 19, 2019	"An Astonishing Gap in Medication Safety"
April 14, 2020	"Patient Safety Tidbits for the COVID-19 Pandemic"
March 2020	"ISMP Smart Infusion Pump Guidelines"
August 4, 2020	"Intravenous Issues"
August 18, 2020	"More Caution on Double Checks"

References:

ISMP Canada. Hierarchy of Effectiveness. ISMP Canada 2013

https://ismpcanada.ca/resource/hierarchy-of-effectiveness/

Konwinski L, Steenland C, Miller K, et al. Evaluating Independent Double Checks in the Pediatric Intensive Care Unit: A Human Factors Engineering Approach. Journal of Patient Safety 2024; ():10.1097/PTS.0000000000001205, January 18, 2024 https://journals.lww.com/journalpatientsafety/abstract/9900/evaluating_independent_double_checks_in_the.182.aspx

Konwinski L, Miller K, Steenland C.Leveraging Single-Checks to Improve Medication Safety. An examination of how humans interact with their environments and each other led this team to question one of its long-standing medication safety practices and change how they work. Children's Hospital Association 2021; Published July 23, 2021 https://www.childrenshospitals.org/news/childrens-hospitals-today/2021/07/leveraging-singlechecks-to-improve-medication-safety

http://www.patientsafetysolutions.com/

Home

Tip of the Week Archive

What's New in the Patient Safety World Archive