

Patient Safety Tip of the Week

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What is the Evidence on Double Checks?

Frequent readers of our columns know that although we sometimes recommend double checks as patient safety interventions we usually classify them as “weak” interventions. In our March 27, 2012 Patient Safety Tip of the Week “[Action Plan Strength in RCA’s](#)” we put together a set of slides lumping action interventions into weak, intermediate or strong categories in a visual analogy with the success of various traffic signs in slowing speeders. [Click here](#) to see them (remember: images are more likely to be remembered than words!) Importantly, double checks are listed as weak interventions that are only slightly better than the very weakest ones.

A new systematic review ([Alsulami 2012](#)) searched for studies on double checking and dose calculations in adults and children and found only 16 articles that met the inclusion criteria. Almost all were qualitative studies, reflecting information gleaned from interviews, surveys, etc. Only 3 studies had quantitative data and showed relative reductions in the 30% range for medication administration and pharmacy dispensing errors. The authors conclude that there is insufficient evidence to either support or refute the practice of double checking the administration of medicines and that clinical trials are needed to establish whether double checking medicines are effective in reducing medication errors.

Double checks are often recommended when we are dealing with administration of high-risk medications. Even though we have emphasized that double checks are a relatively weak intervention (we also know from other industries that the error rate when a supervisor checks someone else’s work may be 10% or higher), the literature suggests a medication error reduction of about 30% when using a double check system (see our July 15, 2008 Patient Safety Tip of the Week “[Heparin Flushes.....Again!](#)”). Also, for any high-risk medications you need to do truly independent double checks (see our March 30, 2010 Patient Safety Tip of the Week “[Publicly Released RCA’s: Everyone Learns from Them](#)” for a description of independent double checks). Another nice article on independent double checks in preventing medication errors ([ISMP Canada 2005](#)) describes the independent double check process and calculates that independent double

checks would reduce the error rate of a process having an error rate of 5% all the way down to 1 in 400.

Our January 2010 What's New in the Patient Safety World column "[ISMP Article on Double Checks](#)" highlighted an article "[Santa checks his list twice. Shouldn't we?](#)" that puts the independent double check process in perspective. They cite some studies done in community pharmacies that show double checks found errors in 2.6% to 4.2% of cases, about half of which were potentially significant. And the "average" error checking rate is about 5%. But they also discuss how difficult it is for someone to pick up their own errors (because of phenomena such as confirmation bias) and point out that double checks work best when they are performed truly independently.

They recommend that double checks be limited to hi-alert medications (like insulin, heparin, chemotherapy, TPN, etc.) and to very complex processes or hi-risk patient populations. Don't use double checks when some more fundamental re-engineering of the system is needed. And learn from errors uncovered during the double check process. They do suggest continuation of "natural" double checks you are already doing, such as when a nurse checks the accuracy after a pharmacist has dispensed a drug. We'll second that one - particularly since over-reliance on computers often discourages those double checks (see our November 3, 2009 Patient Safety Tip of the Week "[Medication Safety: Frontline to the Rescue Again!](#)").

So what can go wrong during double checks? Armitage ([Armitage 2008](#)) looked at incident reports of medication errors and did semi-structured interviews with healthcare workers across multiple disciplines to qualitatively assess issues related to double checks. The incident reports showed that medication errors occurred despite double checking and that seldom was there ever any review as to why the double checking failed to prevent the errors. The interviews revealed several themes that staff felt contributed to the failure of double checks to prevent medication errors. One theme was **deference to authority**. This occurs when the individual being asked to perform the double check perceives the first checker to be above them in the "hierarchy". Note that sometimes it was the other person's formal title or status that put them "above" in the hierarchy. For example, it could be the new hire double checking the work of an experienced worker. But at other times it was a perceived skill, often their ability to perform mathematical calculations rapidly, that put them in a position of authority!

A second theme was **reduction of responsibility**. This is the complacency that tends to occur when someone feels that someone else will catch any mistakes that they made. We'll actually take that a step further and note that we all have a tendency in the information age to think that "the computer says it's ok so it must be ok". But the other phenomenon he included under reduction of responsibility was that social interactions and unrelated conversations often interfere with the double checking process. The latter reminds us of the use of "**the sterile cockpit**" in aviation in which no extraneous conversation is allowed to occur during high risk activities such as takeoff and landing.

A third theme as **auto-processing**. This might involve two people standing together with one reading item by item and the other simply nodding assent to each. The fourth theme was **lack of time**.

Many of the above themes become less salient if one makes sure the process is truly an independent double check. Having the two parties do their checks separated from each other by both distance and time prevents them from both following the same error. Theoretically that separation could also keep the identity of the first checker unknown to the second checker, thus avoiding the deference to authority factor. Realistically, however, in most healthcare environments today there are so few workers at one time that it would be very difficult to avoid knowledge of the identities of both parties.

Armitage borrows heavily on the aviation safety literature for potential solutions. One suggested solution is use of **checklists**. ISMP provides a simple checklist of items to be considered during the independent double check ([ISMP 2008](#)). This checklist adds a key element often missing in double checks: a cognitive element that asks questions like “does this drug make sense for this patient’s diagnosis?” and “has appropriate monitoring been put in place?”. You’ll find that checklist helpful.

Indeed, checklists have been used successfully in the double checking process but there is a science to developing such checklists ([White 2010](#)). White and colleagues looked at the independent double checking process for administering outpatient chemotherapy medications. They used a very realistic simulation environment to observe nurses administering chemotherapy using two different checklists. While use of the two checklists did not differ significantly in detection of pump programming errors, there was a significant difference in the ability to detect other types of errors. They found that using very specific items, rather than more general warnings, significantly improved certain error types. For example, more errors occurred with a checklist that simply told them to check the medication label against the original order than with a checklist that specified the exact elements to check on the label and the order. Also, **a general reminder** to “think critically” and “remember the 5 rights” **had virtually no impact**. (We love the concept in John Nance’s book mentioned in our June 2, 2009 Patient Safety Tip of the Week “[Why Hospitals Should Fly...John Nance Nails It!](#)” where everyone always asks themselves “Could what I’m about to do cause harm to this patient?” but this article by White et al. would suggest that won’t actually have much of an impact). White et al. conclude that for independent double checking the most important factor is completion by the second individual of a well-designed checklist with **specific items for each high-risk error**. They provide a nice table of 7 important steps in developing such checklists.

Tamuz and Harrison ([Tamuz 2006](#)) apply to healthcare some concepts from other industries and two leading complimentary theories of safety we’ve talked about in the past – High Reliability Theory and Normal Accident Theory. They point out that double checks are a form of social redundancy and basically require one fallible person to monitor the work of another fallible person. They also note that when people hear and see what they expect to see, their effectiveness is reduced. They note that although double checks do share many desirable attributes of the High Reliability Organization they are

seldom carried out as recommended. They cite a study ([Smetzer 2003](#)) that showed norms for double checking high-hazard medications were routinely followed in only 45% of hospitals. They also note that such double checking often becomes a “superficial routine task” and people may lose sight of its importance. They also note that Normal Accident Theory would note that people who are aware others are duplicating their efforts may diffuse responsibility and lead some individuals to overlook safety checks.

One medical center found that despite having the double check policy, medication events continued to occur ([Brannan 2010](#)). Investigation of those events found inconsistencies in how staff were completing the double check and that there were no defined processes included in their policy on how to complete an independent double check. So they revised their policy to include the actual procedure and they also added a forcing function in their electronic medical record that forces the nurse to obtain a witness prior to documenting medication administration and bag changes.

We also came across a great slide set on independent double checks for high-alert medications that incorporates several short video vignettes showing the wrong way and right way to do independent double checks ([Intermountain University](#)). You’ll find these very helpful. They highlight many of the errors commonly encountered with high-risk drugs like insulin and opiates and show how the independent double check, done correctly, can help avoid some of these common errors.

Another interesting application of the double check is doing such checks in a homecare setting via televideo monitoring ([Bradford 2012](#)). Basically, with a desktop PC and a webcam one can verify the drug name, dose, and gradations on syringes greater than 1 unit with close to 100% accuracy. However, reading expiration dates on vials proved more difficult, with rates of 63%. While that was a homecare initiative, one might wonder whether similar technologies could be utilized in the acute care or long-term care settings for administration of certain drugs.

The bottom line: 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. So we recommend you audit those processes for which you require double checks, see how often you are actually doing them and doing them correctly, and then put some structure into your double check process (eg. checklists, forcing functions, etc.). But we agree with the conclusions of Alsulami et al. that further research is needed to determine in a more scientific way best practices and what parts of double checks are effective in reducing errors.

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