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How do we eliminate – or reduce the incidence of – wrong side anaesthetic blocks?

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In this issue of the journal, McLellan et al. [1] report that introducing an extra checklist achieves compliance with a stop before you block (SBYB) moment, and therefore has potential to reduce or eliminate the incidence of wrong side anaesthetic blocks. The authors are to be congratulated on their endeavours to develop systems which promote patient safety. But before we advocate universal roll out of their proposals, it is worth pausing and asking, amongst other things: are their results valid? Are they sustainable? Is their checklist the best way of achieving the objective? And finally: what are the alternatives?

Wrong side blocks are rare events, known to be randomly (Poisson) distributed [2,3]. Of themselves, they are rarely if ever life-threatening, but in addition to the inconvenience to the patient and potential for side-effects of misplaced injection or local anaesthetic overdose, they might indicate underlying factors which if left unchecked could indicate poor compliance with safety checks across the organisation more widely. Root cause analysis is important to help identify areas for improvement. For this reason, the NHS in England has classed wrong side blocks as a 'never event'; something which can and should be preventable. The means the NHS has identified for preventing this error is 'stop before you block', SBYB.

However, the Poisson nature of the distribution of wrong side blocks is important [3]. Just as the aviation industry recognised decades ago that always attributing air crash disasters to 'pilot error' was inherently wrong and would ultimately lead to a failure in essential system redesign, a wrong side block does not simplistically reflect poor anaesthetic conduct. Many things outside the anaesthetist's control may have contributed. We may be individually careful in our own conduct, but events that surround us can conspire in random ways to create mishap.

The nature of our thought processes is relevant. Humans 'think fast' and 'think slow' [4]. Slow thinking applies when faced with a novel or very complex problem; we

generally apply first principles to work our way through to a solution, step by step, perhaps deconstructing the problem into its constituent parts. This is laborious, but often gets the job done. In contrast, thinking fast uses our experience, intuition and inductive reasoning to reach a rapid solution. This involves assumptions or biases and is a highly efficient way to short-cut to the solution.

The trainee, when confronted with a new technique such as a regional block, has to think slow as part of the process of learning. In contrast, the expert thinks – and acts – fast, almost subconsciously. But it is this thinking fast that seems to be at the root cause of most wrong side blocks, because identifying the correct side – in contrast to performing the block – requires slow thinking. SBYB is intended to slow down the experts as much as the novices and force them to think slow.

Thinking slow takes time. McLellan et al. claim that their additional checklist somehow did not take any extra time, but we find that very difficult to accept, and the data in support of their claim is weak. The extra time it took may not have made much difference to the timings of their cohort of cases but, given that the proper case time on which to base scheduling calculations is from the start of anaesthesia to the arrival of the patient in recovery [5,6], any additional steps are inevitably going to slow the process. Rather than claim that no extra time was required we would prefer to see a conclusion along the lines of: ‘the extra time required desirably caused the process to slow, and this was a price worth paying for the additional safety’.

However useful SBYB may be as a mantra, it of itself does not force a stop moment. Checklists may achieve this, but they present their own problems. One is the increasingly recognised notion of ‘checklist fatigue’ [7]. By introducing yet another checklist, we may have the following situation: one checklist at the WHO pre-meeting; one for the anaesthesia machine check; one when the patient enters the anaesthesia/block or operating room (and one each in any centre where each of these is separate); one at the block (i.e., McLellan et al.’s new check); one at the WHO timeout; one for the NAP5 ABCDE checklist to ensure delivery of anaesthetic [8,9]; one at the WHO sign out. This is a total of at least 7 for each patient. The real danger of checklist fatigue is that it becomes a self-fulfilling, automatic brainstem-level, tick-box exercise from which staff are cortically disengaged. People tick the boxes rather than listen to the questions being asked or the responses given.

There is scope for improvement. For example, each checklist should be different and fresh. Thus, the NAP5 ABCDE checklist [8,9] is completely different from the timeout checklist, which should help ensure compliance. Once the patient is checked in for identity into the anaesthetic room/theatre, then there is almost no reason to check their identity again at the block. At this later stage, all that should really matter is that the block is sited on the same side as the surgery. In other words, the purpose of this second checklist is not to re-identify the patient and to do so merely creates unnecessary cognitive load. We are not worried that the original, correctly identified patient has somehow suddenly been replaced by another. We are

solely concerned about whether the block will be placed on the same side as the surgery. So the repeated questions that formed part of McLellan et al's checklist were redundant and had potential only to distract. Ideally, as implied by Grigg [7], there may only need to be one continuous checklist, working as a sort of algorithm, for each step of the anaesthetic from start to finish. This would not be repetitive, but seamless, and the completion of the anaesthetic results in marking off each step of that 'grand checklist'.

Hopping et al. have recently surveyed UK anaesthetists in one region, presenting the important finding that while most anaesthetists believe they perform SBYB in fact, they perform it at a moment far too early to usefully service as a stop moment [10]. McLellan et al. did not exclude the possibility that anaesthetists were performing their checklist far too early. In this scheme, it is important to note that while McLellan et al. showed compliance with the checklist, they did not show that this eliminated wrong side blocks. Interestingly, they required the checklist to be performed even for types of regional anaesthesia that could never be placed on the wrong side, such as central neuraxial block and bilateral blocks. Unsurprisingly, there was low compliance for this, and this in turn suggests a degree of checklist fatigue.

What are the alternatives? In Table 1 we have collated some options that have been suggested both anecdotally and in the literature, with their pros and cons. 'Mock before you block', listed in Table 1 is a new proposal that requires the anaesthetist to perform a pretend block as an action that forces a stop moment to check this mock block is on the correct side.

A review of Table 1 suggests that the safety interventions can be classed by broad categories: alarms, process checks, barriers, behaviours. Alarms are like the SBYB poster or extra stickers or marks; something striking that is designed to cause the anaesthetist to stop and think. However, posters left on walls soon become invisible and lose their power to compel attention. Patient stickers or marks have in fact caused wrong side blocks, when placed on the incorrect side [10]. Process checks are like the checklist; an extra step in the pathway designed to reconcile the action with what is desired. Physical barriers are like the reminder on the ultrasound machine; the anaesthetist must move the barrier to see the screen and this acts to force a stop moment. But not all blocks require ultrasound. Action or behavioural check are like MBYB; the harmless pretend action mimics the real and forces the stop moment.

The aim of checklists and similar aids is to generate a forcing function or behaviour-shaped constraint. The checklist per se does not produce this 'forcing function' and potentially does not add to the safety of the procedure or the minimisation of wrong sided blocks. It may be that the checklist is not the correct way to produce this forcing function and other mechanisms will be more successful. For example, in central venous canula (CVC) insertion systems like the Venner

WireSafe™ the guidewire used to insert the CVC is required to open a box used to secure the CVC [11]. Thus the risk of leaving the guidewire in situ becomes less likely. It is hoped that similar systems can be developed for blocks.

What would a robot do? A robot would not be responsive to alarms, so posters and extra marks are redundant. A robot would require itself to reconcile the surgical site mark with the intended block site, so extra marks on the patient might only serve to confuse it. A robot would be satisfied with only one checklist; once completed it would have the go-ahead to perform the block. A robot would unlikely need to perform a mock block.

We can imagine a physical barrier akin to how a robot would behave. Imagine that a locked box contains the local anaesthetic, drawn up in a sterile syringe, with needle attached ready for injection. The box can only be opened by a specific verbal statement: *"I am Dr X; I have identified, positioned and prepared Patient Y and am ready immediately to perform the block. I have checked that the correct side to be blocked is left/right"*. Only when the declared patient name and side matches to the pre-programmed information will the door open, allowing the anaesthetist immediately to proceed. The verbal command can be recorded for posterity. The statement of the anaesthetist will thus constrain their behaviour unless makes a false declaration and is not, in fact, ready. **There is also a role for the patient to play a part in this process, if the block is performed awake. However, wrong side blocks are commonly reported in awake patients – a common reason cited later, that the patient thought this was the way the block was performed – hence over-reliance should not be placed on expecting the patient to verify in a vulnerable or anxious state [12].**

Ingredients of the technology required already exist, such as voice recognition commands (see Amazon's Alexa; <https://developer.amazon.com/alexa>), but the box may be expensive to make. Of course, now that we have described the principle, nobody will be able to patent it for financial gain, so that itself may be a constraint. Nevertheless, it is a theoretical system that should eliminate wrong side blocks. Checklists and 'mock before you block' are very cheap and likely reduce the incidence of wrong side blocks somewhat. Whichever method we choose depends ultimately on whether we as a society and as an anaesthetic community wish this particular error to be eliminated, or simply reduced.

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Table 1. Advantages and disadvantages of different methods to prevent wrong side block; *includes sticky label on patient. U/S = ultrasound; SBYB = stop before you block; MBYB = mock before you block

Method	Advantages	Disadvantages
SBYB poster	catchy title	posters are 'invisible'/ posters do not force stop moment
Extra checklist	checklists can work/ paper trail for later audit	checklist fatigue/ can be done at wrong time
Extra patient mark*	creates more 'signal'	extra marks can confuse
Reminder on U/S	part-physical barrier	not all blocks need U/S
Syringe label	acts as reminder	needle might be inserted too early
MBYB	forces stop moment/ likely guaranteed to prevent wrong side block	unusual; needs to be learned