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Colour coding, drug administration error and the systems approach to safety

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EDITOR:

We were interested to read Haslam and colleagues' recent paper on the risks of introducing the international colour-coding system for syringe labels in anaesthesia [1]. The authors demonstrate that introducing the new international colour-coding scheme, to a hospital that previously used the Medilabel system, can increase the rate of near-miss incidents or latent drug errors, primarily owing to the fact that the international scheme uses some of the same colours as the Medilabel system, but for different classes of drug. This is an unsurprising result and underscores the importance of the use of multiple safeguards in any complex work environment, consistent with the systems approach to safety – particularly when obvious potential risks present themselves, such as when changing colour-coding schemes. In a recent systematic review of the entire body of literature related to intravenous drug administration error in anaesthesia, our group identified 11 distinct strategies for the prevention of drug error in addition to colour coding by class of drug [2]. Furthermore, colour coding alone was rated as being able to prevent only 20% of the 80 incidents we used to validate our 12 safety strategies. What this result tells us is not that colour coding *per se* is ineffective, but that it should be used as part of a wider system of multiple safeguards within a fully developed culture of safety. No single safeguard can be expected to prevent all error types, just as no amount of human vigilance can. In addition, all safety technologies carry some potential for adverse outcomes, including even bar coding, which has recently been endorsed by the US Food and Drug Administration [3]. An effective culture of safety should anticipate potential safety risks where possible, attempt to minimize them where appropriate and react quickly to remove or ameliorate them when incidents do occur. For safety to be maintained and indeed improved, this process must be continuous, as inevitable changes in supplies, upgrades in equipment and revisions of procedures can all have important safety implications.

In terms of colour-coded drug labels, a short-term increase in the risk of drug error during the introduction of a consistent colour-coding scheme seems likely to lead to less iatrogenic harm in the long term than the continued use of up to three inconsistent colour-coding schemes in the same country and, indeed, sometimes simultaneously within the same hospitals [4]. Furthermore, Haslam and colleagues claim that it has not been proven that colour-coded labels can reduce errors, citing a Fasting and Gisvold paper in support [5]. However, this study is known to be underpowered [6]. In addition, it has been argued that it would have been statistically appropriate to use a one-sided test of significance in analysing the results, in which case the combination of education and colour coding does yield a significant reduction in error rate ($P = 0.037$) [6]. Colour coding is a potent psychological cue that is used widely and effectively in numerous other complex and potentially hazardous organizations [7]. It would be a surprising result indeed if it were discovered that healthcare is a sufficiently peculiar or special discipline that these basic safety principles did not apply.

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