Editorial

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Effectiveness of interventions to improve test appropriateness

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Laboratory testing is critical to the provision of care to the population served by a healthcare institution. It has been reported that laboratory tests are involved in around 70% of clinical decisions regarding patient care and are involved in 95% of patient pathways. Given the critical role played it is therefore essential that the right tests are performed at the right time. It is therefore important to define what is an appropriate test. An appropriate test should contribute to a patient's diagnosis in either a confirmatory or eliminatory way, help guide patient care, add value in addition to other tests requested, not be an unnecessary repeat and be in line with current guidelines [1]. Inappropriate tests are defined as tests that are not indicated, are indicated but not requested or tests that are appropriately requested but are then not acted on in an appropriate manner [1]. As these definitions show appropriateness refers to not just ensuring that inappropriate testing is avoided, but also to ensure that appropriate tests are not missed. It has been reported that the level of inappropriate requests could be anywhere between 5 and 95% but additionally it has also been reported that the rate of missed appropriate tests is around 50% [1].

The consequences of inappropriate testing are significant for both the patient and the hospital. By definition 5% of normal patient results will lie outside of the reference range and in this situation will need to be followed up. If there was no indication for the initial test this can lead to unnecessary follow ups, phlebotomy sessions and repeated tests and perhaps most significantly increased stress for the patient [2, 3]. On the flip side, a failure to request a test that would have been appropriate or a failure to act on the result can lead to missed diagnosis and therefore patient harm. In both of these scenarios there is the potential for litigation against the hospital [4].

There are many possible contributing factors that cause inappropriate requesting. The first of these is due to the

progression within laboratory medicine over the last few decades meaning there is now a significantly bigger repertoire of tests available at ever decreasing speed and due to electronic requesting these are all now much easier to request. The second significant factor is defensive medicine due to fear of litigation with over 90% of clinicians stating they have requested tests solely because of a threat of liability. This is backed up by the in the US over 50% of malpractice claims related to misdiagnosis were due to a failure to order the appropriate test [4]. A third potential factor is due to the decreasing education in laboratory medicine as part of medical training leading to a lack of understanding of the diagnostic value of a test. A final but very significant factor, especially in the modern world with ready access to online information and misinformation is patient demand, which can in turn link back into the fear of litigation [1, 2].

Given that we are aware that there are significant levels of inappropriate testing what can we as laboratory professionals do to improve the situation. The article by Lillo et al. in a previous issue of *CCLM* looked at the interventions in primary care and found that most took the approach of education either alone or coupled to feedback reports, whereas the use of electronic ordering mechanisms as usually used in the hospital setting was not considered [5]. In their follow up article in this issue of the *Journal* they perform a randomised controlled study of six different approaches to improve the appropriateness of Vitamin D requesting in primary care [6]. The six different interventions were based on different combinations of issuing guidelines, providing feedback reports to the surgeries, using non-interruptive alerts (the user just needs to click ok to proceed) and interruptive alerts (user needs to enter information to proceed). What they found was that in all groups there was a reduction, over and above the reduction seen in the control group but only in the group where there was an alert did this become significant. It therefore seems clear that issuing guidelines alone has very little impact, a finding that is in line with other studies [6]. It is unclear what the reasons for this might be but one reason could be that it is very difficult to change the way people have worked for the rest of their careers. It may also be a lack of awareness of changes to guidance or in some cases a disagreement with them and

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therefore a following of local guidelines. There is always a tendency to revert back without repeated reminders [2].

The best way to prevent this reversion back to previous practice is to use clinicians electronic requesting systems. The alternative to this is repeated education but this is hard to maintain, doesn't capture all users and lacks the real time feedback element you can get by using the order communication system. There are three ways in which to use alerts to help optimise requesting. Two of these are discussed in the paper and involve the use of pop up boxes. As discussed above these can either just be a pop up alert to remind the clinicians or the recommendation which they can then choose to follow or take a different course, or a pop up that requires some feedback in order to progress with the request. The other harder line approach is to use a pop up to state that the test will not be processed unless the laboratory is phoned to override automated rules. This works well for tests that are repeated within an inappropriate timeframe. The disadvantage of this is that it does not prevent the sample being taken and therefore a patient may have been bled unnecessarily and potentially get no results. The ideal would be to prevent the sample being taken in the first place. However, although pop up alerts are the best mechanism there needs to be a careful balance of the number of these in use to avoid alert fatigue. This occurs when there are too many alerts which then no longer get read and are users do whatever it takes to get past the alert and get the test requested [7].

What was interesting in the study was that although there was the desired reduction in Vitamin D requests a second aim of the study, which was to check that the reduction was due to a reduction in inappropriate requests wasn't seen, or didn't present in the expected way. The expectation was that there would be a relative increase in the number of low Vitamin D levels but this was not seen [6]. Possible explanations for this could be that the guidelines are not appropriate or that low vitamin D levels are an effect of a clinical condition meaning a patient is less able to access sunlight meaning that the low level is an effect rather than a cause and therefore not currently part of the diagnosis [6]. Another possible reason, as highlighted in the article is that demand optimisation is synonymous with reducing test requesting and therefore the clinicians may have viewed this study as a drive to purely reduce test volume and therefore reduced test requesting in a more randomised way. It would be interesting to look at the clinical impact of similar interventions on appropriateness of requesting for other analyses.

In order to ensure that any optimisation strategies are successful it is important to follow several key principles. Most critical of these is to engage with the clinicians and users of the service and get their buy in following a

discussion of why it is important for the patient. It is also very important to regularly review the strategies to make sure they are still appropriate with current guidance. A good tool to help with this is when an interruptive alert is used. The data collected from that interruptive alert can be used to review how the strategy is working and allow it to evolve as new information is published. With all approaches it is critical to ensure that they are seen as a tool to ensure patients receive the correct test during initial consultations as this is the best way to ensure that errors are reduced and patients receive the best standard of care which must be at the core of all we do [7]. A good way to ensure that the correct tests are requested first time is to use care sets. These are request profiles based on a clinical condition e.g. abdominal pain or chest pain. Each care set is agreed with clinical teams and would contain only the tests relevant to investigate the clinical condition. Additional tests can be added to the care sets to reflect the clinical questions being asked [8].

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