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G.White, C. Campbell, and A. Horvath.
Is This a Critical, Panic, Alarm, Urgent, or Markedly Abnormal Result?
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Guest:
Dr. Graham White is Chief Clinical Biochemist in Pathology at Flinders Medical Centre, Adelaide, Australia.

Bob Barrett: This is a podcast from *Clinical Chemistry,* sponsored by the Department of Laboratory Medicine at Boston Children's Hospital. I am Bob Barrett.

Medical laboratories frequently encounter clinically unexpected results that require timely clinical evaluation because they may indicate an imminent life-threatening condition or a major clinical deterioration.

Laboratories, therefore, need to identify and report such results sooner than they normally would, and have policies and procedures that minimize the possibility of patient harm due to delayed clinical attention.

The concept of these so-called "panic values" was raised by George Lundberg in 1970, but a variety of other terms have since appeared in the literature. For example, urgent, critical, acute, alert, abnormal, markedly or significantly abnormal, clinically significant, vital, red or orange or yellow zone values, and various combinations of terms.

A letter appearing in the December issue of *Clinical Chemistry* has the title, "Is This a Critical, Panic, Alarm, Urgent, or Markedly Abnormal Result?"

We are joined by one of its authors Dr. Graham White, who is Chief Clinical Biochemist in Pathology at Flinders Medical Centre, Adelaide, Australia.

Dr. White, how did this title come about, and what prompted you and your colleagues to write this letter?

Dr. Graham White: Well Bob, not surprisingly, clinical laboratories produce abnormal test results from patient's specimens every day. Most of these abnormal results are expected by the requesting doctor, and are reported in a safe and timely fashion.

Now sometimes an abnormal result is suggestive of an acute and potentially very serious clinical condition, but most importantly it's also an unexpected result. Such a result places a heavy proactive responsibility on laboratory staff to rapidly identify and report these results to the requester, because that they do require immediate clinical attention.

Back in 1970, Lundberg published a paper that introduced the term “panic result” to describe this type of abnormal test result. Since then laboratories worldwide have applied many different terms to such results. For example, vital results, emergent results, markedly abnormal results, significantly abnormal result, red zone, orange zone, and yellow zone results, clinically significant results, I could go on with many more examples.

But to answer your question the title of our letter is to highlight this jumble of terms for the same thing.

Bob Barrett: Do you think it really matters if clinical labs use their own terms to describe these abnormal results as long as they handle them in the right way?

Dr. Graham White: Well, in the big picture clinical laboratories work best for patient care and safety when they follow standardized or harmonized best practice policies and procedures for both their technical and management operations.

This is of growing importance as laboratory staff, clinical users, and patients are increasingly moving within and across healthcare systems.

So it's very important the professional words used by clinical laboratories mean the same thing and trigger the same responses wherever you go.

Bob Barrett: Well it sounds as if it would be good standard practice if labs agreed to use the same term for these special abnormal results. So is this just a matter of agreeing on the most popular term for those abnormal results that need to be identified by the lab and urgently reported?

Dr. Graham White: Well, yes Bob. You are right that all laboratories should settle on an appropriate term. However, of the most commonly used terms, panic results creates an unfortunate image of how they should be managed by laboratories, whereas critical result to take another example, failed to identify what is actually critical.

More widely, there are two basic problems of all the current terms, firstly none explicitly identified the primary attribute to these abnormal risk test results, and secondly throughout

the literature the many local terms, all have their own different definitions.

So yes, we both need a new term to which laboratories can standardize, and a clear definition of what it means.

Bob Barrett: Well, let's go to a term that you just use, Primary Attribute, can you explain what you mean by that?

Dr. Graham White: Well for example, take one of the current terms, Markedly Abnormal. This term is vague and also misleading in its description of what we need to define. Certainly unexpected markedly abnormal test results often need to be rapidly reported, but for some patients the same markedly abnormal result may not indicate a very urgent clinical situation.

A common example is an unexpected acute high serum creatinine result, which needs urgent reporting in a new patient, but not in a patient with stable chronic renal failure. That is the magnitude of the abnormality of a result does not necessarily indicate a clinically very urgent condition.

The key difference in the two situations, the first patient is at acute high risk of significant morbidity or mortality, if clinical review and action is delayed due to routine reporting, whereas the second patient is not at immediate high risk to the health and well-being.

So the primary attribute of unexpected results requiring urgent clinical attention is that they herald acute high risk to the health and well-being of that patient. We have therefore proposed in the letter as a standardized firm critical risk results, which we have to find as results requiring immediate medical attention and action, because they indicate a high risk of eminent death or major patient harm.

An obvious example of this is unexpected neonatal hyperglycemia. We have also proposed a second term--significant risk results--which we have defined as results that are not eminently life-threatening but indicates significant risk to patient well-being and therefore require medical attention and follow up action within that clinically justified time limit. Common example of this group is a positive blood culture.

It should be noted that high risk results may be only slightly abnormal or even normal. For example, a rapid overcorrection of a high serum sodium concentration coming back to normal, so a large delta change in a result may represent a critical or significant risk for a patient rather than the absolute value of the result.

By identifying the primary attribute of concern, that being patient risk, the terms highlight what is critical or significant and maintain the focus on patient safety. In our letter we also proposed the term 'High Risk Results' as the umbrella term for critical risk and significant risk results.

Bob Barrett: There must be many organizational components labs need to ensure they have an efficient and effective service reporting high-risk results. What do you think are the key points lab should now be considering?

Graham White: Well all labs can take first steps of thinking of these abnormal unexpected results in term of risk to the patient's safety and well-being, rather than simply by the magnitude of abnormality. By focusing on patient risk by default, risk assessment techniques should be adopted before implementing the proposed two standard terms.

As part of this process laboratories should identify an alert list of tests under each term that is appropriate for their specific patient groups of general patient population. It is very important that this step should closely involve the relevant clinical users, as they should be equal partners in designing a jointly owned policy and procedure that provides flexible and responsive management of high risk results.

In defining alert thresholds, it is important where relevant and possible, not to simply base criteria on the magnitude of abnormality, but to modify alert thresholds to take account of high risk parameters in specific clinical conditions in patient subgroups and even for individual patients.

The overall approach to the routine management of high risk results should be a risk assessment and risk management process. Much of this of course is very dependent on the laboratory resources available, especially the capability of IT systems.

The latest systems are now capable of implementing quite sophisticated high risk result alert in feedback systems, but we do recognize that for many laboratories the new system can be some years away. However, in the meantime they are still able at least to implement the proposed standard terms and the basic concepts of risk assessment and risk management.

Bob Barrett: Dr. Graham White is Chief Clinical Biochemist in Pathology at Flinders Medical Centre, Adelaide, Australia. He has been our guest in this podcast from *Clinical Chemistry* on panic values.

I am Bob Barrett. Thanks for listening!