



Dr Rick Jones

And we call ourselves scientists...

I am sure we've all had a chuckle at the case of the Mars probe that crash landed because the Americans got confused between imperial and metric units when they programmed the descent software. However, we should perhaps remove the beam from our own eyes, given the results of a recent national audit of the variability of units of measure (UoM) being reported electronically from our laboratory systems using the well-established Pathology Messaging Implementation Project (PMIP) service.

Figures 1 and 2 provide some examples of the variance seen for just two units of measure applied to common tests. That there should be such variance attests to human ingenuity, but also exposes failings in understanding of units and dimensions that would embarrass an average 'GCSE' level candidate. Furthermore, given the claims we make for the safety critical value of the test results we publish, it rather undermines the strapline of the College that we are "the science behind the cure".

So, three questions. Is it important? Why has this arisen? What should be done about it?

Yes, it is important because increasingly data is being merged in patient records and used for sequential analysis or to trigger automated clinical interventions. The variation can lead to particular difficulties in correctly filing and merging data and there is an increasing corpus of reports of clinical near-misses or system errors thrown up when disparate data is merged in tables and graphs.

The explanation of why it has arisen is more complex. Partly, it is because increasingly the final output of the laboratory is invisible to those generating it. When paper-based reporting was the norm, it was easy to eyeball the output and indeed hours would be spent tweaking the layouts and designs. With electronic reporting, what appears on the clinician's screen cannot readily be seen from within the laboratory, so the in-built quality check has been lost. Also, the output is now mediated and controlled by IT staff, who may lack the clinical insight and scientific training required to properly construct and assign units of measure. In the past, many laboratory IT staff were drawn from the ranks of biomedical staff, but this generation is moving on and new recruits may not have the bench experience of yore.

In addition, laboratory directors have probably never fully appreciated the implications of electronic reporting and their ultimate role in ensuring the quality of the output. CPA accreditation does not extend that far and there may be a false assumption that CPA accreditation would be sufficient to cover the eventuality of patient harm through inadequate control of electronic reporting.

Finally, though electronic reporting is supported by a raft of NHS standards, the opportunity to extend and quality assure them was lost when the NHS Information Authority, which introduced the GP messaging systems, was wound up to make way for Connecting for Health. PMIP was

Figure 1: Examples of the UoM for millimetre per hour

UoM in PMIP standard format	Examples of UoM reported by laboratories
mm/h	mm in 1 hr
mm/h	mm in 1Hr
mm/h	mm/1h
mm/h	mm/1Hr
mm/h	mm/1stHr
mm/h	mm/h
mm/h	mm/hour
mm/h	mm/hr
mm/h	mm1st hr
mm/h	MM /HR
mm/h	mm 1st h
mm/h	mm/1hr
mm/h	mm/1st Hour
mm/h	MM/HR

Figure 2: Examples of UoM in reporting measures of cubic millimetre

UoM in PMIP standard format	Examples of UoM reported by laboratories
/mm ³	/cu mm
/mm ³	/cu.mm
/mm ³	cmm
/mm ³	per cmm
/mm ³	per cumm
/mm ³	/cu mm.
/mm ³	/cu.mm.
/mm ³	/cu/mm
/mm ³	per cumm

seen as an interim solution, soon to be replaced by new spine-based services. Hence funding was constrained. Ironically, PMIP is a shining example of success of NHS IT systems and it is likely to be with us for some years to come.

Thankfully, largely due to work by the National Pathology Leads, Dr Ian Barnes and Dr Gifford Batstone, strongly supported by Professor Peter Furness and the College, Connecting for Health is now paying proper attention to the problem. In response to the potential safety risks, the Department of Health and Connecting for Health have now returned to the task in hand and have defined the necessary extensions to the standards. The data in the table has been obtained from a live audit of anonymised PMIP message traffic and is drawn from a sample of 19 million reported test results. The technique used for the audit is readily automatable and could provide automated feedback on adherence to standards for unit formats and their use in relation to reported tests.

Whatever solution is adopted, however, the key will be professional engagement. There is a real opportunity to reassert to need to properly apply basic science by laboratory clinicians and scientists at all grades, to ensure high quality and safe test reporting. To borrow a line from the President, this is not a problem confined to the ‘numerate’ disciplines and in some ways is worse in the ‘literate’ disciplines (e.g. histopathology, microbiology, genetics) as they develop quantitative tests using DNA and digital technologies.

More information about the audit data, the definition of the new standards and the new National Laboratory Medicine Catalogue can be found on www.ychi.leeds.ac.uk/pmipunits.

In conclusion, I urge College members to live up to the aspirations to be the “science behind the cure” and not end up as a laughing stock when a rocket scientist next gets hold of their own results showing units of ‘mm/1 st hr’. He might even sue you if things go wrong. Not as expensive as a Mars probe, but bad enough.

The evidence

These examples betray a lack of understanding of standards and of basic dimensionality of units. Though the use of full stops may seem to be a trivial issue, a full stop has the role of multiplier in the formulation of units and computers, being dumb creatures, get very confused by such variation. The example /cu/mm could mean centi-unit per millimetre. Surely not what was intended?

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