

LETTERS TO THE EDITOR

‘Reference rot’: A developing problem in *Emergency Medicine Australasia*

Dear Editor,

The sourcing of the original references of scholarly articles is an integral part of academic learning.

The increased use of online resourcing, and the referencing of same, has resulted in the emerging phenomena of ‘reference rot’. This relates to the combination of two elements that are commonly found when attempting to access web pages, which are:

1. Link rot – the article or webpage resource identified by the URL no longer exists or has moved to another site, resulting in the ubiquitous ‘404 not found’ error message.
2. Content drift – where the resource identified changes over time, and might evolve into a resource that bears no resemblance to the content originally referenced.

We examined all issues of *Emergency Medicine Australasia* between 2010 and 2014 for reference rot. A URL that suffered from either link rot or content drift was classed as being affected by reference rot.

In total there were 30 issues and five supplements between 2010 and 2014 with a total of 10 993 references. Of these, 1142 (10.4%) were

URL references. Overall, 389 URL references (34.1%) suffered from reference rot.

Link rot was more prevalent than content drift. Thirteen URL references (0.2% of total references, 1.1% of URL references) were affected by content drift. This compares to 376 URL references (3.4% of total references, 32.9% of URL references) that were affected by link rot.

In general, reference rot increased as time went on. For articles written in 2014, 15.3% of URL references (2.0% of all references) were inaccessible due to reference rot. Reference rot was almost twice as high for articles written in 2013, with 30.5% of URL references being affected. The figures for articles written in 2012 and 2011 were 38.3% and 36.5%, respectively, while over half of URL references (58.0%) in 2010 articles can no longer be accessed.

Our findings demonstrate that reference rot is a significant problem in the journal *Emergency Medicine Australasia*. Over 34% of URL references in the 5 years studied are affected by reference rot and are now inaccessible. This is in the midrange of

previous studies, which found rates of reference rot ranging from 20% to 70%.¹

As academic scholarship relies on references to support the claims made by authors, we feel that reference rot poses a real threat to the integrity of scholarly output and solutions are needed to address this.

Competing interests

AO is a section editor for *Emergency Medicine Australasia*.

Reference

1. Klein M, Van de Sompel H, Sanderson R *et al.* Scholarly context not found: one in five articles suffers from reference rot. *PLoS ONE* 2014; **9**: e115253.

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