Measuring radiologist workload: past, present and future

Radiology services are at the heart of patient management and straddle both primary and secondary care. The demands for radiology services have never been higher and are still increasing. In addition, the complexity of imaging processes is increasing constantly, with the introduction of such procedures as CT colonography and the ever-expanding array of interventional procedures. This situation is further compounded by the evolving role of radiologists, who have to undertake non-reporting activities such as participating in multidisciplinary teams (MDTs), management, teaching and research. The current tight economic climate puts further strain on departments. Given all this, it is no surprise that efficiency is becoming an important topic for radiologist reporting.

This article looks at how available, existing methods can be adapted to analyse workload, describes the results of a study examining the workloads of British radiologists, and speculates on what the future might hold in the field of measuring the workloads of radiologists.

Attempts to measure the workload of radiologists are not new; however, rapid advances in technology have left us struggling to keep up. When there were only plain films to report it was a simple matter of comparing the number of studies performed. Eventually institutions such as the UK’s Royal College of Radiologists (RCR) published benchmarks suggesting how many studies individual radiologists should be reporting over the course of a year [1]. Obviously, performing/reporting an ultrasound is not the same as reporting a plain film, and comparisons become even trickier with complex CT and MRI scans. The advent of complex imaging was the death knell for the method of simply comparing the quantity of images reported. As a result, the RCR retracted their benchmarks and advised trusts to develop local guidelines to deal with variations in reporting case-mix and productivity [2].

RELATIVE VALUE UNIT (RVU) BASED SYSTEMS
In response to changing case-mix, more complex measuring systems were developed. These can broadly be termed as ‘Relative Value Units’ (RVU) systems and are based on a system of attributing values to different imaging studies depending on factors such as reporting time and difficulty. RVU systems aim to allow the user to measure the total workload of radiologists with different case-mixes on a fair and even basis. Some, such as the Körner system in the UK, have however fallen by the wayside and into disuse as the rate of change in the specialty outgrew the measuring system [3]. More successful systems include cost-related methods used in countries such as Canada and the USA [4], and purely productivity focused methods such as that developed by Pitman and Jones in Australia [5].

The purpose of all RVU systems is to measure workload, and there are multiple ways that this information can be practically applied. Comparing workloads accurately makes it possible to calculate benchmarks for individual radiologist workload. Lower benchmarks can be used to encourage a minimum standard and ensure that all members of staff are pulling their weight. Conversely, maximum benchmarks can be used to try and stop over-reporting, something increasingly identified as a cause of stress [6] and also a target for malpractice suits [7]. Another useful application is analysis of working practices to improve reporting efficiency. This area has yet to see extensive analysis.

APPLYING RVU IN THE UK
The UK has a particularly small number of radiologists per capita [8], putting more strain on radiology departments in dealing with increasing demands for imaging services. Accurate workload figures could help identify appropriate staffing levels and justify the use of increasingly tight finance. At the time of our study there was no central guidance on workload
measurement in the UK and we decided to adapt existing international RVU systems, apply them in a UK hospital, and see how UK radiologists compared to existing international benchmarks. The aim was to generate debate and stimulate future research into the setting of workload benchmarks and improving reporting efficiency in the UK.

In order to do this we selected the Pitman-Jones RVU system [5]. This system is simple and easy to apply in an exploratory study. It had been used to set maximum workload benchmarks based on the work of Australian radiologists [9], and has been recently updated by researchers in Ireland [10]. These provided theoretical standards as well as real figures from a similar healthcare system to UK. The basic RVU system provides scores for imaging studies that are differentiated by study type (plain film, CT, etc.) and by anatomical location (eg. CT head vs CT chest, abdomen and pelvis). We adapted the system used in the Irish studies to take into account studies that had not been commonplace when the first system was developed. The Irish system included methods for assessing net workload by considering non-reporting activities such as administration and multidisciplinary team meetings (MDTs).

We re-organised this to better suit local activities. Due to a lack of scoring in the original model, interventional procedures and nuclear medicine had to be grouped with these activities. Including non-reporting work in workload measures is vital for full appreciation of the expanding role radiologists play in modern healthcare. Full details of our methods can be found in our published work [11]. We used electronic data from our hospital for all reporting done by radiologists done from 2010/11. Workload was calculated per whole-time equivalent (WTE) consultant, with crude workload (RVU/WTE) using just reporting data and net workload taking into account non-reporting time as laid down in job plans of consultants.

UK VS THE WORLD
The latest Australian benchmark [9] recommended a maximum crude workload of 45,000 RVU/WTE per year. In Ireland, the average crude workload in hospitals varied between 48,873 – 58,788 RVU/WTE depending on the type of hospital and presence of trainees. Net workload varied between 62,414 and 126,376 RVU/WTE [10]. In our UK district general hospital, our average crude workload was 48,120 RVU/WTE, with average net RVU/WTE of 83,675. This net workload is similar to the average net workload of Irish County Hospitals (79,135). Our findings suggested that our radiologists’ workload was substantially higher than the recommended Australian benchmark.

We also discovered that our radiologists spent a considerable amount of time on non-reporting activities. 42.4% of consultant radiologist job plans was spent on these. 33.67% of non-reporting time was devoted to nuclear medicine, procedures and interventional work. These figures were broadly similar to figures in Irish hospitals and show how significant the effect of expanding radiologist duties is on workload calculation. Any method to calculate workload that doesn’t take these into account is both inaccurate and fails to appreciate the full spectrum of service that radiologists provide in modern healthcare systems.

LIMITATIONS
Our study shared many of the limitations of the Australian [9] and Irish studies [10] based on the same RVU system.

Firstly, the scoring system is not comprehensive. There are relatively few categories into which imaging studies are collected. This reduces somewhat the level of accuracy of workload calculations, but makes data collection and analysis much more manageable, especially important in an exploratory study like ours. Also, direct patient care activities such as interventional procedures do not have a score. An ideal RVU system would include practical procedures as well as image reporting. Also, the original Australian system was developed as far back as 2002, with some updates from Irish researchers and our own team. Thus it doesn’t necessarily reflect current practice accurately.

Our study was limited to one radiology department in a medium sized UK hospital, which includes several trainees. Obviously these data can’t be extrapolated to analyse UK radiologists’ workload as a whole, but do provide proof of principle that such a system can work. We thought that this was important considering that previous studies based on this system had been controversial.

This method of workload analysis does not take into account the presence of radiology trainees, something found to significantly affect the workload processed by consultants [12]. It has previously been proposed that academic RVUs or conversion factors could be used so that hospitals with trainees are not penalised by RVU systems [13].

ARE RVUS THE FUTURE?
In the UK, demand for radiology examinations has increased 26.5% since 2004/5[14]. This pattern is repeated worldwide. Radiology departments everywhere will need to become more efficient in order to cope with this demand. Radiology departments and individual radiologists need performance guidance to ensure that they are achieving an appropriate output but are also protected from overload. There are two approaches to this currently in use, namely RVUs and ‘ready reckoners’. In 2012 UK radiologists were advised to use a ‘ready reckoner’ [15]. This laid out an average number of different studies a radiologist should perform in a year, with ideal ranges of how many scans of different modalities should be performed per hour. This simple numerical approach is easy
for radiologists to understand but tricky to adapt well if the case-mix differs significantly from the given example. This allows individual radiologists or departments to reassure themselves. However, it doesn't take into account some key aspects of non-reporting work such as research or administration and can't be used to analyse national trends or identify best practice.

We believe that our study and others adapted from the Pitman-Jones RVU model [9,10], demonstrate clearly that RVU systems do allow radiologist workload to be measured in a more comprehensive and accurate manner than is currently standard practice. The current scoring system is flawed, but updating it to reflect current practice should not be too difficult if national governing bodies are involved. Admittedly, differences in practice and coding mean that an international system is unlikely to work. Few radiologists would relish the idea of being directly compared to each other, and a variation in workload is only human. This kind of comparison is a fact of life for most other specialties, but this data were used to identify best practice and not to punish those at the lower end of the bell curve. Excessive optimisation of reporting runs the risk of turning the radiologist into a reporting machine, but rather than encourage this, RVU systems can be used to set maximum workload benchmarks and protect radiologists from overload. This would obviously also be safer for patients as there would be less likelihood of error from fatigue or excessive workload.

Increasing demand for images runs the danger of valuing quantity over quality in reporting, putting patients at risk. The best way to fight this is with hard and accurate workload data, which can be used to justify resources spent in radiology departments. RVUs offer the best method to obtain such data and we believe that if national governing bodies wish to protect radiologists from liability of interpreting too many radiographs. AJR Am J Roentgenol 2000;175:17e22

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