ORIGINAL ARTICLE

The Warwick system of prospective workload allocation in cellular pathology—an aid to subspecialisation: a comparison with the Royal College of Pathologists' system

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Background: *Guidelines on staffing and workload for histopathology and cytopathology departments* was published by the Royal College of Pathologists (RCPath) in July 2003. In this document, a system is provided whereby the workload of a cellular pathology department and individual pathologists can be assessed with a scoring system based on specialty and complexity of the specimens. A similar, but simplified, system of scoring specimens by specialty was developed in the Warwick District General Hospital. The system was based on the specimen type and suggested clinical diagnosis, so that specimens could be allocated prospectively by the laboratory technical staff to even out workload and support subspecialisation in a department staffed by 4.6 whole-time equivalent consultant pathologists.

Methods: The pathologists were asked to indicate their reporting preferences to determine specialist reporting teams. The workload was allocated according to the "prospective" Warwick system (based on specimen type and suggested clinical diagnosis, not affected by final diagnosis or individual pathologist variation in reference to numbers of blocks, sections and special stains examined) for October 2003. The cumulative Warwick score was compared with the "retrospective" RCPath scoring system for each pathologist and between specialties. Four pathologists recorded their time for cut-up and reporting for the month audited.

Results: The equitable distribution of work between pathologists was ensured by the Warwick allocation and workload system, hence facilitating specialist reporting. Less variation was observed in points reported per hour by the Warwick system (6.3 (range 5.5–6.9)) than by the RCPath system (11.5 (range 9.3–15)).

Conclusions: The RCPath system of scoring is inherently complex, is applied retrospectively and is not consistent across subspecialties. The Warwick system is simpler, prospective and can be run by technical staff; it facilitates even workload distribution throughout the day. Subspecialisation within a small-sized or medium-sized department with fair distribution of work between pathologists is also allowed for by this system. Reporting times among pathologists were shown by time and motion studies to be more consistent with Warwick points per hour than with RCPath points per hour.

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The old Royal College of Pathologists' (RCPath) workload guidelines, initially published in 1992, were based on numbers of requests or specimens and recommended annual workload maxima of 4000 histopathology surgical specimens, 6000 cytopathology specimens or 600 autopsies per whole-time equivalent district general hospital (DGH) consultant. These maxima reduced to 2000, 3000 and 300 for consultants in teaching hospitals, reflecting teaching and research input.¹ Rapid changes in clinical practice, however, took place through the 1990s, including the Calman-Hine cancer initiatives, the development of minimum reporting datasets for cancer and non-cancer cases, and the development of multidisciplinary team meetings for cancer sites. The number of information items in a histopathology report is reported to have increased twofold between 1940 and 1990.² Increasing workloads and poor recruitment and retention of junior and consultant pathologists has placed huge pressures on consultant time. Defining and monitoring excessive individual workloads and enabling fair workload distribution among colleagues have become major issues in many cellular pathology departments.³ A trend towards site-specific specialised reporting has also been observed in many larger

departments. Balancing workload in these departments is a particular problem and is perceived as an issue precluding specialisation, particularly in smaller DGHs.

To deal with the specimen complexity issue, the RCPath produced a document—*Guidelines on staffing and workload for histopathology and cytopathology departments*—in July 2003 following a period of consultation on draft guidelines.⁴ The guidelines aim to

- provide a mechanism for assessing an individual's workload;
- ensure that workload is not excessive and reduce errors related to overload;
- reassure the public that appropriate workforce resources are devoted to reporting pathology specimens;
- enable equitable distribution of work in the department with regard to varying specimen complexity;

Abbreviations: BMS, biomedical scientist; DGH, district general hospital; MDTM, multidisciplinary team meetings; MLA, medical laboratory assistant; RCPath, Royal College of Pathologists

- produce scores equivalent to units of time or consultant sessions;
- facilitate workforce planning;
- assist pathologists in job planning; and
- assist appraisal by providing documentation.

Warwick Hospital is a medium-sized DGH receiving a broad range of specimens for cytology and histopathology studies (excluding major cardiothoracic surgery, perinatal, paediatric, non-neoplastic kidney and neuropathological specimens). The overall case load in cellular pathology (for 2003) was roughly 11 500 histopathology, 1400 non-gynaecology and 22 000 gynaecology specimens and 20 hospital autopsies per annum, with the full consultant staffing of 4.6 whole-time equivalent cellular pathologists and one advanced practitioner in cytopathology closely reflecting the recommended staffing levels under the old system of the RCPATH.² The need for a workload allocation system initially arose from the inability to recruit to a consultant vacancy and the requirement for distributing the additional resulting workload equitably among the remaining consultants. A subsequent move towards subspecialisation in the department was prompted by the appointment of a subspecialised consultant pathologist from a large teaching hospital. Although draft guidelines from the Royal College were available for consultation, this system did not allow specimens to be allocated prospectively. Therefore, redesigning of the Warwick allocation system was undertaken to account for specimen complexity and subspecialisation. It was chosen for its simplicity and the advantage that specimens could be allocated to categories by the laboratory staff.

The Warwick system was audited in October 2003 and is presented here with a time and motion study; a comparison of the system with the RCPATH system is also presented. The Warwick system has subsequently been used to develop a generic departmental-based job plan for individual consultant pathologists. The objectives of the Warwick system are similar to those of the RCPATH, stated earlier. The additional objectives of the Warwick system are to

- allow allocation of work to be done prospectively and by laboratory staff;
- allow for subspecialisation from minor redistribution to full subspecialisation;
- account for part-time and full-time working;
- incorporate flexibility in allocation when one or more colleagues are on leave, either expected or unexpected;
- continuously, prospectively and fairly distribute work on a day-to-day basis;
- be flexible to changing roles in department; and
- be simple to audit.

METHODS

- *Step 1.* Complexity categories were agreed on for all the different types of specimens commonly received by the department on a specialty basis (fig 1A). For ease of use the specialties were colour coded as follows: breast, blue; hospital skin, yellow; urology, green; female genital tract, pink; gastrointestinal tract, purple; ear, nose and throat (ENT), light brown; and general pool, white.
- *Step 2.* As a guide to the biomedical scientist (BMS) staff for the day-to-day running of the system, specialist teams were set up and the proposed percentage of work within a speciality to be allocated to individual consultant staff was agreed and documented (fig 1B).

- *Step 3.* On receipt, specimen request forms were allocated to a specialty code (fig 1 lower panel) and each specimen container (per request form) was scored on the basis of the complexity category (fig 1A) by the technical staff, which determines the overall score to be allocated to the request form. The tables in figs 1A,B were made available in the cut-up room, on a single laminated A4 sheet, for reference during allocation by the laboratory technical staff.
- *Step 4.* A running daily and weekly total of workload points was kept for each consultant pathologist on a single A4 spreadsheet for each week, including a column for each consultant and a row for each weekday.

The final guidelines from the RCPATH were used to roughly correlate the two systems in terms of overall complexity or time of reporting. For example, placentas, originally category 2 (2 Warwick points) specimens in the Warwick system, were moved to category 3 (scoring 4 Warwick points). Rarely encountered specimens and clarification relating to common specimens were listed by specialty in a more detailed document, which was similar to that used in appendix 3 of the RCPATH guidelines⁴ and was available in the laboratory cut-up room.

ALLOWANCE FOR CYTOPATHOLOGY

All cytopathology specimens (gynaecological or non-gynaecological) reported by the consultants were, for simplicity, considered to be equivalent to category 1 histopathology specimens (1 point per case). On the basis of the annual workload figures, there were eight cases per day. To account for the added complexity of some cytology cases (compared with category 1 histology cases), we added 20% to this workload, splitting 10 points per working day between the two cytopathologists.

Allowance for leave or non-working days

For each day of leave, or non-working day for the part-time pathologist, 25 points were allocated to the pathologist who was not present, representing an average daily workload per working consultant at the time of the audit.

Allocation of specimens by technical staff

Using a single A4 worksheet for each week, the technical staff recorded the "running score" for each pathologist on a daily basis. The running scores and workload allocation for each pathologist could be seen at a glance. The laboratory staff allocated less work to the pathologists with the highest running scores while following the principle of specialist teams for the allocation. Allocation was done by medical laboratory assistants (MLAs) and BMS. The laboratory staff allocated specimens according to the categories in fig 1, placing a code representing the specialty and total Warwick points for each request form (representing the sum of the scores for each specimen container) on the bottom right corner of the request form at allocation.

Audit

The pathologists collected their authorised request forms for October. They retrospectively allocated their RCPATH score and double-checked the Warwick score assigned by the technical staff at allocation. The macroscopic part of the RCPATH score was excluded from the pathologist's score if the specimen had been described or cut-up by a BMS.

Time and motion

Four of the five pathologists recorded their total time for cutting up (including preview or review of BMS cut-up) and reporting or authorising reports for October.

Specimen categories by specialty	
Cat 0: Score 0	Cat 3: Score 4
Hospital sterilisation (G0); private cases (P0)	Bone marrow trephine; lymph node or spleen
Outside referrals (R0)	lymphoma. Frozen sections (e.g. Hip capsule),
Cat 1: Score 1	Warwick derived referrals (R4)
Bronchial/pleural biopsy, fluid/clot (G0)	Cervix: LLETZ/cone bx, Ovarian tumour;
Appendix, foreskin, gall bladder, GP skin,	Placenta; Uterus+BSO non malignant
Soft tissue: lipoma, synovial bx, neuroma	thyroid gland
Temporal artery, peritoneal bx	Bowel: Diverticular/ischaemic (not cancer
Bladder bx, appendix testis, epididymal cysts,	resection or major CIBD resection)
glans penis	Liver biopsy: inflammatory
Cervical bx/polyp, endometrial sample,	Skin: Orientated or melanoma/lymphoma
POC, fluid clot, vulval, vaginal bx	Breast: Simple lumpectomy for Ca
ENT biopsy: middle ear bx, PNS, larynx, oral,	(unorientated specimens)
nasal polyps, Benign tonsils, pharynx	Cat 4: Score 8
GIT endoscopic bx/GIT polyps, anal, perianal;	Testis, Kidney or penectomy: malignant
Bowel donuts	Malignant uterus+BSO; vulvectomy
Skin Hospital: basic	Larynx or neck dissection
Cat 2: Score 2	Colon: Malignant or resection for CIBD
Bone including femoral head, lymph node or	Stomach or oesophagectomy
spleen (not lymphoma), needle core bx (not	Breast: Mastectomy/wide local excision: for
inflammatory liver), by specialty	Ca (orientated/wire guided specimens)
Prostate needle core; TURP; TURBT; testis	Cat 5: Score 10
or kidney: non malignant	Cystectomy/bladder (+/- uterus and prostate
Vulval neoplasia excision; simple	attached)
Hysterectomy/fibroids, omentum	Mastectomy or wide local excision with axillary
Ovary+/-Fallopian tube: simple cysts and	nodes attached
dermoid; ectopic; inflammation, LLETZ parts	Larynx with attached neck dissection
Salivary gland	Frozen sections for skin cancer margins
Axillary/groin node clearance (not breast);	Table 1b: Proposed specialty
reduction, cavity margins; gynaecomastia	teams/allocation by pathologist
Breast: needle cores, benign lumpectomy	Breast: II (33%); IV (33%); V (33%)
Skin hospital: excision for BCC, SCC, skin	ENT: I (75%); III (25%); II (B/U)
atypical/dysplastic naevus or Inflammatory	GIT: III (70%); IV (15%); V (15%)
disease	Gynae: IV (50%); II (25%); V (25%)
	Hospital Skin: I (70%); III (30%)
	Urology: V (35%); I (35%); II (30%)
	General: All (to balance work day to day)
Specialty codes: Breast (B); ENT (E); GIT (I); gynae (F); skin (S); urol (U); general (G); haematopathology (H)	
Special codes/scores: Cytology fluid clots (G1); haematopathology cases (H4); Warwick Hospital request for	
slide review score 4 points and allocate by specialty (R4). Referral from outside pathologist, i.e. not Warwick	
patient (R0); private patient: P0; hospital sterilisation: G0.	
Abbreviations: BCC, basal cell carcinoma; BSO, bilateral salpingoophorectomy; Bx, biopsy; Ca, cancer; CIBD	
chronic inflammatory bowel disease; GP, general practitioner; LLETZ, wire loop excision of cervix; PNS, postnasal	
space; POC, products of conception; SCC, squamous cell carcinoma; TURP, transurethral resection of prostate;	
TURBT, transurethral resection of bladder tumour.	

Figure 1 Specimen categories by specialty.

Feedback

The system of allocation was assessed subjectively by feedback received from laboratory technical staff and pathologists.

RESULTS

The consultant pathologists did not report the same total workloads as there were differences between the running Warwick scores at the beginning of the month. The prospective laboratory allocation was identical to the pathologists' retrospectively audited data for two pathologists and similar for three pathologists (-17, -2 and 7). Excluding

cytology, the prospective total laboratory score for histopathology allocation of 2002 Warwick points was only 1.1% greater than the retrospective total score from the pathologists' audit.

The lower part of table 1 shows the summary of the time and motion study, indicating that the pathologists reported a fairly similar number of Warwick points per hour (range 5.5–6.9, mean 6.3). Greater variation was seen in the number of RCPATH points reported per hour (range 9.3–15.0) with an average of 11.5 RCPATH per hour.

Figure 2 shows that hospital skin, urology and non-gynaecological cytology would represent a greater proportion

Table 1 Summary of Warwick points, Royal College of Pathologists (RCPath) points and time and motion study

Pathologist	I	II	III	IV	V	Total
Non-working or leave days (Oct 2003)	2	5	2.5	1	12	22.5
Total Warwick score including non-working days and actual cytology work by pathologists' audit (Oct 2003)	528	528	582	534	600	
Total RCPath score for histopathology (Oct 2003): pathologists' audit	1036	723	981	873	473	4086
Hours of reporting/cut-up	69	ND	84	93.9	44.5	291.4
Warwick points/hour	6.9	ND	6.2	5.5	6.7	6.3 *
RCPath points/hour	15.0	ND	11.7	9.3	10.6	11.5 *
RCPath points per Warwick point	2.2	1.8	1.9	1.7	1.6	1.8 *

Pathologists I (dermatopathology/ENT lead) and III (GIT lead): histopathology only, full-time. Pathologists II (breast lead) and IV (cytology/gynaecology lead): histocytopathologists, full-time. Pathologist V (urology lead): part-time. ND, not done.

*Mean.

of the laboratory work according to the RCPath system, whereas gynaecological and breast pathology represent a greater proportion of overall laboratory work according to the Warwick system.

The audit of Warwick points was found to be relatively straightforward as the criteria for designation of work category and specialty (a single A4 sheet) were rarely different between laboratory and pathologist. Although not formally audited in this study, there were clearly apparent differences between individual pathologists in their approach to scoring their cases using the RCPath system. The laboratory staff were initially concerned by the increased complexity of the allocation system according to specialty and category score. In practice, however, both MLA and BMS staff quickly adapted to the new system, which they found to be both fair and explicit. It proved to be relatively easy to allocate work according to the subspecialist teams. The audit confirmed a close agreement between their prospective allocation and the retrospective assessment by the pathologists.

DISCUSSION

Annual workload guidelines based on specimen numbers¹ are unable to reflect accurately the variety of work and the variable complexity of different types of specimens reported by individual consultants and do not permit a comparison between general and specialist pathologists. Welcan units have been the traditional measure of the non-medical

laboratory workload, but do not reflect the true workload of histopathologists.⁵ The new RCPath⁴ system and the Warwick system presented here allow workload to be assessed by specialty and complexity, representing a major step forward. The systems assume the participation of pathologists in training to be neutral to the overall work of the department and individual consultant pathologists. Some fundamental differences in the systems do, however, exist, which, make the Warwick system more practical for day-to-day use.

The first fundamental difference is that the RCPath system separates the macroscopic (cut-up) part from the remainder of the reporting process. This difference roughly doubles the complexity of the RCPath system compared with the Warwick system. The Warwick system assumes that BMS cut-up benefits all areas of specialisation and can be incorporated into a simple five-category system. The Warwick system encourages pathologists to make maximal use of BMS cut-up, as it represents a clear gain in terms of time taken to report a case, which will not affect their total allocation of work. BMS cut-up was only partially instituted during the audit period and future audits will be undertaken to monitor this situation. Having experienced the system in practice, the technical staff carrying out the specimen allocation found it to be simpler than expected and generally feel positive about this change. The additional level of complexity incorporating cut-up could be considered unnecessary, difficult and frustrating in practice, and therefore counterproductive.

A second fundamental difference exists between the two systems in the approach to the scoring of cases. The RCPath system is based on individual requests (which may have any number of specimens per request). The score for a particular request may depend on the diagnosis and number of blocks, sections, levels and special stains. This difference also roughly doubles the complexity of the RCPath system and makes it difficult for a non-medically trained third party to audit the workload independently. The Warwick system scores each specimen container, but assumes an average reporting time for the type of specimen irrespective of the final diagnosis, number of levels or blocks, or special stains requested. The RCPath system allows for a situation whereby pathologists carrying out more levels and special stains than their colleagues will be assessed as having carried out more work. These two fundamental differences render the RCPath system complex and retrospective, as highlighted by an audit showing a 39% error rate in pathologist self-allocated RCPath score.⁶

Both MLA and BMS staff found the Warwick system to be simple to apply. The system continuously allows work to be prospectively allocated. This is done equitably and by subspecialty. The audit confirmed few discrepancies for individual cases and little difference in overall score for 1 calendar month when comparing the allocation by technical staff and the pathologists' retrospective audit. We are

Figure 2 A comparison of assessment of total workload by specialty is shown comparing RCPath system scores (blue) with Warwick system scores (maroon). Discrepancies between the two systems are seen—for example, hospital skin is scored more generously in the RCPath system whereas breast pathology is scored more generously in the Warwick system. ENT, ear, nose and throat; GIT, gastrointestinal; gynae, gynaecology; NG, non-gynaecological; RCPath, Royal College of Pathologists.

confident that future audit can use the prospectively allocated scores, which are now coded into the laboratory computer system consisting of a single letter (specialty code) and number (time-related score) for each request form. Future audits can be undertaken by anyone irrespective of any knowledge of cellular pathology. Our secretaries now place the allocated codes directly into the coding section of the Telepath system so that the workload and distribution can be assessed. With our result of 6.3 Warwick points per reporting hour, any individual pathologist (or the whole department) can, in a few hours, have an entire breakdown of 1 month's workload by specialty and the estimated hours of reporting time to support their job planning.

The Warwick system took a simple approach to scoring cytopathology (1 point per case with an additional 20% added for complexity), because in general the work was equally divided between the two pathologists reporting this area. This suited us locally, but in practice the actual work allocated can be recorded daily in the laboratory allocation sheet.

To continuously make work allocation prospective, equitable part-time work and leave need to be incorporated into the system. We did this again rather simplistically by dividing the average daily workload received in Warwick points by the average daily staffing—that is, corrected for leave. During the audit period this was 25 points added to the pathologists' score for each non-working day. This aspect of the Warwick system ensures that pathologists on leave roughly keep pace with their colleagues' running scores and excludes any incentive to take leave during busy periods of the year. In practice, it also means that there has been less resistance to having more than one colleague on leave. Although the remaining pathologists are busier, they go ahead in the running scores and know that they will have a relatively quieter period when their colleagues return. The system also means that pathologists can request light allocation before taking leave, or that work (and the associated scores) can be readily transferred among colleagues when a colleague is unexpectedly sick.

We have subsequently incorporated the time for preparation and attending multidisciplinary team meetings (MDTMs) into the points system, following an audit of time taken for these activities. For example, average time for preparation, attendance and documentation for the breast MDTM was 4.5 h (equivalent to $4.5 \times 6.3 = 28.4$ Warwick points). We rounded up the equivalent points to 30 in the case of the breast MDTM, to account for extra work related to the lead role as it is presumed that the lead pathologist attends most of the MDTMs in their specialty. The consultant attending the breast MDTM is therefore given 30 points on the day of the meeting. The system has been used to develop a departmental-based job plan for each consultant incorporating non-clinical roles, such as head of department, audit lead, teaching and educational supervisor, into the scoring system to include all the activities in consultant job plans. For example, the role of head of department is considered to require 4 h per week to carry out the role effectively. To

account for this, the head of the department is allocated an additional 5 points per working day (equivalent to 4 h service work per week—that is, $4 \times 6.3 = 25$ Warwick points). We negotiated the departmental workload, including non-clinical activities, collectively and then allocated the roles in the individual consultant job plans, which determined the "starter" points consultants receive on working days (resulting in an increase of 40 points for non-working days). This approach proved transparent to the employing trust and the individual consultants and had the benefit of being based on objective audit rather than on an individual's personal estimates. In our trust, the few hospital autopsies that are carried out are equally distributed among the consultants; so we have not included them specifically in the points system. Our local agreement is that coroner's autopsies are not included in our NHS job plans. An average time to carry out an autopsy may, however, be converted to Warwick points and included in an individual's job plan.

CONCLUSION

We have reported the Warwick workload allocation system for cellular pathology and outlined the reasons why we feel the system has advantages over the recently published RCPATH system. Implementation of this workload system has enabled day-to-day equitable distribution of service workload between individual consultants within our department, supported a move to subspecialised working and formed the basis of a generic departmental consultant job plan. We would recommend the system to colleagues in the UK and have provided a step-by-step account to aid implementation.

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