ORIGINAL ARTICLE

Continuing education for pathology laboratory technologists: a needs analysis in a Singapore teaching hospital

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Background/Aims: Continuing education is important to laboratory technologists. It helps them keep pace with the advances in medicine and pathology and thus to provide quality service. A survey was conducted to assess the attitudes of pathology laboratory technologists towards different educational activities.

Methods: Relevant continuing education activities include lectures, case discussions, journal clubs, short courses, scientific conferences and higher educational courses. Technologists were asked for their views on these various activities, scoring each item 1–5 out of 5.

Results: The response rate was 66% (19/29); respondents' work experience ranged from <3 years to >20 years. Short courses was rated the most highly; 89% of respondents considered them good/excellent. General medical knowledge and the methods and rationale of key histopathology procedures were the preferred lecture topics. Most respondents (58%) were interested (4–5/5) to have their own journal club. 84% of respondents were fairly keen/keen (4–5/5) to participate in conferences. 74% responded that they were fairly keen/keen to consider pursuing higher education. 84% were fairly keen/keen to upgrade themselves and to assume higher responsibilities.

Discussion: The results indicate a positive outlook of technologists towards continuing education. The planning of future lecture topics has taken into account their preferences, and talks on the pursuit of higher education have been organised. It is hoped that these measures and others, will help boost the usefulness of continuing education and enhance the work environment.

Continuing education for pathology laboratory technologists is important as it helps them to maintain a high level of proficiency in their work.^{1–3} As in all of medicine, the progress of pathology is inexorable, influenced particularly by the advent of newer immunological and molecular techniques. By participating in a continuing education programme, technologists will be exposed to current trends in laboratory research and practice and thus be able to keep pace with advances in their areas of expertise.^{1 2}

Continuing education can be defined as ongoing learning activities that improve the participants' performance at work through the development of knowledge, skills and attitudes.³ Many tools of continuing education exist in pathology laboratories. These include in-house lectures, short courses, safety sessions, quality assurance programmes and journal clubs. They have their respective strengths and also provide variety for the continuing education programme of pathology laboratories. Seeking the views of technologists on the kind of continuing education activities they like makes good sense as it enables a relevant education programme to be planned accordingly, thereby enhancing participation.^{1 4 5} We devised a comprehensive questionnaire survey to assess what our technologists really wanted in a continuing education programme. We were also keen to assess the attitudes of technologists towards performing research projects and the undertaking of higher education and responsibilities, since these activities may also be considered as being part of continuing education.³

METHODS

Our Department of Pathology at the National University Hospital, Singapore, provides a diagnostic service for our 900+ bed acute-care tertiary teaching hospital and the surrounding western region of Singapore. Our routine histopathology and cytopathology service is backed by ancillary facilities for

immunohistochemistry, immunofluorescence and electron microscopy. At the time of our survey in early 2004, we had a total of 29 technologists. The majority (about two-thirds) are histotechnologists working in the routine histopathology laboratory, while the remaining one-third comprised cytotechnologists and technologists working in the immunohistochemical and electron microscopy sections.

With regards to their work experience, 6 (32%) had <3 years of laboratory experience, 4 (21%) had 3–10 years of experience, 2 (10%) had 11–20 years of experience and 7 (37%) had >20 years of experience. Most of our technologists had, as their highest qualification, a diploma in medical laboratory technology or a related discipline, while a handful had bachelor degrees in science.

A questionnaire survey was designed to assess the attitudes of our technologists towards the various continuing education tools. They were asked to rate from a score of 1 to 5 (1, poor; 2, below average; 3, average; 4, good; 5, excellent) lectures, short courses, safety demonstrations, case studies and work improvement projects, all of which have been traditional continuing education activities in our department. For lecture topics, they were also asked to rate (from 1 to 5) the perceived value of the following topics: methods and rationale of key histopathology procedures (eg, handling of particular specimen at cut-up); topics of general medical knowledge; and molecular advances in pathology. In addition, they were also asked to rate from 1 to 5 (1, not keen; 2, below average; 3, average; 4, fairly keen; 5, keen) their enthusiasm to participate in journal clubs, conferences, research projects, furthering their education (eg, pursuing degree courses) and higher responsibilities as a biomedical scientist/scientific officer, if given the opportunity. Ample opportunity was also provided for free text comments within the questionnaire.

The survey was anonymous and participation voluntary. The overall response rate was 66% (19/29). Statistical analysis using

Table 1 Approval scores for the various continuing education tools

	Short courses (%)	Lectures (%)	Work improvement projects (%)	Safety demonstrations (%)	Case studies (%)
Score 1	0	0	1 (5%)	0	0
Score 2	0	0	0	0	1 (5%)
Score 3	2 (11%)	4 (21%)	10 (53%)	9 (47%)	6 (31%)
Score 4	7 (37%)	14 (74%)	7 (37%)	8 (42%)	10 (53%)
Score 5	10 (52%)	1 (5%)	1 (5%)	2 (11%)	2 (11%)
Total	19	19	19	19	19

the χ^2 test of differences was used to assess for possible differences in the proportions of responses obtained (Microsoft Excel 2003).

RESULTS

Short courses were rated the most highly of all the continuing education tools (table 1). Eighty-nine per cent of technologists considered them to be good/excellent. This compares with the corresponding figures of 79% for lectures, 53% for safety demonstrations, 64% for case studies and 42% for work improvement projects ($p = 0.013$).

For lectures, topics of general medical knowledge and handling of specimen were favoured over updates on molecular pathology (74% and 72% versus 41% respectively, considering it good/excellent topics) ($p = 0.025$) (table 2).

Forty-seven per cent of technologists were fairly keen/keen (score 4–5 out of 5) to participate in journal clubs that have been attended by registrars/pathologists. A greater percentage (58%) were fairly keen/keen to have their own journal clubs ($p < 0.001$) (table 3).

Technologists also appeared to want to attend medical and pathology conferences, with 84% fairly keen/keen to participate. Sixty-nine per cent of technologists were fairly keen/keen to undertake research projects and to present the findings in such conferences if given the opportunity (table 3).

Seventy-four per cent of technologists were fairly keen/keen to pursue courses to upgrade their qualifications, for example, attaining a degree. Finally, 84% of technologists were fairly keen/keen to undertake higher responsibilities as a biomedical scientist/scientific officer, should they be suitably qualified and trained (table 3).

DISCUSSION

This study shows positive attitudes of our technologists towards continuing education. As can be seen from table 1, a high percentage of technologists thought the existing programme was good/excellent. They were also keen to undertake higher education when there is opportunity. These observations bode well for the long term outlook of the laboratory, as continuing education in its various forms is crucial to the continued improvements of laboratory standards.

Table 2 Approval scores for the various lecture topics

	Specimen handling (%)	General medical knowledge (%)	Molecular pathology (%)
Score 1	0	0	2 (12%)
Score 2	0	0	0 (0%)
Score 3	5 (28%)	5 (26%)	8 (47%)
Score 4	11 (61%)	11 (58%)	5 (29%)
Score 5	2 (11%)	3 (16%)	2 (12%)
Total	18	19	17

Short courses were the favoured continuing education tools of our technologists. Notable courses recently organised included a 3-day diagnostic cytopathology workshop, a 2-day immunohistochemistry course and a 5-day liquid-based gynaecological-cytology course. Such courses focus on important update areas for technologists and are often of reasonable cost. When accommodated by work priorities, protected time away from laboratory work can usually be arranged to attend such courses. In liquid-based gynaecological-cytology, a large review by the College of American Pathologists showed that training courses and certification helped to reduce the diagnostic discordance rates in interlaboratory comparison programmes.⁶ An interesting course recently conducted was a workplace ergonomics course, organised by our hospital's occupational therapists. Poor work ergonomics had previously been shown to lead to 85% of technologists having musculoskeletal problems of one form or another.⁷ Hopefully, a greater awareness of such issues will lead to a work-life that is not only effective but healthier.

Lectures had a fairly high rate of approval and are easily organised. Of some surprise, our technologists preferred topics of general medical knowledge and handling of specimen over cutting-edge topics on molecular pathology. This might reflect the current work-scope of technologists working in a routine histopathology and cytology laboratory like ours, where the former topics are considered of more practical importance to them and where molecular diagnostic techniques are still in their infancy in routine practice. This is likely to contrast with our associates in the neighbouring molecular diagnostic centre where molecular diagnostic training tools would of course be directly relevant.⁸ Nevertheless, some exposure to such topics will still be desirable as there will be ongoing advances and increasing application of molecular techniques to routine histopathology practice.

Safety demonstrations and work improvement projects received relatively lower approval scores. To stimulate interest, case scenario studies were introduced and allowed groups of technologists to discuss cases highlighting specific and relevant safety issues in the laboratory. These were supplemented with a hands-on safety refresher course that required technologists to respond to simulated hazardous situations, for example chemical or biological spills, while under observation by peers. After-action reviews then enabled useful lessons to be learnt. Notably, case studies and hands-on activities were the preferred learning tools by technologists surveyed in a previous study by Fritsma *et al.*¹ These tools are of particular use in smaller groups of participants and could easily be applied in most histopathology laboratories.

Some of the technologists had also highlighted as free text comments that they were interested in having histopathology and cytology slide sessions organised for them as part of the continuing education programme. As such, these slide sessions have been arranged with both pathologists and registrars contributing presentations. Such sessions provide an opportunity

Table 3 Approval scores for other academic and professional pursuits

	Journal club (%)	Journal club (tech.) (%)	Conference (%)	Research projects (%)	Pursue a degree (%)	Higher duties (%)
Score 1	1 (5%)	0	0	0	2 (10%)	1 (5%)
Score 2	3 (16%)	1 (5%)	0	1 (5%)	0	0
Score 3	6 (32%)	7 (37%)	3 (16%)	5 (26%)	3 (16%)	2 (11%)
Score 4	5 (26%)	5 (26%)	5 (26%)	4 (21%)	4 (21%)	4 (21%)
Score 5	4 (21%)	6 (32%)	11 (58%)	9 (48%)	10 (53%)	12 (63%)
Total	19	19	19	19	19	19

for technologists to not only appreciate the importance of their technical work to the diagnostic process but also to be aware of some of the fundamentals of diagnostic histopathology. From informal feedback received, these sessions have been well received.

Some of our technologists liked the idea of participating in journal clubs and pathology update sessions. In our department, these monthly sessions are either timely reviews of important topics or updates of research work by registrars and PhD students, and they have been traditionally attended by pathologists, registrars and scientists. With the awareness of the results of this survey, these sessions are publicised actively to the technologists as well. Their degree of attendance has been modest. We know from the survey results that the technologists were keener to have their own dedicated journal club. Two notable reasons that were given in the survey were that they felt more comfortable attending their own journal clubs, and they could also arrange topics that were more relevant for them. Such journal clubs are being explored.

Our survey also showed that most technologists would like to attend medical and pathology conferences (84%). Fewer (69%) were fairly keen/keen to perform research projects and to present their findings at suitable meetings. Both activities are certainly encouraged, but the latter would be particularly challenging to implement in our context, given their heavy routine laboratory duties and the fact that technologists have traditionally played supportive roles in the research work of scientists and pathologists. An example of research work that one of our technologists has been actively engaged in involves the use of double immunostaining techniques to delineate pleural fluid adenocarcinoma and mesothelioma cells.⁹ In the area of educational research, another technologist has been developing a web-based teach and test gynaecological-cytopathology computer program.¹⁰ The latter project aims to introduce a convenient and interactive way for cytotechnologists to engage in online tutorials and self-assessment from the comfort of their own laboratory workstations or home computers. It is hoped that such projects will add an interesting dimension to the work of technologists.

Take-home messages

- Short courses are rated the most highly of the continuing education tools.
- General medical knowledge and methods/rationale of key histopathology procedures are the preferred lecture topics.
- Awareness of the needs of technologists can help in the planning and implementation of a more effective continuing education programme.

Many technologists welcomed the idea of undergoing higher education. This desire to upgrade themselves is to be lauded, and an educational talk given by a senior technologist of ours who is currently in the process of pursuing a part-time Bachelor of Science course has been organised. It is hoped that the other technologists would get an idea of the challenges, sacrifices and benefits of such an endeavour. Interestingly, a study by Karp *et al* in 1979 showed that baccalaureate degrees had greater perceived impact by the technologists than by their medical directors.¹¹ However, the perceived impact on the technologists was more in relation to career mobility than on professional status and salaries. Clearly, soul-searching is needed with regard to this issue, and a genuine effort to support the academic spirit of our technologists would be in order.

In some developed countries, such as the UK, technologists armed with a degree and with suitable training may undertake higher responsibilities as biomedical scientists or scientific officers. In histopathology, such personnel may undertake cut-up of gross specimens.¹² In cytology, advanced practitioners perform not only the role of the secondary screener or supervisor, but also report abnormal gynaecological-cytology cases.¹³ In Singapore, although such schemes are not yet available, our technologists seem open to the idea of taking up these higher responsibilities should they be given the opportunity and can be remunerated accordingly. Given the worldwide shortage of pathologists, these measures can help alleviate the heavy workload of diagnostic pathology laboratories. In Japan, Iwatani noted that such well-trained technologists can perform some of the work of clinical laboratory physicians and help to further develop laboratory medicine.¹⁴

Finally, with enhanced continuing education measures in place, what is required is the proper documentation of these continuing education activities.^{3 15} This would serve as a record of a laboratory's teaching activities and can be audited as part of laboratory accreditation programmes.¹⁵ In a South Australian centre, technologists also keep a personal diary of their continuing education activities.¹⁶ This may help enhance a sense of ownership and pride in the continuing education programme by technologists, culminating in active participation. It is hoped that the ongoing improvements in continuing education will help enhance the work environment of pathology laboratory technologists and spur them on in their careers.

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