

Trends and Challenges in Pathology Practice

Choices and necessities

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الاتجاهات والتحديات في ممارسة علم الأمراض خيارات وضرورات

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المخلص: تتأثر الطريقة التي نقدم بها الرعاية الصحية بالتجارب الجارية، وزيادة المعرفة والاكتشافات الجديدة وكذلك التقدم العلمي والتكنولوجي، وقد أثرت الوتيرة السريعة من التطورات الهامة التي حدثت في السنوات الأخيرة بشكل ملحوظ خياراتنا من الطرق التي نقدم من خلالها خدماتنا الصحية. ومثل غيرها من التخصصات الطبية اضطر علم الأمراض وممارسته إلى الاستجابة للاحتياجات المتزايدة والتحديات في الخدمات الصحية بصفة عامة، وتلك التي تواجه هذا التخصص على وجه الخصوص. تتناول هذه المقالة بعض التحديات، ولاسيما تلك التي تخص علم الأمراض بشكل خاص، ونناقش الخيارات المتاحة لمختلف أقسام علم الأمراض اعتماداً على ظروفها الفردية.

مفتاح الكلمات: علم الأمراض. التخصص. اجتماعات فريق متعدد التخصصات. تشريح الجثة. مقاطع مجمدة. علم الخلايا.

ABSTRACT: The way we provide healthcare is influenced by ongoing experiences, increased knowledge, new discoveries and scientific as well as technological advances. The rapid pace of important developments that have taken place in recent years have significantly influenced our choices of the ways we provide our health service. Like other medical specialties, pathology and its practice have had to respond to the rising needs and challenges within the health service in general and those facing the speciality in particular. This article addresses some of the challenges, particularly those which are unique to pathology. It discusses the choices that are available to different pathology departments depending on their individual circumstances.

Keywords: Pathology; Specialisation; Multidisciplinary team meetings; Autopsy; Frozen sections; Cytology

ADVANCES IN MEDICINE AND HEALTH care are influenced by technological achievements, information technology and evolving new knowledge and discoveries. These, in turn, change the way in which we practise and provide health care. The changes not only influence the practice within the various medical specialities, but they also influence the way those specialities interact with each other. The latter can not be more obvious than in supporting clinical services such as radiology and pathology.

Reasons for Changing Trends and Rising Challenges within Pathology

In addition to the changes outlined above, pathology practice has also been faced with its own changes. These have both necessitated considering new

trends and also raised challenges in the way the service is delivered. Among these are: 1) increased demand for pathology services;¹ in diagnostic surgical pathology this has not only been in order to deal with the increased number of biopsies, but also to comply with guidelines for cancer case reporting^{2,3} and with the various recommendations of specimen handling and additional testing;⁴ 2) the need to improve turnaround time as a critical element in clinical management;⁵ 3) the need to comply with the statutory requirements of the various laboratory accreditation and quality assurance regulatory bodies; 4) the rising trend of subspecialisation within the clinical specialities;⁶ 5) the introduction of the principle of multidisciplinary team meetings for the management of cancer patients;⁷ 6) the decline in the number of autopsies; 7) the explosion in the number of rapidly evolving new techniques, and 8) advances in information technology and digital imaging.^{8,9}

For these reasons, it was inevitable that the various aspects of the pathology service would need to respond to these challenges and to change the way that they deliver their services. Some of those challenges and the choices of solutions are discussed here as follows: subspecialisation in the diagnostic surgical pathology service and cytology; frozen sections; the autopsy; multidisciplinary team meetings; ancillary techniques; the pathology report and some other administrative duties. However, first, a brief reference to the pathology service users and their contribution in shaping the service is warranted.

Pathology Service Users

Any changes to the pathology service should ultimately take into consideration the needs of the service users. It is appropriate, therefore, to highlight first who are the main users of pathology services and how they contribute to the changing trends and the challenges that face the specialty. The main users of the pathology service include surgeons, oncologists, gynaecologists, hospital physicians, radiologists, general practitioners, students and various research groups.

Surgical specialties, including gynaecology, continue to be the major service users of the histopathology service and therefore remain the main drivers of the changes to service delivery and provision. It was the move of general surgery into various surgical subspecialties⁶ that originally drove the histopathology service to follow suit. As surgical techniques and approaches develop and progress, the histopathology service should be able to adapt and respond to rising needs and demands. This requires close interaction and better sustained communications between the pathologists and their various surgical colleagues. Equally, newly developed techniques and new knowledge within the various subspecialties of pathology need to be communicated to our surgical colleagues to explain how these new developments can contribute to the management and care of patients.

Radiologists are not strictly speaking service users, but they are increasingly providers of pathology material on behalf of other service users. In recent decades, they have contributed to important changes that happened within histopathology. On the one hand, advanced imaging techniques have

improved significantly the accuracy of premortem diagnosis thus significantly decreasing the need for hospital autopsies and contributing to the decline in autopsy numbers. On the other hand, the accessibility by modern radiological techniques to various sites in the body and the provision of cytology or biopsy material from previously difficult^{10,11} or inaccessible locations has contributed to: 1) increasing the number of biopsies and consequently the pathologist's workload; 2) better accuracy and adequacy of sampling of the targeted lesion; 3) understanding and unravelling of new pathological entities, and 4) better pathological staging of cancer cases and improved clinicopathological correlation.

The contribution of our oncologist colleagues in influencing the way we report cancer cases should also not be underestimated. They contributed significantly to the present format of cancer management and were instrumental in the establishment of multidisciplinary team meetings. Their input on the required contents in synoptic reporting and in minimal data sets as well as checklists and guidelines^{2,3} can not be overestimated.

The Diagnostic Surgical Pathology Service

In recent years, one of the most important developments that has changed the diagnostic surgical pathology service is the move towards subspecialisation in departments where the pathologists used to provide a general diagnostic service. This means that each pathologist now provides services only within one or very few subspecialties. For example, some pathologists report only on breast pathology, others specialise in gastrointestinal (GI) pathology or soft tissue diseases etc. Pathology subspecialisation has existed for a long time in some subspecialties such as paediatrics and neuropathology, but it has only recently spread into all other subspecialties, particularly within large teaching departments and big referral centres.

Subspecialisation in pathology was seen as the natural response to the move to subspecialisation in surgery and as a solution to the problem of increasing workload, whether due to increased numbers of biopsies or the increased reporting requirements for various cancer and non-cancer

cases.¹² It also seemed a natural progression in response to the overwhelming increase in our knowledge in the past three decades. Overall, and if it can be afforded, the advantages of subspecialisation outweigh those of the general diagnostic service.

The acknowledged benefits and advantages of subspecialisation include: 1) increased experience and skill of the pathologists at interpreting challenging cases within their own subspecialties, thus allowing timely and accurate diagnosis; 2) maximising clinical efficiency through enhanced team work and communications with the corresponding subspecialised clinical services; 3) optimisation of teaching; 4) promotion of research efforts in the various subspecialty areas, and 5) creation of an environment in which research can be successfully planned and performed.

However, subspecialisation has its demanding requirements and it can not be applied in all pathology laboratories. The main disadvantages include: 1) decreased staffing flexibility in comparison to laboratories which provide a wider general service; 2) increased operational overheads with every subspecialty operating as if it were a separate unit; 3) difficulties in measuring the equity of workload between staff of different subspecialty teams;^{13,14,15} 4) difficulties in evaluating the efficiency of the pathologists' work due to weights and indicators varying from one subspecialty to another,^{13,14,15} and 5) the need for more staffing which remains the biggest factor hindering the wider development of subspecialisation.

Subspecialisation: Choice or Necessity?

Subspecialisation remains largely a choice that is dictated by a variety of factors including the laboratory setting (service versus academic), specimen volume and specimen composition as well as level of staffing. For example, subspecialisation cannot be afforded by departments that are staffed by less than six consultant pathologists. Also, if they have a low number of biopsies or range of materials, the significant increase in costs and staff cannot be justified. On the other hand, subspecialisation should be seen ultimately as a necessity for large academic and teaching departments with heavy workloads. In this case, it will accommodate and

improve research and optimise teaching obligations, in addition to the other benefits of subspecialisation.

The Fate of Cytology in Subspecialised Pathology Departments

Prior to the subspecialisation trend, cytology often constituted an independent department or a separate unit, within the pathology department while in a small department it was regarded as part of the general diagnostic service. As histopathology moved to subspecialisation, some institutions opted to integrating the various cytological specimens into the corresponding or appropriate subspecialty histopathology teams; for example, breast fine needle aspiration (FNA) was allocated to the breast team and so on. Cervical cytology was dealt as a separate issue in places where there were large screening programmes. Other places continued to have an independent cytology service that did not integrate into the subspecialty teams.

There are reasons that favour integrating cytology specimens into the corresponding histopathology subspecialty: 1) it allows the correlation of the histological and cytological findings, thus resulting in more accurate diagnoses and better patient care; 2) it increases experience and improves skill; 3) it enhances team work with the corresponding subspecialised clinical services, and 4) it optimises teaching and promotes research.

Equally, there are arguments against the need for such integration which call for cytology to remain independent. These include: 1) existing cytopathologists who are experienced across the whole of the cytology spectrum. With subspecialisation, a major part of their expertise would become redundant, lost or underutilised; 2) unlike histopathology specimens, there could be difficulties in assigning and allocating some materials: e.g. should ascetic fluid go to the GI team or to the gynaecology team? 3) the heavy cytology burden in some subspecialties in comparison to others, e.g. breast versus GI, and 4) the nature and amount of material where there are cervical cytology screening programmes. The reasons for and against integration of cytology seem to be equally strong. It therefore seems logical, for the time being at least, that the choice should depend on the circumstances of each establishment.

Intraoperative Consultation/Diagnosis (Frozen Sections)

Most pathologists accept that the frozen section procedure is an important and difficult procedure that requires experience, knowledge, the ability to make quick decisions under pressure and good judgement. It is often needed in order to confirm the extent of disease, the nature of a pathological process, the resection margins and the nature of a tissue, such as parathyroid. The procedure has its obvious limitations which are mainly time, sampling error, lack of consultation, lack of special stains/studies, inconsistency in the quality of the sections and the type of artefacts particularly ice crystal artefacts.

Changing trends in the practice of pathology have significantly contributed to the decline, relative or absolute, in the frequency of the pathologists' exposure to frozen section materials. The main trends responsible for this are subspecialisation and the availability of radiologically guided biopsies. The former have resulted in the number of available frozen sections being thinly distributed among a large number of trainee pathologists. The latter means that materials that were in the past only accessible through frozen sections became less dependent on this procedure. In either case, the result is that the frozen section procedure has become even more challenging for the less experienced pathologist. The problem is often further compounded by the requesting clinicians being unfamiliar with the difficulties and limitations of the procedure, when it comes to particular pathological processes such as follicular lesions of the thyroid.¹⁶ In today's practice, therefore, pre- and intraoperative consultation and communication between surgeons and pathologists are a necessity while the decision to have a frozen section for intraoperative diagnosis should ultimately be the surgeon's choice and decision.

The Autopsy

The availability of an autopsy service is a necessity both within the health and forensic services. The reasons for this include cases of unexplained, or suspected wrongful deaths in the case of forensic service. In the health service, autopsy is required in cases of death with no premortem diagnosis

and for the purpose of auditing and correlating premortem diagnoses with those of the autopsy findings.

Various factors have contributed in the last three decades to the dramatic worldwide decline in the number of autopsies.^{17,18} These relate generally to the increasing public reluctance to give consent for an autopsy, exacerbated by the publicity given to certain infamous episodes. In addition and unfortunately, autopsy practice does not appeal nowadays to the majority of pathologists. They consider it disruptive to other increasing duties and a source of distraction for staff employed to meet the clinical needs of live patients. The decline has also been accelerated by advanced imaging and other diagnostic techniques that have significantly improved premortem diagnosis. The unpopularity and decline of the autopsy has confronted the specialty with the challenge of providing adequate training and experience for trainee pathologists.

There is a consensus that autopsy training is a necessity since, as outlined above, the autopsy service is a necessity. However, while it is essential to have proper autopsy training, it is not essential that all trainees in pathology should have such training. Making autopsy training an "elective" subspecialty¹⁹ will ensure that only genuinely interested trainees are able to get the proper experience from the declining pool of autopsies. Furthermore, centralisation of the service may be the solution in order to maximise the experience and exposure of those trainees to a larger number and wider spectrum of autopsy cases, improve the standard of service and cope with the problem of the declining number of pathologists interested in this particular subspecialty. It has also been suggested that the rigid rules and regulations that determine which cases should be considered for hospital autopsies need to be relaxed. Instead, requests for autopsy needs to be decided on a case by case basis and could include the few cases where the relatives of the deceased request an autopsy, even when it is deemed unnecessary by the treating physicians.

Multidisciplinary Team Meetings (MDTs)

To many pathologists, MDTs are looked upon as the "best thing" that happened to the speciality in recent times. Through participation in clinical

decision making, pathologists gain improved job satisfaction and have sense of being appreciated. MDTs have increased awareness among other health professions of the speciality of pathology and its important role in the management of cancer patients. They have also improved communication with our service users and other health professions leading to more accurate, meaningful and informative pathology results.^{20,10} For many, it is also regarded as part of continual professional development so that although it is a time consuming duty it is often welcomed.²¹ MDTs are undoubtedly here to stay as they have proven to be immensely useful both to the patients and to all parties involved in management and care of cancer patients.^{20,21,22} As MDTs are a relatively recent innovation, they need to be formally regulated to ascertain who should attend, the meeting venue, the technology and equipment required and the decision making method. MDTs should also be recognised as a significant component in the pathologist's duties and job plan.²¹

Old and New Ancillary Techniques

Special stains, enzyme histochemistry, virtual slide telepathology, confocal light microscopy, immunohistochemistry, flow cytometry, electron microscopy (with its various modalities including transmission electron microscopy [TEM], scanning electron microscopy [SEM], scanning transmission electron microscopy [STEM], low voltage electron microscopy [LVEM], reflective electron microscopy [REM]) and molecular pathology techniques are some of the techniques that pathologists utilise in their various activities and roles whether for diagnosis, prognosis, teaching and/or research. Ancillary techniques, including those which are new or technologically and scientifically highly advanced, are the means to achieve specific aims, be it for the diagnostic service or for research. In the drive for excellence, the focus on the aims can get distracted by the intriguing means to the point that the means become aims in themselves. We need always to remember to choose and apply techniques that answer our questions and address our needs rather than searching for irrelevant questions in order to adopt fascinating and attractive, yet irrelevant, new techniques.

In the recent past, several exciting and promising techniques did not match expectations. Others eventually occupied an important, yet significantly smaller, role than that which was originally expected. One example, more than two decades ago, was when silver staining for nucleolar organising regions was seen a promising tool as a proliferation marker; this topic generated an enormous number of publications.^{23,24} A second example is electron microscopy in the 1970s and 1980s which was seen as the "ultimate" means for identifying tumour differentiation,^{25,26} yet it has now largely been replaced by immunohistochemistry. On the other hand, it still makes an essential and major contribution to specific topics mainly in kidney and neuromuscular diseases.

We should also remember that the pace of technological advance far exceeds our ability to adopt or implement all newly emerging techniques. Before adopting them, we need to identify the problems they can address while recognising our limitations. Otherwise new technologies can have an adverse impact on our basic and essential functions. We should also seek opportunities in global collaboration as rapid email and transport communications make our world increasingly smaller.

The Pathology Report

Naturally perhaps, choices are limited when it comes to the style of the pathology report. For a long time, free text and summary style reports constituted the majority of pathology reports. They still remain the norm for reporting many non-neoplastic diseases. In the last two decades, with the increase in information requirements,²⁷ synoptic reports have become fashionable particularly in reporting cancer cases. A mixture of both free text and synoptic style reports are also adopted by some, but they are often tedious and time consuming to compose. Digital images have also found their way into the pathology report in many centres worldwide, but their value and contribution is often questioned.

There is an overwhelming case for adopting a standardised synoptic report style especially for cancer cases. Their contents and designs are based on recommendations and guidelines issues

by international professional bodies.^{2,3} Most are simple and thorough in their contents, having the advantages of consistency, uniformity and being quicker to produce while avoiding oversight and typographic errors. They are also appealing to the service users who seem to recommend them. There does not seem to be a case against the synoptic report style. As such, it is reasonable to say that they should be regarded as a necessity for reporting cancer cases and at least a good choice for the reporting of non-neoplastic diseases.

Other Duties that Influence Today's Pathology Practice

The pathologists' growing administrative duties have increased their work load and responsibilities in addition to the clinical duties referred to above. The former include the requirements to comply with various regulatory bodies for both the medical and non-medical aspects of the provision of the pathology laboratory service. Issues such as accreditation; external and internal quality assurances;²⁸ continuing professional development activities; various performance indicators including appraisal and job planning; continuous internal and external audit activities and revalidation and participation in clinical governance activities are just some of the essential tasks expected of medical professionals nowadays. Regardless of whether we like them or not, believe in them or not, we have to carry them out. They are necessary because: 1) they justify our confidence in our practice; 2) they justify the confidence of our service users and managers; 3) they safeguard the standard of our practice, and 4) they ensure continuous pathology service improvement.

Conclusion - Maintaining the Momentum of Pathology Service Improvements

Finally, facing and responding to the challenges, as well as to the changing trends, are strategies through which pathology service improvements continue and are ensured. Certain approaches are fundamental within any organisation to maintain the momentum of ongoing improvement. These include: 1) effective

communication, the significance of which cannot be overstated. This entails communication at all levels be it within the department, with other pathology departments and institutions or with service users and managers; 2) the strong support of service users and managers in order for the service to continue to thrive and improve; 3) taking radical decisions, if deemed necessary for improvements, for example, centralisation of some aspects of the service which could concentrate expertise and reduce costs; 4) participation in regulatory bodies and schemes; 5) continuous adaptation to and adoption of useful new technology and procedures, and 6) exploration of opportunities for collaboration. No organisation, regardless of its size, can survive in isolation with today's rapidly changing pace of technological and medical advances.

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