Future of the pathologist in an era of technological change and cost containment*

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The future of the pathologist in an era of technological change and cost containment is problematical, and to some extent a crystal ball must be used. There are guidelines, however, in the changes that have occurred in management after the implementation of the Griffiths report,1 the influence that this has had on the restriction of moneys for laboratory development, and the changes taking place in laboratory instrumentation and attitudes.

Although functional laboratory budgeting has been working in parts of the country for many years, the introduction of effective clinical budgeting is likely to have profound effects. But it is difficult to speculate about the precise effects until the present experiments have been fully analysed and agreed. It is, for example, possible to visualise (as previously pointed out in 1984) that the cost of laboratory services might be itemised out on a historical basis, shared between consultant medical staff and general practitioners according to the extent of their previous demands.2 Once these consultants hold their budgets they would be free to reduce their demand for tests in order to save money to be transferred to other areas of medical need such as medical equipment.

One of the practical consequences to the consultant pathologist manager of a laboratory is that half way through the year the “income” from clinical consultants may not be sufficient even to pay salaries let alone cover consumables because of the drop in demand. This could lead to a reduction in staffing levels and, for example, the withdrawal of various uneconomic services.

Cost cutting exercises led by administrators will seriously threaten doctors’ clinical freedom. This is certainly occurring in the United States, where doctors are facing massive restrictions that prevent them treating and investigating patients in the way that they think best.3 They are working under a prospective payment system for the government’s aided health care schemes aimed at restricting costs, thus effectively putting a price on diseases. It seems likely that similar restriction will be the result of the current cost cutting exercises in Britain and will be more profound if clinical budgeting is introduced.

Laboratory instrumentation and attitudes

It is said that he who diligently observes market trends, carefully extrapolates them, and then prepares himself for the anticipated conditions is the most likely to succeed in the market place. Technology in laboratories is changing rapidly, and the old philosophy that bigger is better is being exchanged for test results at the lowest possible cost. This will inevitably mean a revolution in the way in which laboratories are organised.

Over the past 30 years individual disciplines of pathology within the same geographic area have centralised their major functions. This has meant that diagnostic procedures may be carried out in large laboratories away from the patients, ward, or general practitioner. The advantages of such a system—mainly in accuracy—have to be weighed against the disadvantages of clinical convenience, the distancing of the pathologist from the clinician, and, in some instances, cost effectiveness. A continuation of this process could mean that within 10 years the all embracing laboratory of the district general hospital will have become a curiosity. Such a process would undoubtedly produce standardisation in methodology and equipment in the laboratory—an appreciable step forward if the selection procedure is sound. It also adds to the suggestion that pathology laboratories will employ considerably less labour than at present.

In the years ahead the move to the ward will gather momentum, with an increase in side room diagnostic tests or, as it is now fashionable to term it, “bedside pathology.”

The revival of side room diagnostic tests has been aided by advances in solid phase chemistry, ion specific and enzyme electrodes, microprocessors, and the continuing miniaturisation of apparatus with computer data processing capability.

Add to this the enormous investment into biosensors and it is apparent that the determination of many chemical compounds, directly on the patient at the bedside or in the outpatient clinic, will soon become a reality. This new generation of instruments is attracting the attention not only of laboratory oriented staffs but of clinicians as well. In the United States industry experts predict that this type of instrumentation will become the basis of a fast growing segment of diagnostic testing, which is being referred to as “satellite and physicians office testing” (SPOT). It has developed because of the determination of the United States government to limit expenditure on health care, with a consequent restructuring of its organisation and delivery. Can we really believe that the government in this country will act in any different way, faced with similar financial restraints? Apart from the financial pressures it is obvious that these new instruments will also be important in any future clinical testing because they offer immediate test results, which are often needed to support an urgent diagnosis.

Problems of proliferation

The proliferation of testing services will undoubtedly present problems. The level of professionalism in the laboratory is high, and it is not certain that these same standards will be maintained by those who will use these new testing instruments in less regulated circumstances. Although the instruments are designed for easy operation, their underlying chemistry and electronic and mechanical designs are usually complex and manufacturers and users must be prepared to cooperate to minimise the adverse effects of any malfunctions. Intensive care and neonatal paediatric units already undertake their own blood gas analyses, and the development of ion selective electrodes and simple to use meters for measurement of glucose and bilirubin concentrations are only the forerunners of the new technology. In haematology dipsticks are available for detecting white cells in body fluids. Microbiology is developing into a bedside science with latex agglutination kits to detect C reactive protein in a matter of minutes and thus provide a sensitive indicator for the presence of inflammation. Other kits allegedly easy to perform and requiring little equipment, consequently reducing tedious laboratory work, are able to detect Haemophilus influenza type b, Neisseria meningitidis, pneumococcal antigens, and group b streptococci in body fluids. Rotaviruses can also be detected in stools and rubella antibodies in serums.

Despite the known limitations of such tests—particularly the potential hazard of untrained staff handling infectious material— they will continue to displace laboratory based tests.

Bedside pathology in Britain and other developed countries will, of course, be of most value when a diagnosis has to be made “out of hours.” This will cut the costs of the on call services and perhaps balance out the likely increased costs of the bedside test. If junior

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medical staff are trained to perform and interpret the results of the tests it will demand a close liaison between the main laboratory and the user to ensure a reasonable standard of accuracy, precision, and reliability. Will the clinician think in a similar way and will the emergency test become the routine daytime procedure of the future?

This surge of new interest in biotechnology is best illustrated by the interest that major industrial companies are now showing in them either by buying into the new technology by cooperative deals with "start up" companies or by acquisition. New products are already proliferating—diagnostic kits based on monoclonal antibodies, deoxyribonucleic acid hybridisation probes, and genetically engineered therapeutic agents such as human insulin and human growth hormone.

Health care is being targeted by more and more companies because of its size and profit potential. The presence of major industrial companies with their high research and development budgets will revolutionise the various disciplines of pathology. Such is the pace of research it seems likely that within five years biosensors capable of analysing ions, enzymes, and hormones by non-invasive in vivo techniques will be making an impact on clinical medicine with an inevitable knock on effect on laboratory workload. In addition, the continued refinement of techniques such as ultrasonography will make certain types of laboratory procedures obsolete or superfluous. An example of this is the considerable reduction in demand for tests of fetoplacental function, which were once a major part of many endocrinological laboratories' workload.

These developments will make it possible for relatively unskilled operators using simple pieces of equipment and their associated disposable reagents to obtain clinically acceptable results within a few minutes of collecting samples. High technology is steadily reducing skill to the ability to push a button or to read a test against a precalibrated set of standards. The pathology laboratory as we know it will inevitably undergo profound change.

**Clinical pathology at the crossroads**

The primary responsibility of any doctor is to serve his patients, always remembering that medicine is an art as well as a science. It is now evident that many of the professions supplementary to medicine are attempting to upgrade their status. Both Whitley Council A (graduates) and B (medical laboratory scientific officers) are engaged in such manoeuvres. Simard pointed out that nurses are pushing hard for greater recognition and in a few instances are attempting to replace doctors in aspects of primary care. Hospital administrators and managers, health care economists, computer scientists, and many others are developing skills in aspects of health care. Although health care continues to expand, will it be large enough to support all these new professionals?

The major catalyst in all of this is, of course, a striving for money, although this is conceived under the guise of role, status, and professionalism.

Over the years there has been a void between the clinician and the pathologist, and although some pathologists have seized the initiative to fill this void, much remains to be done to develop a true, although changed, clinical pathology service in the interests of the patient. Failure to grasp this nettles will inevitably lead to the development of departments of pathology in which there is no medical component at all or to the takeover of sections of pathology by clinicians. Already there is evidence that the skin and the eye are becoming the province of the clinician with a microscope.

The era of instrumentation in some disciplines has meant that the art and science of pathology have become two separate entities. Many existing instruments are now so capable—and certainly many will be in the future—that they do not require a medical pathologist, a qualified Whitley A scientist, or a qualified medical laboratory scientific officer to operate them. Test results by the thousand are produced, and it is evident that those pathologists who engage primarily in the numbers game to support their existence cannot and will not survive as medical specialists.

Pathologists must become more clinical to survive. The fund of knowledge in medicine continues to grow rapidly, and it is becoming increasingly difficult for even single discipline specialists to keep abreast with the changes in instrumentation, the newer diagnostic and monitoring procedures, and the demands of single organ clinical specialists. The pathologist should fill this void by undertaking direct patient care in specialised aspects of investigation and treatment. Breckenridge pointed out that among the wonders of nature is the way in which many animals and birds are able to alter their appearance or adjust their behaviour when the world around them changes and becomes threatening. The environment is unquestionably changing in pathology, and pathologists will have to adapt to survive any adverse conditions or developments.

**Conclusion**

In conclusion let me quote the words of Henry B Solway writing in the *Pathologist*:

"There is a well-known laboratory exercise through which biologists graphically demonstrate a flaw in the nervous system of frogs. A live specimen is dropped into boiling water, with a predictable result—the frog instantly jumps out. Next the frog is placed in cool water which is slowly brought to the boil. Blissfully ignorant of the insidious crime being perpetrated against him, the frog allows himself to be scalped to death.

"Ebisch employed this metaphor to illustrate the response that we the human species exhibit in the face of ‘creeping’ catastrophes—catastrophes of great magnitude that evolve over significant periods of time."

I wonder if this analogy cannot be applied to the practice of pathology. For at least 15 years there have been danger signals that the status of pathology is in jeopardy. There have been increasing numbers of non-medical practitioners attempting to upgrade their status, improved technology obviating some of the need for skills once required of clinical pathologists, the increasing distance of many pathologists from bedside clinical medicine, the fashionable introduction of bedside pathology, and the intrusion of clinical doctors ever ready to take over aspects of laboratory medicine. There is also the uncertainty produced by the tinkering with our examination systems, with perhaps a future inappropriate emphasis on research over patient care. Let us not reach a stage where rewards and prestige within our specialty are parcelled out only for excellence in research instead of for excellence in patient care.

The possible amalgamation of the Whitley Council A (graduates) and Whitley Council B (medical laboratory scientific officers) should also be considered in terms of its effects on the discipline of pathology. In this event the Royal College of Pathologists would find it difficult to refuse any graduate the opportunity to take its diploma examination. The eventual result of this would be a predominantly non-medical college—out of step with the other royal colleges. Pathology pervades and is no small part of all other branches of medicine. Simard exhorted us to direct more of our attention to "the pathology of direct patient care and to determine that it is the sole objective for the future."

If we add to these problems the variations in the supply of consultant manpower in pathology, with shortages in some specialties and a balance in others, the future is problematical: to quote an old Chinese proverb, "prophesying is very difficult particularly with regard to the future."

**References**

6. Breckenridge RL. Like the prawn and the herds, we will survive. *Pathologist* 1986 May:3-4.

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