A review of the National Health Service's computing policy in the 1970s

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Alderson, M. (1976). British Journal of Preventive and Social Medicine, 30, 11-16. A review of the National Health Service's computing policy in the 1970s. The health service computer policy is reviewed in this paper particularly the potential contribution of some systems to information gathering. The paper begins with a brief description of the computer applications thought suitable for the medical field in the late 1960s, and two views of the future that were published in 1968. Two reports on computing and information systems in Scotland are then described; the general philosophy and specific proposals on the use of population files are contrasted with the initial Department of Health and Social Services' (DHSS) experimental computer program. The subsequent changes in English policy are revealed in the reports of three reviews published by the DHSS. The present development of a master patient index in Tayside is noted and the potential applications in management and planning of information stemming from such systems are discussed. It is suggested that lack of work in this field is a major gap in the programme of activity in England.

One of the stimuli to drafting this review of health service computer policy and current progress with computing in the United Kingdom has been the interesting succession of documents published over the last five years from Scotland and England, which indicate a major difference in philosophy in this field. An attempt is made to touch upon the range of computing activities in the medical field, although particular emphasis is placed upon certain aspects of computing that are of interest to specialists in community medicine and to epidemiologists. Knox (1968) described the introduction of a small off-line batch processing system in a Birmingham hospital; commenting on the time-scale of investigation in such fields, he pointed out that it is necessary to plan the replacement on the day that the initial equipment arrives, thus compelling those involved to devise future plans before present ones had matured. This dilemma is another reason for periodically taking stock of published 'future plans', and relating these to subsequent progress.

BACKGROUND
Computers were introduced to the medical field in the 1960s, predominantly through financial and payroll applications, and then they were used increasingly by research workers, particularly for computation and data analysis. The computer's ability:

- to accept and analyse large volumes of data such as generated by laboratory equipment and physiological signal analysis, and
- to store, transmit, and present data to a user physically remote from the source of the information

was of great interest. Increasing activity was reported from America, Scandinavia, and the Continent in the late 1960s.

This burst of enthusiasm was documented by a number of authors. Apart from administrative, billing, and research activities, Shogog (1968) identified eight major areas of activity in America that warranted attention: admission, transfer, and discharge systems; laboratory automation; patient monitoring; planning of radiation therapy; production of patient summaries for 'utilization reviews'; patient profiles; comprehensive information systems; diagnostic applications. He drew attention to the relatively limited progress that had been made in comparison with the human effort and expenditure which had been lavished on these projects—after five years' work no computer centre was clearly making an effective contribution to service medicine.
He suggested that major benefits to the patient would come from improved management through the computer's impact on efficiency of appointment and admission systems, allocation of medical equipment, and follow-up after treatment.

Early Views of Anticipated Development

Weir (1968), discussing the coming 10 years, placed emphasis upon anticipated advances in dedicated computers used for a range of activities, the development of a national medical information system, and increasing standardization of computing throughout the health service. This prediction from a Scottish contributor was followed by a 20-year glimpse ahead from White (1968); he correctly identified some of the problems that would be associated with the Ministry's 'on-line, real-time' computer systems, but was optimistic in suggesting that a solution to those problems would be found in the 1970s. He forecast an extension of computing in laboratory automation and of automated screening; attention was also drawn to the area co-ordinator's need for information to manage the health service.

In 1969 a working party of the BMA planning unit (British Medical Association, 1969) suggested that a computer health file would be required in the reorganized health service, held at area level and containing basic social and medical data about each person. It was thought that this should facilitate scheduling patients for a range of contacts with the health service; the compilation of registers for the elderly, handicapped, and those at risk; the recall of certain categories of patient; enhance the standard of record-keeping; and provide service information for the area.

Two Reports from Scotland

By 1970 the Ministry (Department) of Health in England had established a branch for development of a policy for computing and set up an advisory committee; they had launched a programme of experiments involving the installation of expensive equipment in a few hospitals, supported by large development teams of computer scientists. Concurrently a study of the Scottish scene, commissioned by the Nuffield Provincial Hospitals Trust, was carried out by Ockenden and Bodenham (1970). Their report surveyed the current uses of computers in the health service in Scotland, examined those applications meriting priority for development, and estimated costs of such development. They advocated development of those areas of application where expertise was already accumulated and favoured a major investment in unglamorous but effective batch-processing to assist with certain activities in hospitals. It was pointed out that the only functioning real time inquiry system in other fields of work (defence and airline reservation) have taken hundreds of man years of careful and very detailed preparation; this effort had been required for dedicated systems covering well-defined applications which were almost straightforward in comparison with some experimental hospital projects. They identified the long-term aims and uses of a system of integrated patient records; while the arguments in favour of integrated health records were convincing, the problems involved, at that time, were considered to preclude consideration of a national scheme of such records except as a strategic aim. A follow-up report (Bodenham and Wellman, 1972) examined the information requirements for management of an integrated health service. The report was written in the light of White papers on reorganization of the health services, which commented on the opportunities for rationalization of health services. It was suggested that information is an essential preliminary requisite of such management changes and the report indicated the ways in which information systems might be developed. Five separate areas of information are identified as relevant for consideration: patient, personnel, supplies, drugs, and buildings. The collection and use of data on these subjects are discussed and proposals for establishing an organization for handling such material delineated. The earlier report had mentioned the establishment of an integrated patient record as a strategic objective; the second study identified this as an activity requiring urgent attention. A major recommendation was the establishment of a basic register of all the people in each health service area which may be extended by data on such activities as hospital discharges, immunization programmes, and notification of special disabilities or risks.

English Policy Published

Initially the DHSS programme was concentrated upon a few hospital-based large computer projects. However, in parallel with the study of activity in Scotland the DHSS started its own review of computing in 1971, and a report was published Using Computers to Improve Health Services (DHSS, 1972a); the intriguing title does not clearly indicate the content of the report. A method was described of classifying the complete range of applications of computers in the service by priority for experiment, development, or implementation; this required consideration of the technical methods, user interface and progress at one or more locations. For the first time a published document showed
the DHSS funded activity in medical computing, and identified gaps in the programme in relation to priority; this review did not indicate a major change in their programme, partly because a change in emphasis was already apparent. The final recommendation in the report is that the DHSS should mount a special study to examine how data-handling systems could aid National Health Service (NHS) integration, taking account of complementary work proposed for Scotland. During the review the Secretary of State decided there should be standardization of Regional Hospital Boards’ computing equipment; a minimum configuration was recommended to regions, although no documented evidence was presented on the range of activities to be handled on these machines (DHSS, 1972b).

In 1972 and 1973 several documents were published, identifying various measures to be taken in the lead-up to reorganization of the health service; many of these made great play of the need for information (Alderson, 1973). A Working Party on collaboration between the NHS and local government set up a specialist group to look at the handling of statistics and computing; this recommended (DHSS, 1973a) that a systematic programme of investigations and studies of the value and operation of master registers for the health and personal social services should be started in a selected area or areas.

One of the recommendations in the initial DHSS review had been that an annual review of NHS computing should occur; the following year the first report of an annual review was published (DHSS, 1973b). Some apprehension was expressed about the scope and adequacy of computing activity in primary medical care; it was recommended that a comprehensive appreciation and analysis of existing work should be carried out, in order to generate firm proposals for further activity. Concern was also expressed about the delay in producing final guidance for implementation in the field of laboratory automation. The DHSS (1974) has published a further annual review; one important component of this was a very brief comment about six projects that have terminated. It seems that projects involving on-line, real-time systems for computer-held medical records have proved to be costly, complex, and less acceptable to the users than conventional systems. There is general discussion of progress in other fields, again a special note on pathology, and an interesting comment about the development of systems in outpatients to aid with the organization of clinic work. The need for collaboration between the DHSS and the health service in agreeing an overall plan for computing is stressed and reference made to the danger of misalignment between the development programme and the requirements of the field authorities. Unfortunately, no guidance on activities at this level is available; even for the hospital-based work that has been in progress for five years or so, the comment is made that it is unlikely that any specific application throughout the service will be ready for implementation before 1980. Concern is expressed about this slow time-scale, and some suggestions made about reconsidering the method of progressing from experiment to implementation. Comment is made about the projected requirement for computing facilities in areas and districts in the coming decade; it is pointed out that there are problems in defining the needs of primary medical care, community health, and the Family Practitioner Committees (FPC). One encouraging aspect, that is mentioned is the FPC experiment, which has shown the feasibility of using a computer-based file to carry out some of the simpler activities of the FPC with regard to payment of capitation fees. This work is currently being evaluated, but if such an activity is cost-effective, the establishment of the computer-based file of the population can be instituted and other activities could then be introduced as sub-systems of the basic file. This should extend the benefits of the basic file and be considerably cheaper than isolated systems for each application.

It was suggested that in 1974/75 approved projects would require about £4.2 million (capital and revenue), with perhaps a further £0.2 million on new activities; at the same time health authorities were expected to be spending about £7 million from their overall allocations. This is an extremely high ratio of R and D to service expenditure; details of all current activities are given in the 200-page part 2 of the Annual Review. Despite this investment in research, the latest DHSS Annual Review has an air of gloom about it; the reader can identify despondency over the lack of progress and the time-scale before implementation of ‘successful’ applications, linked to some general remarks about the lack of funds for pursuing fresh work that is of high priority. One area identified as warranting further support for research is computer-assisted patient monitoring. A recent review (Lancet, 1974a) suggested that the dearth of functioning systems and the number of systems which have had to be abandoned, might indicate that computer assistance in this field has no future in the management of the individually seriously-ill patient. However, the review comments that such pessimism would be just as much misplaced as the earlier optimism. There have been other recent articles stressing the suitability of computers in haematology departments.
(Lancet, 1974b) and the diagnostic value of computerized tomography with an EMI scanner (Gawler et al., 1974).

Current Work in Scotland

A recent report from Scotland confirms their rather different approach to medical computing (Graham, 1974). This article describes the progress in the establishment of a master patient index for Tayside, the reasons for this, and the approach selected. The basic demographic data for each member of the population served are to be supplemented with minimal information on his or her previous medical history and the linkage of repeated contacts with the health service. The index should then provide a basic identifying and linking mechanism for the build-up of a range of other specific files of information. It is argued that this information is required for the day-to-day management of existing services and for longer-term planning; specific examples are given of the contribution that the files should make to the family doctor service and the hospital service. This work has application at district or area level; Heasman (1971) has described the use of the national (Scottish) record linkage file as a tool of the central health organization.

Discussion

There exists rather different policy, strategy, and current growth of computing in the two countries. DHSS expenditure on the experimental computer program began in 1967/68 and now uses one-quarter of all the money directly spent by the DHSS upon Research and Development (DHSS, 1975). Rivett (1975) drew attention to the switch in priority to ‘modest’ hospital computer systems, but there remains general unease about the pace and direction of progress; the Lancet (1975) has called for a thorough and independent inquiry into this research. One aspect of health service computing that is likely to be of particular interest to those working in community medicine is the overlap area of computing and information systems; it has been shown that there is considerable divergence between England and Scotland. An attempt is now made to indicate the effect of this difference in policy.

There has been pioneer work on record linkage at Oxford (Acheson, 1967; Baldwin, 1973); by the investment of limited additional funds, the routinely collected returns on births, hospital inpatient spells, and deaths may be linked to provide a file of data that is invaluable for epidemiological and genetic studies. However, this activity has a much more limited application in the management field than the current work in Scotland aimed at establishing area-based master patient indexes with many associated subfiles. It is useful to distinguish between the basic master patient index containing identification data for each person and keys to the various subfiles, and the subfiles themselves which accumulate information of varying detail about particular aspects of health care. There will be considerable problems of data capture while setting up the basic file, maintaining the accuracy of the master file, and then in extending the data capture to the other areas of interest. In addition some fairly expensive computer equipment is needed in order to accept, store, and handle data—particularly where access to the data has to be speedy (with the Tayside index the proposal is to make this available on-line to certain hospitals to replace their clerically maintained registers). The complexity of the general proposals described by Graham (1974) pose a number of problems of logistics, but these cannot be resolved merely by clear thinking and decision; evaluation of such activity can be achieved only by piloting such work on a fairly extensive basis. This should identify: the problems involved in setting up, maintaining and running the systems; the costs; the benefits that stem from such systems.

Consideration of the collation and use of such data brings one immediately to the issue of confidentiality; the files would be useless for many of the applications unless they were linked or linkable to identification particulars. There is a need to consider carefully the steps that should be taken to ensure the handling of confidential data, so that access and improper use of the material on transmission and storage are not possible, and confidential data are released to approved users for specific activities. The Younger Committee (1972) and the recent report from the Law Commission (1974) make a number of points about the control of confidential data; the issue of release of such data to researchers has been covered by the proposals from the Medical Research Council (1973). Mechanical and electronic systems of security, staff training, and stringent control of release of output from such systems should provide adequate security and still telah the qualms of most of those concerned about confidentiality. Scotland has overcome the hurdle not only in the medical field; the central collection of data on individuals undergoing further education has progressed at a much faster rate there, than in England (Edwards, 1974). This issue has not been adequately discussed in England so that a final decision may be taken to proceed with the collection of population based files of confidential medical data. A government White paper which would...
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impinge on this issue has been long awaited, whilst
delay leads to stagnation of thought and due
consideration of other means of providing an
adequate range of management information.

The DHSS (National Computing Centre, 1974)
having recently circulated proposals for establishing a
standardized computer-held child register in Eng-
land, which will be used to schedule immunization
and store limited data about the health of each
infant. This proposal, interesting as it is, is a very
care image of the activity in Scotland and is not
directly associated with the project on FPC records.

Immunization-scheduling is a computer application
which has been shown to improve the service
provided, and reduce the cost per item of service
(Saunders, 1970); it also facilitates collection of
statistics for management and planning of the
service. The value of a total master patient index
and associated subfiles is less clear cut. The Office
of Health Economics (1974) has pointed out that
those planning the new organizational pattern of the
health service have misidentified the major health
care problems. It was suggested that administrative
changes can do little to affect the quality of health
care in any group in the population, and emphasis
on the role of professional managerial expertise
in the NHS is misplaced. Cartwright et al. (1975)
consider that the application of epidemiological
techniques to determine medical policy will be more
important than the adoption of new management
methods. Systems such as described above are an
approach towards the assessment of need, demand,
workload, use of facilities, and outcome of health
care; when data covering these different aspects of
health care are available it should be possible to
monitor the functioning of the health service and
plan the future. If it is accepted that there is at
present a deficiency in the availability and use of
information for management of the health service,
there are a number of approaches possible to alter
this:

1. The increased retrieval, presentation, and
   interpretation of data that are potentially
   available but not currently used.
2. The collection of additional data as a routine,
   to extend the scope of issues covered.
3. The mounting of special studies, including
   surveys, in order to resolve doubt over
   particular issues.
4. Development of simulation and other models,
   which incorporate available statistics, esti-
   mates of present unmet need and unmet
   demand, and judgement about the degree of
   change likely in the future.

5. A combination of two or more of the above
   approaches.

The present knowledge of the optimum approach
to health information systems is deficient, despite
the lip-service paid to identifying need, monitoring
functioning of the health service, and optimizing
allocation of resources. It is also important to
acknowledge that hard information only provides a
background against which decisions are made,
often after considering a wide range of subtle but
important attitudes and pressures. Yates (1973) has
clearly shown how the application of information
can aid management and planning, but has indicated
the investment of effort required in analysing and
presenting data. There is thus a chicken and egg
situation: lack of retrievable routine information
(and staff to handle this information) prevents the
development of defined methods for using an
extended range of information for management and
planning. 'Managers' are thus unlikely to put high
on their priority information system, when the
present state of development of such systems costs
money and yet provides limited value because of
inadequacies of the systems. The attraction of fully
developed master patient indices with associated
subfiles is their potential for producing as a by-
product information that is more complete, accurate,
up-to-date, appropriate, acceptable, and possibly
cheaper than data from other approaches. As
mentioned earlier, this requires major experiments
to test and evaluate (including investment of effort in
exploring full use of resulting information); the
limited ventures in this field in England seem
inadequate—watching Scotland progress has its
advantages—but those interested in such activities
can only sharpen their approach on the grindstone
of practical experience.

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