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REVIEW ARTICLE

Research in our practice—a requirement not an option: discussion paper[1]

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INTRODUCTION

Research should affect all aspects of our professional lives. Clinical managers should use research evidence to plan and deliver healthcare. Clinical professionals should draw upon research evidence to inform clinical practice and clinical decision-making. University academics and students should use research in a variety of ways—for example it may be taught/learnt as a discipline within a course and/or it might be applied in a [research] project. The use of research-evidence to inform decisions is not limited to healthcare professionals. Increasingly patients are using research-evidence to help decide on their diagnostic and management options; this is in part due to the easy access to healthcare information through the Internet. The concept of an 'expert patient' is emerging; not surprisingly this places additional knowledge and skill demands on healthcare staff. Indeed patients are encouraged and empowered to access such information through a range of Government initiatives.

Clinical managers, clinical professionals, students and academics may also use research—as a tool—to generate new knowledge; typically this activity is done because the existing body of knowledge fails to solve a problem, thus new information must be generated to move understanding and practice forwards. Sadly, referring to radiography/radiotherapy, Challen et al. [1] note that "most research that has been done was related to course requirements and little has been published". Conducting formal research and disseminating the results is clearly an area in which we must further develop our capability. Not withstanding this Upton [2] tells us that "the current underlying culture provides a firm foundation for the necessary education and encouragement required for the fuller implementation of evidence based practice in radiography"; this is most encouraging. However the implementation of evidence-based practice across many professional healthcare groups is not

[1]Note: You are advised to read the Editorial Comment in this Review Section prior to reading this discussion paper. The Editorial Comment sets the context to this article. This article attempts to provoke discussion about the value and need for research.

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as good as it might be, suggesting that radiography/radiotherapy have problems similar to others [3].

If our professional standards are to be maintained (or better still improved) it is clear that we need to base our practice on research-based evidence. Furthermore, in certain circumstances where our understanding is limited, we will need to create new knowledge by conducting our own research. Intellectually and practically it is quite clear that the argument for using research-based evidence in practice is won. Morally and ethically this explains why *research in our practice [is] a requirement [and] not an option*. Not surprisingly our Government has made it crystal clear that we must use research-based evidence in our practice and also engage in formal scientific study (i.e. do research); which will be regulated/audited. It should come as no shock therefore, that research methods (and statistics) are normally included within undergraduate and post graduate curricula and our nationally available educational benchmarks for radiographer education (diagnosis and therapy) reflect this demand.

For clinical work the Clinical Governance agenda makes explicit reference to evidence-based practice and evidence-based guidelines and protocols. Similarly, documents like 'Meeting the Challenge' [4] illustrate the same aspirations. The National Institute for Clinical Excellence (NICE), and other organizations, will help by providing evidence-based approaches and the Commission for Health Improvement (CHI) will audit our evidence-based approaches to practice. Should our evidence-based practice not be adequate, or worse still non-existent, the CHI will certainly intervene. Hardy [5] comments neatly on this—"Although NHS trusts and primary care groups have overall responsibility for quality, it is accepted that clinicians (i.e. radiographers in this context) are individually responsible for their own practice". Also, to further encourage evidence-based practice, the two top levels of the *four-tier career structure* (i.e. Consultant and Advanced Practitioner) are likely to make explicit the absolute requirement for the research and evidence-based aspects to be mandatory. Albeit the advancement of knowledge through engaging formally in research activity, is perhaps more likely, to be associated with Consultant rather than Advanced Practitioner status.

The academic will not be excluded from evidence-based practice and they are more likely to be expected to participate in formal research activity. The academic must also respond to the same Government drivers that healthcare workers do; this may be by direct or indirect means. The Research Assessment Exercise is likely to be a driving force that encourages academic staff to become research active—which includes the requirement for the dissemination of research findings. Where teaching quality is concerned the Quality Assurance Agency will be looking for evidence-based learning and teaching which has clearly informed the curriculum and learning strategies. Audit-type research will be important here.

Having established the need for research activity to generate new knowledge and research-based evidence to inform our practice we shall now start to explore the philosophy of research and also the practical value it has in clinical settings. Since it has been considered that 'radiographic knowledge spans natural sciences and the humanities' [6], then it is important that we consider a range of research topics in this series of these articles. The nature of radiography-related research therefore dictates methodological choices; and these will clearly have to include qualitative and quantitative methods and supporting statistics. It is important to realise that all healthcare staff, including radiographers, need certain basic skills of research. To practise an evidence-based approach you must be able to find literature and then discriminate between that which is 'good' and 'bad'. For conducting research you must be able to plan and then execute a rigorous scientific study. Also, because people/patients are likely to be the object of a research investigation, ethical and legal issues will require exploration. Not surprisingly because the world has become economically limited financial issues will have to be considered too. In the first instance we shall explore what research might be, taking relevant examples from the literature.

THE NATURE OF RESEARCH AND EVIDENCE BASED PRACTICE

Evidence based medicine has its roots in clinical epidemiology, owing much to Cochrane's [7] critique of the effectiveness and efficiency of health services. Cochrane argued that many commonly used treatments and investigations in contemporary healthcare systems had not been shown to be effective in terms

of clear and convincing evidence. Sackett [8] describes evidence-based medicine as "the conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients". However, the scope of evidence-based medicine can also be extended to consider populations. The subject matter then becomes broader to include costs and health technologies for example procedures, settings, healthcare personnel and policy. There has been a proliferation of attempts to satisfy the demand for evidence-based healthcare with the development of multiple new publications and dissemination media e.g. new journals to electronic databases. Most importantly there have been a number of innovations in the development of the research base.

It is now widely recognized that research includes not just primary research (data gathering) but also secondary research (a systematic review of [an already existing] primary research evidence). Indeed the latter is becoming more formalized and disciplined. The critical features of good primary research are being increasingly recognized as indispensable: appropriately posed questions, studies designed to reduce bias, with patient relevant outcomes, conducted without bias, ethically, and with suitable quality control, drawing conclusion(s) which flow from the results, and published regardless of outcome.

In addition, the critical features of secondary research can also be agreed. These include systematic and reproducible reviews using clear search strategies; formal critical appraisal of the contributory studies; grading of the evidence from these studies according to their quality and size; selection of relevant outcomes from the primary research and valid methods for integrating the evidence. For radiography the existing body of research is limited and secondary research can therefore become problematic in some subject areas. However, a thorough review of the literature can be used to highlight areas for primary research. Clearly this will be invaluable for radiographers wishing to identify areas in which to conduct research. An understanding of methodologies and the research process is required to undertake both primary and secondary research. Next we shall explore, in brief, the process of conducting primary research; after this we shall try to demonstrate how secondary research can be used to inform practice. Two existing papers will be used as illustrative examples.

PRIMARY RESEARCH

Primary research can comprise of creative work undertaken on a systematic basis in order to increase knowledge. The term 'Research and Development' (R&D) is often used in healthcare to cover three activities: basic research, applied research and experimental development. Basic research is experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundation of phenomena and observable facts, without any particular application or use in view. Applied research is also original investigation undertaken in order to acquire new knowledge. It is, however, directed primarily towards a specific practical aim or objective. Experimental development is systematic work, drawing on existing knowledge gained from research and/or practical experience which is directed to producing new materials, products or devices. Primary research can be practical or theoretical; both require understanding and training in research methodology. Most primary research projects share a similar general structure, as illustrated in Fig. 1.

Randomized controlled trials (RCT) are considered to be the gold standard for research. Approximately a third of a million RCTs are registered on the Cochrane database. It has been shown empirically that RCTs in general produce more modest estimates of treatment effects than other study designs. Much evidence-based practice is yielded through the interpretation and pooling of these data.

Cuzik [9] gives an example of an RCT double blind placebo control. The broad question considered here was does tamoxifen prevent breast cancer. After a consideration of previous work—in particular three previous clinical trials that produced mixed results—Cuzik also decided to focus on whether the benefits of tamoxifen outweighed the risks and side effects. The established side effects of tamoxifen included an increase in menopausal symptoms, vascular events and endometrial abnormalities. The sample included 7125 women at increased risk of breast cancer aged 35–70 years. The primary outcome measure was the frequency of breast cancer. Secondary outcomes were other cancers, thromboembolic events, cardiovascular events and cause specific mortality. Analysis was by intention to treat. Recommendations for the use of tamoxifen and areas for further study were identified from this work. Studies such as this require a multi-professional team of researchers, considerable

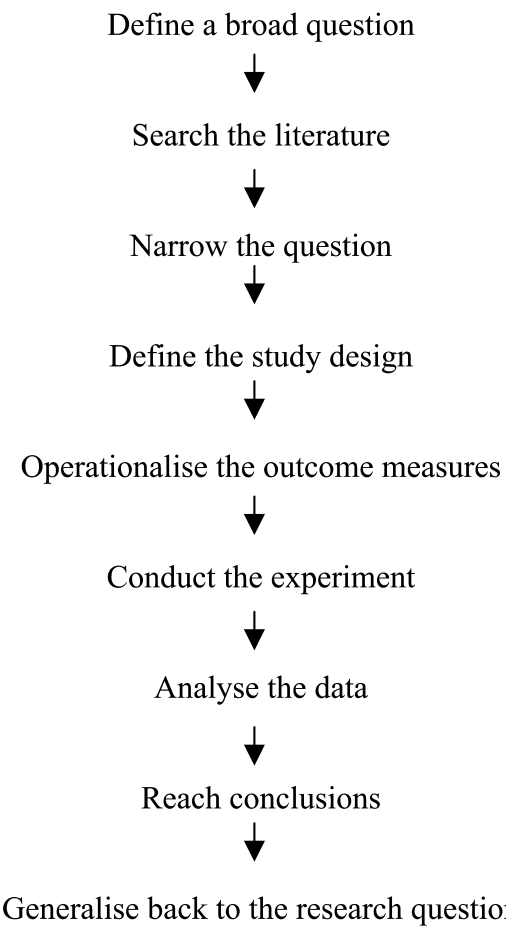

Figure 1 General structure of primary research.

funding, detailed planning and ethical approval. There also tends to be time delay before the results become available for example this study was conducted over a five-year period.

SECONDARY RESEARCH

The rapidly expanding volume of medical research means that systematic reviews are becoming increasingly important to summarise research evidence for clinical and health policy decision-making. Fig. 2 illustrates a summary of the possible steps involved in conducting secondary research. This is followed by an example of how such evidence can be utilised to enhance practice.

Parker [10] was interested in the optimum evidence based management of an elderly patient admitted via accident and emergency having sustained a trochantric fracture of her left hip at home. The patient was 82-years old and of average health. The focused question was 'what is the optimum management of trochantric hip fractures in the elderly'. Using the search term 'hip fracture'. Parker used the following sources:

1. Medline
2. Cochrane Library1 (CD Rom)
3. Best Evidence2 (CD Rom)
4. Internet sites, including:
   - The NHS Centre for Reviews and Dissemination (http://www0.york.ac.uk/inst/crd/welcome.htm)
   - American Academy of Orthopedic Surgeons (www.aaos.org)
   - Omni (www.omni.ac.uk)
   - The Trip Database (http://www.ceres.uwcm.ac.uk/frameset.cfm?section=trip)
   - The Scottish Intercollegiate Guidelines Network (SIGN) (http://www.sign.ac.uk/)
   - Bandolier (www.jr2.ox.ac.uk/Bandolier)

An initial search of Medline for randomized trials showed that there had been 48 studies in the past three years. Parker limited the search to systematic reviews of randomized controlled trials due to his personal time constraints. Where the questions were not answered by these reviews, independent reviews and clinical guidelines were utilised. Following this process the evidence for the management of the patient included the following areas: initial management, surgical intervention, anticoagulation prophylaxis, type of implant, post operative care and further prevention of injury. This provides one simple illustration of how secondary evidence can influence practice. Parker used this evidence to inform the management of this patient.

FINAL THOUGHTS

Whilst it is clear that not every health professional will engage in primary research it is evident that it is the responsibility of professionals to be up to date in their knowledge and to utilise the research of others to inform their practice. This is an exciting time for those engaged in research as a growing number of new methodologies are now available consonant with the shift from a positivist to a post positivist paradigm. Non-experimental methods are now accepted recognizing the central role of language and discourse to answer some of the more human aspects of healthcare, such as a patient's perspective of their quality of life.

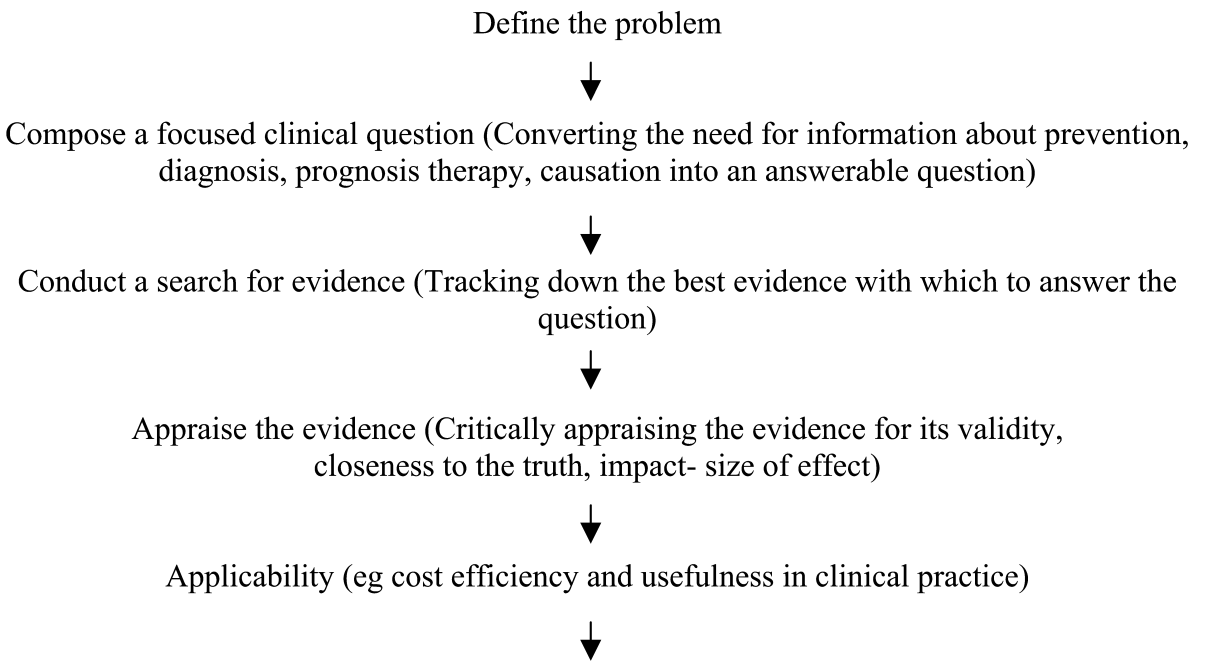

Figure 2 Possible steps involved conducting secondary research.

In the next issue of *Radiography* we shall take a more detailed look at how one could take the first steps in doing some research (primary or secondary). Not surprisingly the title of that article will be 'First steps—how to set about doing some research'.

SUGGESTED READING

Web-based material

A first class service, quality in the NHS, London. DOH 1998 NHSE http://www.doh.gov.uk/newnhs/qualsum.htm.
Clinical governance http://www.cgsupport.org/.
Commission for Health Improvement http://www.chi.nhs.uk/
National Institute for Clinical Excellence http://www.nice.org.uk/
Quality Assurance Agency http://www.qaa.ac.uk/
Quality Assurance Agency for Higher education (Radiography benchmarks) http://www.qaa.ac.uk/crntwork/benchmark/nhsbenchmark/radio.pdf
Research and Development-Department of Health http://www.doh.gov.uk/research/index.htm
Research Assessment Exercise http://www.hero.ac.uk/rae/
Research Governance Framework for England http://www.doh.gov.uk/research/rd3/nhsrandd/researchgovernance.htm.
The new NHS Modern, Dependable, London DOH 1997, NHSE http://www.archive.official-documents.co.uk/document/doh/newnhs/newnhs.htm

Reading material in *Radiography*

Brearley S. What is evidence based medicine? An emerging science not a fashionable rhetoric. *Radiography* 2001; **7:** 7–10.
Clinical governance, College of Radiographers, 1999.
Hammick M, Radiography research and the qualitative approach: a paradigm and a discourse, *Radiography* 1995; **1:** 135–43.
Harris R, Find and deliver: research and practice in therapeutic radiography, *Radiography* 2000; **6:** 225–6.
Harrison S. NICE, CHI, clinical governance and healthcare rationing., *Radiography* 2000; **6:** 9–10.
Lewis S. Some research possibilities in diagnostic radiography. *Radiography* 1998; **4:** 205–9.
Manning D. Research questions in clinical reporting by radiographers. *Radiography* 2000; **6:** 221–4.
Nixon S. Professionalism in Radiography. *Radiography* 2001; **7:** 31–5.
Pettigrew A. Ethical issues in healthcare research. *Radiography* 2002; **8:** 21–5.

DEFINITIONS

Evidence based medicine—The conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients.

Evidence based practice—The use of rigorous scientific evidence to inform healthcare.

Epidemiology—Medical science concerned with the occurrence and distribution of disease in human populations.

Randomized controlled trial—A research design which seeks to isolate specific effects of different treatments on outcomes.

Positivist—The essence of this position is the belief that there is a reality derive by immutable natural laws. The ultimate aim of science is to predict and control natural phenomena.

Post positivist—The essence of this position is the belief that a real world driven by real causes exists and is impossible for humans to truly perceive it.

Discourse—The study of language, narratives and linguists.

Paradigm—a research stance.

REFERENCES

1. Challen V, Kaminski S, Harris P. Research mindedness in the radiography procession. *Radiography* 1992; **2:** 139–51.
2. Upton D. Clinical effectiveness: how much do radiographers know about it and what do they think about the concept. *Radiography* 1999; **5:** 79–87.
3. Ferlie E. Clinical effectiveness and evidence based medicine Clinical Governance, making it happen, Royal Society of Medicine Press, London, 1999, pp. 49–60.
4. Meeting the Challenge: a strategy for the allied health professions, 2000. Department of Health http://www.doh.gov.uk/meetingthechallenge/
5. Hardy M, Persaud PA. Challenge of governance: achieving quality in diagnostic imaging. *Radiography* 2001; **7:** 159–63.
6. Castle A. Radiography: nature of knowledge and academic tribe. *Radiography* 2000; **5:** 261–8.
7. Cochrane A. Effectiveness and Efficiency Random Reflections on the Health service, Nuffield Provincial Hospitals Trust, Leeds, 1972.
8. Sackett D, Rosenburg W, Gray J, Haynes R, Richardson W. Evidence Based Medicine: What it is and what it isn't. *British Medical Journal* 1996; **312:** 71–2.
9. Cuzick J, investigators IBIS. First results from the International Breast Cancer Intervention Study (IBIS-I): A Randomised Prevention Trial. *The Lancet* 2002; **360:** 817–24.
10. Parker MJ. Evidence based Case Report. Managing an elderly patient with a fractured femur. *British Medical Journal* 2000; **320:** 102–3.