

Pharmacy Research - Academia's Responsibility

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Introduction

Pharmacy research, broadly speaking, is research conducted in Pharmacy Practice and the Pharmaceutical Sciences. The former is concerned with the most effective use of medicines to optimise patient outcomes and incorporates the social sciences and health economics. The latter utilises the traditional sciences to improve the discovery, design and development of medicines.

Through the course of this paper I will attempt to emphasise the vital part leading pharmacy academics have played in developing the profession and practice of pharmacy through research and teaching, and indicate how academia should continue to have an influential part to play in this process. I will also add some personal experiences in Thailand and elsewhere.

The research method and the culture it generates are well described on the Purdue University School of Pharmacy and Pharmaceutical Sciences website.

Research is the process of formulating questions that lead to hypotheses, and then carrying out investigations that verify or nullify those hypotheses. In addition to the practical benefits that research makes possible, a highly active research environment provides a unique kind of excitement that is both indispensable for attracting and retaining the best and brightest faculty and essential for providing

students with the most up-to-date education.

This description aptly encapsulates, to use a pharmaceutical term, the commonly followed research process together with its academic spin-off benefits. The latter benefits are very important for academic environments. The phrase *a unique kind of excitement* projects a picture of the buzz, the pleasure, the intellectual confidence and vitality generated in a school/faculty/centre/department having a successful research environment which proves to be attractive to both staff and students.

Motivation for research and the pursuit of academic excellence is profoundly conveyed through the words of an inscription at the entrance to the Chemistry and Pharmacy Building (Leigh Hall) of the University of Florida College Of Pharmacy. The inscription reads:

Enter to think God's thoughts after Him.

Go forth to apply His thoughts in service.

The first sentence echoes Kepler's famous phrase *thinking God's thoughts after him* which he used to describe his discoveries. Johannes Kepler (1571–1630), Imperial Mathematician in Prague, painstakingly proved using the direct and meticulous observations of the orbit of Mars made by his predecessor Tycho Brahe, that planetary motion was elliptical and not circular as had been held since propounded by Aristotle (4th Century BC). Kepler (cited in Cline, 1980) described his motivation thus:

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The chief aim of all investigations of the external world should be to discuss the rational order which has been imposed by God, and which he revealed to us in the language of mathematics.

As scientists undertaking research we follow in Kepler's footsteps *thinking God's thoughts after him*. It is obvious that unless there is order in the universe scientific research which *de facto* depends on the scientific method would be impossible. Nor would we have the rational brain necessary to formulate research hypotheses in the first place.

The second sentence of the Florida inscription further emphasises the motivation for the pursuit of knowledge and research. That is to use the knowledge gained in the service of others. Generations of pharmacy students have heard me state this!

Pharmacy Research

From the foregoing introduction it can be postulated that academic responsibility for pharmacy research encompasses the following:

- 1. academic staff should be expected to undertake research as part of their overall responsibilities and routinely publish their findings,**
- 2. curricula should be designed and kept up-to-date so as to produce knowledgeable graduates competent in problem solving, skilled in communication and capable of participating in research,**
- 3. the pharmacy profession should be shaped to meet societal needs based on the findings of product related and patient oriented research,**
- 4. academic staff should actively promote the responsible conduct of research.**

These points will be considered in detail.

1. Academic staff should be expected to undertake research as part of their overall academic responsibilities and routinely publish their findings.

a) Appropriate research should be expected of all newly appointed university lecturers. Lecturers not already involved in research should be

encouraged and supported to do so. The majority of lecturers should have a PhD, or equivalent, or be encouraged to study for one.

- b) Each institution should have a research plan which focuses the research on clusters of staff expertise. Individuals should not be working on their own but should, either be heading up a research area, or be one of the supporting team.
- c) Inter institutional and multidisciplinary research should be encouraged.
- d) Routine preparation of grant applications and research publications should be the norm.
- e) Conference attendance should be supported where possible for the presenting author of an accepted publication.

2. Curricula should be designed and kept up-to-date so as to produce knowledgeable graduates competent in problem solving, skilled in communication and capable of participating in research.

a) Curricula should be modern and relevant in content and delivery and follow best educational practice. Each course should have clearly stated teaching objectives, educational outcomes and methods of assessment. The course content should be delivered in both traditional and innovative ways which will include directed student centred learning, literature assessments, practice experience, undertaking a research project and presentation of results in written, poster and oral format.

b) Curricula should aim to produce thinking graduates able to critically evaluate, integrate, and apply diverse subject material and thus able to apply their knowledge and skills to provide solutions to problems met with in practice.

c) Curricula should encourage the development of information technology and interpersonal skills; team working; continuous professional development and appropriate professional attitudes.

3. The pharmacy profession should be shaped to meet societal needs based on the findings of product related and patient oriented research.

a) Product related research.

Philadelphia College of Pharmacy (PCP), founded in 1821, provides an inspiring example of how academics have shaped the pharmacy profession through product related research. Their website states.

With nearly two centuries of experience in pharmacy and science and thousands of alumni working in the pharmaceutical industry, the world turns to PCP graduates for advice. Learn where the founders (alumni such as McNeil, Lilley, Rorer, Wyeth, Warner, Burroughs and Wellcome) of six of the top pharmaceutical companies in the world got their education - Philadelphia College of Pharmacy - the first College of Pharmacy in North America. Learn from first-class educators who have worked in the pharmaceutical industry acquiring real-world experience and who routinely publish and present nationally.

Professor Joseph Remington of PCP is remembered for his comprehensive textbook first published in 1885 and now known as *Remington: The Science and Practice of Pharmacy*. The book is still compiled at PCP.

The School of the Pharmaceutical Society of Great Britain founded in 1842, which was fully incorporated as an independent entity into the University of London in 1949, has had a similar role in the UK. The world famous *Martindale: The complete drug reference* with its encyclopaedic facts about drugs and medicines has been a trusted source for medicines information for over 120 years. It continues to be published by the Pharmaceutical Press – the publishing arm of the Royal Pharmaceutical

Society of Great Britain. The three year BPharm honours degree course introduced in 1946 served as a model for over twenty years for new degree courses worldwide.

The research that my colleagues, research students and I have undertaken has mostly had an application to pharmacy practice. Initially my research was involved with the design of efficient and reliable eye-drop containers and the formulation of ophthalmic solutions. My *Investigations on the resistance of Pseudomonas aeruginosa to chemical antibacterial agents* (Richards, 1965) provided the information needed to formulate and preserve ophthalmic solutions successfully. As the research developed over succeeding years information was provided which aided the formulation of the first commercial contact lens solutions and had application to wound treatment and the evaluation and use of effective disinfectants in hospitals. In 1975 I was privileged to write the chapter *In vitro Eradicating of Pseudomonas aeruginosa*, (p.271-323), in the book *Resistance of Pseudomonas aeruginosa* (Brown, 1975). Determination of the mechanism of action of antibacterials and overcoming the resistance of clinically significant bacteria, especially with antibacterial combinations, remained a theme of my research until I left The Robert Gordon University.

b) Patient oriented research.

The flag-bearer for the introduction and development of clinical pharmacy practice in North America was the University of Southern California (USC), School of Pharmacy. They introduced a clinical curriculum leading to a PharmD in 1968. This development led to all Schools of Pharmacy in the USA awarding the PharmD degree with a clinical based curriculum as the entry-level degree of the American pharmacy profession. The USC School of Pharmacy website states:

Recognised as one of the most innovative schools of pharmacy in the nation, the USC School of Pharmacy has served as a model for other progressive schools throughout the country. USC was the first to establish the six-year program leading to the Doctor of Pharmacy degree as the first professional degree. USC also initiated, in 1968, the first clinical pharmacy program in the nation, and in 1990 initiated the first program in pharmaceutical economics and policy. In the USC program, emphasis is given to the application of drug knowledge in patient care. The pharmacist becomes an active and integral member of the patient care team. Patient care experiences begin early and increase both in scope and complexity as the student progresses through the program.

The USC School of Pharmacy Mission Statement includes the following:

To conduct and publicize cutting-edge multidisciplinary research in the discovery, action, utilization and evaluation of therapeutic agents: and To envision and shape the future direction of pharmacy practice in an organized and integrated health care delivery system that emphasizes balanced health care inputs in the optimisation of patient outcomes.

These are lofty aims but we should not be discouraged – they can also be ours. I have been privileged to have a part in encouraging professional practice in the direction of more patient-oriented practice in several countries, including Thailand, where I registered as a Thai pharmacist by full examination in 1960.

Early experiences in Thailand

I set out for Thailand by boat, via Singapore, with my wife and first son in the autumn of 1958. We helped establish the Manorom Christian Hospital, Chainart province, 1959–1962 and it was there my vision for a more patient-oriented pharmacy

practice began. In 1961 I made two short research presentations to the *First Refresher Course for Thai Pharmacists* held at the Faculty of Pharmacy, University of Medical Sciences, Chulalongkorn campus. Little, if any research was being undertaken at the only faculty of pharmacy in Thailand at that time. Laboratory space was very limited.

As a Special Lecturer in 1966 I asked if there were facilities for me to undertake research. The initial reply was ‘No!’, but Ajarn Nuanjira, a friend, encouraged me to apply for funding from the Thai Surgeons’ research fund. It was the time of the Vietnam war and my research had possible application in wound treatment. When I was awarded the funding it was arranged that I undertook the research at a new, but as of then unused research block, at the Thai armed Forces Pharmaceutical Factory, Kluay Namthai. We were very pleased to have some results published in an international research journal.

Later Chulalongkorn Faculty of Pharmacy and Mahidol Faculty of Pharmacy were established with better facilities for research and the research culture is now established. This has provided support for the development of a thriving Pharmaceutical Industry in and around Bangkok. However, my biggest disappointment with pharmacy practice in Thailand has remained much the same since the late 1950s. That is the lack of the development of community pharmacy and the absence of pharmacists from their community pharmacies during opening hours, although I believe changes are in process. However, there is still much to be done and it is encouraging to see that some universities, including the newer universities’ faculties of pharmacy have had the vision and the initiative to work towards transforming professional practice. This has been encouraged by Dr. Pawit Tongroach the former Dean of Chulalongkorn Faculty of Pharmacy and also former President of Mahasarakham University (MSU) and currently

Chairman of the Pharmacy Council. I am pleased to have been a part of the development at MSU which has been my fourth *bite of the cherry* (opportunity), to shape professional practice.

Opportunities to have a major influence on pharmacy practice

My first *bite of the cherry* was at the University of Rhodesia (now Zimbabwe), Salisbury (now Harare), 1973–78, when as Inaugural Professor of Pharmacy I had the opportunity to design the new BPharm honours degree curriculum. We introduced a six week full-time clinical practice placement in the vacation between the second and third year of the degree – the first such large clinical commitment in any BPharm degree. The graduates had a marked impact on the relatively small professional body of pharmacists in Rhodesia at that time.

The second *bite of the cherry* was as Course Director of the MSc Clinical Pharmacy, University of Strathclyde, 1978–83. This was the first master degree in clinical pharmacy in the UK. We also produced the first UK clinical pharmacy textbook, *Clinical Pharmacy and Hospital Drug Management*, which I co-edited with Professor David Lawson, a physician at the Glasgow Royal Infirmary, in 1982 (Lawson and Richards, 1982).

The third opportunity was as Head of The School of Pharmacy, The Robert Gordon University (RGU), Aberdeen, 1986–1997, where I made the most of my authority to carry out a complete revision of the bachelor degree curriculum moving it progressively in a more patient oriented direction. This later became the first four year MPharm level qualification leading to the Pre-registration practice year and entry to the profession of pharmacy in the UK. The first graduates were in 1996. It was not until the year 2000 that the other UK schools of pharmacy had their first MPharm graduates. Earlier in 1993 the School of Pharmacy, RGU, had become a WHO

Collaborating Centre for Pharmacy Practice and Research and we developed an international course on Effective Drug Management and Rational Drug Use. We were the only School of Pharmacy in the world which was a WHO Collaborating Centre. A further milestone was when we were asked to write The Second Edition of *Pharmaceutical Practice* (Winfield and Richards, 1988). This was co-edited with Dr. Arthur Winfield just before I left RGU. The publishers chose us to edit the book because their research had indicated that our curriculum at RGU was generally accepted as the most forward looking and practically relevant in the UK at that time.

My fourth *bite at the cherry* was at MSU. In January 1998, as Chairman of the Project to Establish the Faculty of Pharmacy, and as Dean 1999–2002, we were able to establish the Faculty of Pharmacy and offer the PharmD as a single entry level pharmacy curriculum – the first in Thailand. The *Third Edition of Pharmaceutical Practice* (Winfield and Richards, 2004) was co-edited while I was Dean of the Faculty of Pharmacy, MSU. In 2005 this Third Edition was translated and published in Thai under the leadership of Dr. Bungorn Sriphanichkulchai, Dean of the University of Khon Kaen Faculty of Pharmacy. The Second Edition had been translated into Chinese and had become an internationally popular textbook.

4. Academic staff should actively promote the responsible conduct of research.

In 2007 I gave a lecture at the Faculty of Pharmacy, MSU on *Honesty in Research*. I had become aware that this was a subject that we academics must take very seriously and I believe that every university should have a policy and offer courses on the responsible conduct of research. The US Government has established an Office for Research Integrity (ORI) to advise on the responsible conduct of research. All those applying for government grants must guarantee that if they are awarded research

funding they will conduct their research in accordance with the ORI guidelines. In 2006 the University of Missouri - Kansas City (UM-KC) developed a series of six 1-credit courses on the Responsible Conduct of Research. UM-KC introduce their course with a series of quotes, apparently taken from the ORI introduction to its guidelines on the Responsible Conduct of Research, 2003, as follows:

Responsible Conduct of Research encompasses a wide range of activities. The types of research being conducted vary from disciplines and research settings. However, researchers all have some shared values for conducting research responsibly, such as 'Honesty - conveying information truthfully and honouring commitments' 'Accuracy - reporting findings precisely and taking care to avoid errors' 'Efficiency - using resources wisely and avoiding waste' and 'Objectivity - letting the facts speak for themselves and avoiding improper bias.'

Conclusions

This paper indicates the responsibility of pharmacy academics to be involved in various research inputs and the major impact the resulting outcomes can have on shaping the pharmacy profession to meet the health needs of society. Academics should do all in their power to promote the responsible conduct of research.

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