The Changing Roles Of Pharmacists In Society

Stephen Arthur Hudson, John Jackson Mc Anaw, Barbara Julienne Johnson

A clinical role for pharmacists has developed in response to the societal need to improve the use of medicines. Clinical role development has been led by initiatives in the hospital sector which have enabled Schools of Pharmacy to make shifts in the pre-graduate education of pharmacists. The increasing complexity in the management of drug therapy has given pharmacists clear roles that integrate within the healthcare team. The history is one in which the development of changing roles of pharmacists is an example of progress in healthcare delivery creating the need for revision of the curriculum for a whole profession.

Milestones in the changing roles and in the preparation of pharmacists for those roles have been; Establishment of clinical pharmacy in the US hospitals and the doctorate (PharmD) as the professional entry qualification; postgraduate clinical pharmacy education in UK and elsewhere, notably Asia and Australasia; hospital pharmacist specialisation across the wide range of medical specialties; the clinical teaching of pharmacists; the concept of 'pharmaceutical care' as a factor in public health; changes in Schools of Pharmacy – with professors of pharmacy practice and a shift to patient-centred teaching.

Future evolution of pharmacist roles will follow the wider use of quality systems to address errors in prescribing and drug administration; the automation of systems of drug prescribing and administration and improved documentation of care; widening of prescribing roles; increased patient education and higher patient expectations; patient-centred research in Schools of pharmacy; development of primary care and improved accessibility to pharmaceutical advice; integration of pharmacists' public health roles in strategies to address prevention and management of disease.

IeJSME 2007: 1 (1): 22-34

Key words: clinical pharmacy, pharmacy education, pharmaceutical care, chronic disease management, drug therapy problems, public health

Clinical pharmacy services have emerged as a significant element of hospital pharmacy activity over the past thirty years in the UK.[1] This emergence has reflected similar changes worldwide, especially in North America, Australia and New Zealand. In Europe, the balance of individual patient care services (delivered on wards or clinics) and general clinical support services from a central pharmacy varies because of national differences in the numbers of hospital pharmacists. The roles in individual patient care are changing as the educational formation of the pharmacist as a clinical practitioner develops internationally through changes in university curricula.

Clinical pharmacy practice emerged in the USA in the early 1960s providing ward-based and, later, clinic-based pharmacy services.[2] In the UK, hospital pharmacists saw themselves as drug information advisers emerging from pharmacy-based drug information centres. It was not until after more than ten years of describing themselves as 'ward pharmacists' that UK pharmacists felt comfortable adopting the USA term 'clinical pharmacists' with the formation of the UK Clinical Pharmacy Association.[3] This early reticence was a symptom of the lack of clinical orientation during the pre-graduate education; which is still evident in the UK graduate today. The lack of clinical orientation is a continuing barrier to professional advancement in Europe, where in many countries pharmacy education remains dominated by a traditional emphasis on molecular science that is often poorly linked to clinical application. Gradually, the more progressive Schools of Pharmacy are negotiating a new combination of laboratory science and clinical science, as a structured teaching of clinical practice is becoming legitimised.

Educational extension – Clinical training and professional entry

The extension of clinical training of pharmacists became formalized through the Doctor of Pharmacy (PharmD) programmes, emerging first in California, and subsequently in states such as Michigan and

All authors are all in the Strathclyde Institute of Pharmacy and Biomedical Sciences, University of Strathclyde, Glasgow, UNITED KINGDOM

Address for correspondence:
Prof. S A Hudson Strathclyde Institute of Pharmacy and Biomedical Sciences, University of Strathclyde, 27 Taylor St, Glasgow G4 0NR, UNITED KINGDOM
Email: s.a.hudson@strath.ac.uk

Kentucky that were early adopters of clinical pharmacy.[2] In the 1990s the PharmD became the entry level qualification in the USA and has also become the pregraduate training programme for clinical pharmacists in Canada.[4] The North American programmes now include experiential learning through a planned clinical placement rotation built into the final one to two years of a five to six year vocationally orientated degree. Pharmacy education was extended to four years (plus one year pre-registration training) in the UK in 1997 in response to the need to harmonise to a five year education in Europe and a limited expansion of clinical teaching in the pregraduate years has followed.[5] Clinical training in the UK undergraduate curriculum, through clinical placements and class room simulations, has drawn from the experience of 30 years of delivery of postgraduate clinical instruction at MSc level.[6] MSc courses to provide clinical teaching have been adopted by many UK Schools in the form of a taught Diploma of 9 or 18 months (part time or full time, respectively) often with progression to MSc by project/dissertation .[7]

Postgraduate clinical pharmacy education

The UK pattern of postgraduate programmes offers a combination of taught elements (workshops in clinical topics, clinical skills, clinical pharmacokinetics, problem solving and critical appraisal skills) with experiential or task based learning. The experiential element is from clinical placements or integrated with clinical service delivery. The programmes require a dissertation at Diploma or Masters level, submitted as a literature review or practical research project.[7] The UK postgraduate approach has been slow to be replicated elsewhere in Europe, partly because the MSc degree is less widely recognised in other European countries. However there are now examples of MSc courses in clinical pharmacy in Denmark, Greece, Ireland, Malta, Turkey and Sweden; there are also other shorter (Certificate) programmes influenced by the UK Diploma/MSc experience that are available in Germany and Spain. A postgraduate hospital pharmacy specialisation programme in certain European countries (such as in Belgium, France, Italy, Netherlands, Portugal and Spain) has provided a means of clinical pharmacy training that is very much varied in content.[8]

Elsewhere, for example in Australasia, Malaysia and Thailand, the MSc Clinical Pharmacy course has also been a platform for preparing hospital pharmacists for new roles.[9] While the MSc programmes have had a limited uptake among pharmacists delivering primary care, pharmacy multiples in the UK have been involved in sponsoring places up to Diploma level on certain courses which have a distance learning curriculum design.

In the past ten years in the UK, a wider aspiration to develop clinical services in primary care has created a new type of pharmacist, one working full time, part time or sessionally in family doctor practices.[10] This development has emerged from clinically trained (hospital) pharmacists adapting their type of practice to health centre settings.[11]

Hospital pharmacist specialisation

Pharmacists have become embedded a wide range of medical specialties in North America, UK and Australasia through undertaking ward rounds and participating in clinical meetings. The demand for pharmacists to function within patient care settings has expanded with the recognition of the potential impact on patient care of drug therapy complications such as; drug interactions, drug administration problems, patient compliance, patient educational needs and adverse drug effects masquerading as clinical symptoms associated with natural disease. The clinical pharmacist with duties in a particular patient care setting has functioned within hospital risk management strategies. The pharmacist's close familiarity with medicines use in their setting allows them to focus professionally on known risks in specific clinical areas.[12,13] The model of routine prescription monitoring on daily ward visits has been shown to identify prescribing errors in 1.5 per cent of prescriptions written in the UK.[12] Technical developments such as therapeutic drug monitoring have drawn individual pharmacists closer to support bed-side decision-making.

Most European countries have a shortage of hospital pharmacists to develop new models of individual patient care; and so hospital pharmacy services in certain countries (such as Germany, Scandinavia and the Netherlands) have developed ways of contributing to safe, effective and economic use of medicines through centralised decision support functions. Those often involve multidisciplinary committees to formulate drug use policies to address the need to assure safe and effective ways of using drugs as well as to help control budgetary spend.[8]

In the UK it has been estimated that over 80 per cent of hospital pharmacists practise in patient care areas and half of them spend more than 50 per cent of their time on clinical activities.[13] Pharmacists' experience in the patient care setting helps inform and implement hospital policies on medicines use. Initiatives to improve the means of the supply and use of medicines, 'medicines management', have been adopted widely in the UK and they are increasing the level of professional supervision and advice through clinical pharmacy services.

In Scotland, the Scottish Medicines Consortium (SMC) represents a national co-operation of Drugs and Therapeutics Committees in which clinical pharmacists contribute to national drug evaluations and drug use policy.[14] The SMC seeks to reduce duplication of local efforts to interpret the evidence base in medicines evaluation and to provide national equity of access to new medicines. The conduct of clinical audit systems by individual professions has helped the clinical audit concept develop into a multidisciplinary effort, co-ordinated by hospital-wide committees in which hospital pharmacists play a role.[15-17] Audit methodology is being developed as part of a developing research culture in health service delivery, which is reflected in the expansion of health services research within each of the health care professions.

Pharmaceutical care

Pharmaceutical care is a term referring to quality of medicines use and has become relevant to a wider range of health care professionals and carries a team responsibility.[18-20] The pharmaceutical care concept, therefore offers prescribers a means of improving drug therapy management by engaging with a wider team effort in the continuous processes of monitoring for unwanted effects, assessment of drug effectiveness and patient education.[19]

Medicine-taking by patients is increasing in complexity by virtue of new technological developments and increased extent of medication in society. Chronic disease management increasingly requires a team approach.[21] Chronic medication exposure is not limited to older patients as chronic disease becomes diagnosed earlier. There is widespread recognition of the need for improved quality control, especially in the long term use of medicines, based on evidence of risk of economic inefficiency, loss of control of disease, admission to hospital and inadequate communication between patients, doctors and pharmacists.

Hepler and Strand[22] defined *Pharmaceutical Care* as *'The responsible provision of drug therapy for the purposes of achieving definite outcomes that improve a patient's quality of life'*. 'Pharmaceutical care' implies a level of care the patient deserves to receive.

The word 'pharmacist', significantly, does not appear in the definition; which allows for pharmaceutical care to be delivered in different ways. Pharmaceutical care is therefore a description of what the patient should receive and not what the pharmacist does. Pharmaceutical care can be delivered in different clinical settings in different clinical cultures by different teams of pharmacists, technicians, doctors and nurses.

Pharmaceutical care can therefore be understood as a quality assurance system based on improved teamwork and improved systems for providing drug treatment. Pharmaceutical care addresses current threats to the quality of medication use which are;

- **Patients' needs for drug therapy** are not always formally assessed or agreed with the patient. Medication gets prescribed to solve one problem

after another. One clinician needs to take an overview, sometimes needing to rationalise certain combinations.

- **The goals of medication** (such as target blood pressures, control of blood glucose and maintaining safe and effective anticoagulation) need to be made more clear to patients and all members of the health care team
- **Patient monitoring** needs to be improved according to written plans.
- **Documentation needs to be improved** in the monitoring of long term medication and pharmacists can help to document successful achievement of target goals as they become more patient oriented.

To achieve improvements in the level of pharmaceutical care, the pharmacist should improve their own personal level of practice; with the need to improve their knowledge, problem solving and communication skills, attitudes to patients and level of co-operation. Educational goals include preparation for taking greater responsibility for whether patients are getting the best from their medicines. The pharmacist should help to improve the system that they are working in by designing protocols (local treatment guidelines), documenting problem solving, improving teamwork and continuity of care.

Pharmaceutical care as a unifying concept in medicines use

Pharmaceutical care as a concept brings together the idea that pharmacists must develop their own personal practice as well as improve the systems that enable co-operation with other professions.[23] That requires changes in the form of pharmacy practice and creation of a multidisciplinary system focussed on achieving better patient outcomes by attention to the quality of the processes in drug therapy provision.[18-25]

Pharmaceutical care is a concept that is relevant to patient populations and is becoming an accepted term at policy making levels in some EU countries because it has clear public health implications.[25] As a concept, pharmaceutical care has been useful in guiding improved use of medicines in chronic disease management in primary care. Consequently the pharmaceutical care philosophy has required hospital pharmacists to look beyond inpatient services and direct their attention to medication-related issues in the transfer of care before and after the patient's hospital stay. The goal is in the continuity of pharmaceutical care in the use of medicines as patients are referred around the whole healthcare system.

The future direction for patient-centred hospital pharmacy services may vary considerably in different European countries. Demands for new pharmacy patient services will differ between countries according to different staff mixes. Nordic countries, with the availability of 'prescriptionists', are able to respond to opportunities to develop pharmaceutical care by developing the 'prescriptionist' role within the clinical pharmacy team role. In the UK there is movement of the UK 'pharmacy technician' into patient care areas within the emerging medicines management programmes.[26-28]

Pharmaceutical care in hospital practice

The concept of a pharmaceutical care plan is the use of a document as a clinical tool that identifies potential problems with a patient's medicines. It records the pharmacist's actions with patients, nurses and doctors to address those potential problems.[29]

Actual and potential drug therapy problems can be described in terms of 'pharmaceutical care issues'; which are situations in which a question (a potential risk or an identified problem) about drug therapy is identified.[29] Care issues often arise as questions about safety of a medicine in a particular patient, about its effectiveness, or a need for closer monitoring. A care issue may signal a need for more patient education or for transfer of information between health care professionals including between pharmacists.

There continues to be a need to establish documented standards of clinical pharmacy. Documentation of drug therapy problems must be linked to transfer of the care plan when patients are transferred

- from one ward to another or
- to another hospital or
- to care by the community pharmacist and family doctor

From the 1980's in the UK increases in numbers of clinical pharmacists allowed them to focus on smaller numbers of patients and go on to spend more than half their day at the ward. By the 1990's the hospital pharmacist was experienced at attending medical ward rounds and is integrated into the ward team in a range of specialties. These advances into clinical pharmacy in the UK over the period 1970-1990 made the patient-centred approach to better patient services seem possible for community pharmacists. Since 1990 hospital pharmacists have been increasingly orientated to developing a combined hospital and community pharmacy approach to serving patients.

The care plan is seen as the pharmacist's quality assurance document that should move with the patient to accompany the patient's care.[29] *(Figure 1)*

The medicines management programmes that are now being implemented in UK hospitals are resulting in the restructuring of hospital ward-based services.[13,26,27] The restructuring initially centres on a redefinition of the pharmacy assistant role (pharmacy technician in the UK) at ward level with greater individual patient contact and supervision of medicines-handling on wards. A further advance is the establishment of systems to allow patient self-administration of their own medication while in hospital.[13] Such systems address some medication risks, while potentially exposing patients to new ones as selected patients become responsible for taking their own medicines while in hospital. The introduction of medicines management systems with patient self-administration therefore requires cautious implementation, with appropriate safeguards and under pharmacy staff supervision. The use of patient self-administration offers the prospect of better introduction of new medication while the patient is in hospital, since there is a purposeful focus on educating patients during their stay.

The individual patient's pharmaceutical care plan

The initial assessment when the patient is admitted to a hospital can be carried out by a technician who can start the care planning documentation as follows;

Step 1: Verifications involve technicians making clear the drug history, Checking the use of patients' own medicines (PODs) which can be continued while they are in hospital (for example antihypertensive medication while the patient is in for minor surgery). Also basic checks are made to make sure new medicines prescribed fit in with local protocols (guidelines).

Step 2: The clinical pharmacist can use the pharmacy service documentation to record care issues as they monitor the patient each day and as they spend more time on specific patients with more complex problems.

Step 3: The pharmacist's checks extend to confirming success with treatment (clinical outcomes) and preparing the patient's plan for discharge home. The discharge plan requires co-ordinating the continued monitoring and supply of medication with the patient's community pharmacist.

An example of this kind of the care plan used in intensive monitoring is in the administration of chemotherapy in cancer care. This system involves the use of a pharmacy document that records patients' clinical details and is used to check for toxicity due to the chemotherapy.[30] Pharmaceutical care involves the identification of drug therapy problems that require to be included in the care plan. Strand has identified the categories of drug therapy problems that are associated with pharmaceutical care issues.[23]

The process of care attached to a treatment episode leads the pharmacist to identify pharmaceutical care issues, each of which can then be categorised either as a check or a (recommended) change as shown in Table I.[24]

Pharmaceutical care issues can be described to include individualised checks made at the start, during and after a period of a course of treatment with medication. The checks may lead to changes recommended or implemented directly by the pharmacist.

Drug therapy problems

Patients needs (care issues) may be categorised as[23]

- **Needing new medicine** because they have symptoms requiring treatment
- Receiving **medication that they do not need**
- On the **wrong medicine** to meet their needs
- Showing symptoms of a **suspected Adverse Drug Reaction**
- Receiving a **dose too high**
- Receiving a **dose too low**
- Receiving a medicines combination with a **suspected drug interaction**
- **Not receiving the medicine** as intended (error in medicines administration due to compliance problem or administration error)

Care issues that occur during the evaluation of drug treatment after a period of taking of the medicine might reveal drug-related problems that suggest the patient is on medication that may be;

- The wrong medication for them (It is not working or there is a better alternative)
- Needing to be stopped because the patient no longer needs it
- Producing negative effects, such as an adverse drug reaction or interaction
- Needing to be supplemented to address newly identified patient's needs

A goal of pharmaceutical care is to help the patient receive the right medicine and to be involved in decisions to change their medicines. In our research, the care plan is potentially useful as a document to follow the patient after they have been discharged from hospital.[31] The pharmacist's systematic role can therefore be seen as processes within a quality system feedback loop (Figure 1) and this has been found to be a useful way of teaching pharmaceutical care to clinical practitioners and students, who can then see the purpose of clinical pharmacy practice.

The checking processes can be described according to where they are made in the quality system feedback loop ('verification', 'monitoring' or 'confirmation') described in table 2. Likewise recommended or implemented changes can be categorized as 'adjustment', 'modification' or 'review' as described table 3.

Educational implications

In order to educate future pharmacists to develop their role in the health care system four main objectives are to provide an understanding of the

- Process of delivery of care, through experience in patient care settings, and a development of the caring attitude
- Communication between practitioners through the language of health care to enable better communication with medical practitioners
- The practical use of drugs in the context of disease
- Data collection about the patient together with information about the medication to show how decisions are made in the clinical setting. This helps students deal with the uncertainty that is common in the decision-making process

In talking about changes in delivery of pharmacy services it is useful to refer to the patient's journey through the healthcare system. Likewise, the pharmacy student's journey needs to be seen by their teachers. The student's journey needs to be adjusted by changes in courses delivery and students' learning experiences. For many years the university teaching had not linked teaching in one year to teaching in the next year (causing a lack of horizontal integration). It is now widely recognised that curriculum design must help students to develop as professional practitioners caring for patients starting at the beginning of the student's studies.[32,33]

The pre-graduate studies must establish the main skills and attitudes through the use of case problems. Thereafter the practical period (pre-registration year in the UK) before the pharmacist registers to work independently and during that time practical

experience is gained under the supervision of role models.

The attachment of the student to the role models (the accredited tutors) allows the student to benefit from

- Contact (and engagement) with patients
- Working in a clinical team with other pharmacists, doctors and nurses
- Experiencing the importance of documentation in clinical problem solving. Documentation in clinical problem solving is used as a teaching tool
- The value of sharing knowledge and the required skill in effective communication
- A sense of being responsible for problem solving which comes from the documentation and sharing
- Mounting student confidence in their own abilities
- Contact (and engagement) with patients is done by attending ward rounds and by being given clinical tasks such as to conduct a patient interview or to prepare a case note summary

The sharing of knowledge and the development of improved skill in communication gives the student more confidence in their own abilities. The contact with real patients and their problems allows the student to discuss the options for changes in medication with their tutor.

Pharmaceutical care in community practice and future prospects

Increased patient education, together with social, cultural and technical changes are leading to younger patients being identified with the need for chronic medication. The result adds to increased patient demand for information and education – changes which are leading to higher patient expectations.

Pharmacists based in the high street are increasingly seen by healthcare strategists as having the potential to develop their public health roles in strategies to address prevention and management of disease. Community pharmacists have always had the problem of being at a distance from the community medical centres; and may have had difficulties working together because they are private businesses. The problem of their isolation has been exaggerated by lack of sharing of patient information between pharmacies and clinical teams.

Quality management systems to address errors in prescribing and drug administration are being facilitated by the introduction of information technology solutions.[34] The transfer to electronic environments overcomes some problems with the documentation of care. Increased ease of information exchange and the extension of non-medical prescribing has the prospect of elevating the process of 'prescriptions' to 'therapeutic plans'.[35] Community pharmacy is becoming modernised and increasingly able to provide private consultation areas. Computerisation has allowed better records of medication a patient was on to be maintained in the pharmacy and potentially available to other healthcare team members. In Scotland pharmacists will be linked electronically to other members of the healthcare team.[36]

To address the high incidence of drug therapy problems in the elderly in nursing homes community pharmacists have also adopted a role similar to hospital pharmacists[37] leading to formal contracts in some countries to provide medicines to nursing homes for the elderly.

In recent years, new services from community pharmacies include: Medication reviews;[38,39,40] special services to terminally-ill patients;[41] compliance support to elderly patients;[40,41] methadone services to drug misusers;[42,43] support to chronic psychiatric patients now moved from hospital and living in the community;[44] a major role in anti-smoking campaigns[45] and support to promotion and support of nicotine replacement within a public health strategy.

From 2006 in Scotland Community Pharmacists have agreed to a new contract with the government to provide patient-centred services.[46] Pharmacists are to be re-imbursed not only for dispensing but also for;

- Prescribing for Minor Ailments
- Chronic Disease Management, including repeat medication supplies to patients, compliance and

safety monitoring. Pharmacists will be able to prescribe changes in medication dose and in choice of medication within a plan agreed with the doctor

- Health Education within local health promotion activities as part of local Public Health Strategies

Other developments by community based pharmacists include closer working with Family Doctors. Pharmacists can spend some or all of their time in the community health centres and family doctor centres.[10,11] They offer services such as

- Reviewing patient's medication from the computer and from patient interview. Optimising treatment by stopping or changing medication.
- Running clinics to improve control certain common diseases such as hypertension, thromboembolism
- Building formularies to ensure guidelines are implemented and costs of prescribing are controlled
- Analysing prescribing from computer records in the general physician's office to monitor prescribing

In the UK in 2003, there has been legal expansion of pharmacists' and nurses' roles to include prescribing.[35] This change is allowing multidisciplinary systems for drug treatment individualisation within formal agreements with physicians. The widening of prescribing rights is likely to have a major impact on the range of models of pharmacy practice in Europe, in both hospital and community settings. The extension of prescribing responsibilities to other professions will lead to new models of delivering medicines to patients in order to improve treatment optimisation, efficiency of delivery and patient convenience.

Pharmacists in the UK are developing roles working directly with community physicians in health centres in ways that make those roles analogous to the hospital clinical pharmacist roles working within clinical specialties.[10,11] This new form of clinical pharmacy practice emerging in primary care is reflected in primary care pharmacy specialists being employed to play a liaison role in implementing improved medicines management by working with community physicians, community pharmacists, hospital pharmacists and medical specialists.

Improving the transfer of care

Specialised pharmacy documentation has been developed to address the widespread problem of inadequate post-discharge communication between hospital and primary care.[48,49] The recognition of the importance of multidisciplinary co-ordination in chronic disease management has led to a focus on the need to improve shared care arrangements. The aim is to improve the patient's self management role in diseases such as diabetes, chronic respiratory disease, heart failure, coronary heart disease and rheumatoid arthritis. The reduction in hospital re-admission rates has been one goal of improved chronic disease management.

Arrangements to facilitate secondary to primary care transfer have been developed by hospital and community pharmacists working with nurse specialists in certain 'transmural' programmes, which are well developed in some European countries (such as the Netherlands and Finland). These programmes involve interventions to improve patient education, to provide a hospital contact point for transfer of information and in certain cases follow-up by home visits from a specialist team member (usually a nurse or a pharmacist).

Partnership of health care organisations with Schools of Pharmacy

The future challenge of pharmaceutical care is in community pharmacy and chronic disease management. The growth of clinical pharmacy services and the links with the Universities have increased the need for practice-based research. Universities in adapting to a patient-centred pharmacist philosophy face the challenge to build strength in the field through research. In the UK in the 1990s university pharmacy practice research groups emerged and professors of pharmacy practice have been appointed in all UK

Schools of Pharmacy. The ways that many university research groups have grown in activity has involved establishing co-operation with hospital pharmacists to use a combination of postgraduate teaching with practice research (health services research) to help to develop new patient services.

University-linked research groups within hospitals or primary care settings are sometimes termed 'academic practice units' and are led by senior pharmacists linked to a pharmacy team delivering clinical teaching and practice research. Such units have become recognised by universities and may be partly funded by them. Several such units based in health care settings may be linked to one university research group through networking arrangements.

Universities have founded clinical role models mainly via hospital pharmacists. The hospital environment has more easily provided a suitable learning environment with ready access to clinical data and multidisciplinary co-operation. While the community pharmacy environment provides access to fewer pharmacists with the professional experience of engaging with university staff and with the various types of medical staff. In order to mobilise community pharmacists as student role models, universities must help pharmacists transform the community pharmacy into a more effective learning environment.[50] The model of partnership that is evolving is one in which lecturers in clinical pharmacy practice (that is, faculty members of the School of Pharmacy) may be hospital or community pharmacists with a university link or may be university academic staff with a hospital/community/wider health service link.

Medicines usage continues to offer challenges to society as a whole. The future of pharmacy services has been demonstrated to be in developing the clinical pharmacy role as a means of delivering quality assured use of medicines. The advancement of the function of pharmacists in the quality and efficiency of medicines use will require Schools of Pharmacy to respond with appropriate shifts in the education of the pharmacist as a clinical practitioner.

REFERENCES

1. Cotter SM, Barber ND, McKee M. Survey of clinical pharmacy services in United Kingdom National Health Service hospitals. *American Journal of Health Systems Pharmacy* 1994; 51: 2676-84
2. Miller RR. History of clinical pharmacy and clinical pharmacology. *Journal of Clinical Pharmacology* 1981; 21;195
3. Clark C. UKCPA a quarter century of focus. *Pharmaceutical Journal* 2006; 277: 612-3
4. Koleba T, Martin JG, Jewesson PJ. Entry-level PharmD degree programs in Canada. *Canadian Pharmacy Journal* 2006; 139: 6
5. Sie D, Bates I, Aggarwal R, Borja-Lopetegi A. An analysis of the new UK Master of Pharmacy degree programme: Rhetoric and reality. *Pharmacy Education* 2003; 3: 169-175
6. Mulley B, Hudson S, Taylor P. Development through partnership. *Pharmaceutical Journal* 2007; 278; 278
7. Quinn J, Bates I and Cox R. Postgraduate clinical pharmacy programmes in the United Kingdom: a comparative content analysis. *International Journal of Pharmacy Practice* 1997: 5; 209-215
8. Hudson S. Hospital Pharmacies. In: Mossialos E, Mrazek M, Walley T, eds. WHO Report. European Observatory on Health Care Systems. regulating the sost and use of pharmaceuticals in Europe. Containing costs while improving efficiency, quality and equity. London: Open University, 2004.
9. Chan RC, Ching PL. Pharmacy practice in Thailand. *American Journal Health System Pharmacy* 2005; 62: 1408-11
10. Mullen R, Hassell K. The national pharmacy workforce census (5): The primary care pharmacy workforce in Britain. *The Pharmaceutical Journal* 2003; 271: 326-7
11. Macgregor SH, Hamley JG, Dunbar JA, Dodd TR, Cromarty JA. Evaluation of a primary care anticoagulant clinic managed by a pharmacist. *British Medical Journal* 1996; 312: 560
12. Dean B, Schachter M, Vincent C, Barber N. Prescribing errors in hospital inpatients: their incidence and clinical significance. *Quality Safety Health Care* 2002; 11: 340-4
13. UK Audit Commission. *Spoonful of Sugar. Medicines Management in NHS hospitals*. London: Audit Commision Publications. December 2001
14. Cairns J. Providing guidance to the NHS: The Scottish Medicines Consortium and the National Institute for Clinical Excellence compared. *Health Policy* 2006; 76:134-43
15. Cotter S, McKee M and Barber N. Hospital pharmacists' participation in audit in the United Kingdom. *Quality in Health Care* 1993; 2: 228-31
16. Panton R, Fitzpatrick RJ. The involvement of pharmacists in professional and clinical audit in the UK: a review and assessment of their potential role. *Journal of Evaluation of Clinical Practice*, 1996; 2: 193-198.
17. Cunney A, Williams D, Feely J. Prescription monitoring in an Irish hospital. *Irish Medical Journal* 2003; 96: 20-3.
18. American Society of Heath Systems Pharmacists. ASHP Statement on Pharmaceutical Care. American Journal of Hospital Pharmacy 1993; 50: 1720-1723
19. UK Clinical Pharmacy Association. Statement on Pharmaceutical Care. *The Pharmaceutical Journal* 1996; 256: 345-46
20. American Society of Health System Pharmacists. ASHP *Guidelines on Standardised Method for Pharmaceutical Care*. 1996; 53: 1713-6

21. Wagner E. The role of patient care teams in chronic disease management. *British Medical Journal*, 2000; 320: 569-72
22. Hepler CD, Strand LM. Opportunities and responsibilities in pharmaceutical care. *American Journal of Health Systems Pharmacy* 1990; 47: 533-543
23. Cipolle RJ, Strand LM, Morley PC. *Pharmaceutical Care Practice*. New York: McGraw Hill, 2005.
24. McAnaw JJ. PhD Thesis. Glasgow: University of Strathclyde, 2003.
25. Scottish Executive. *The Right Medicine: The Strategy for Pharmaceutical Care in Scotland*. Edinburgh: Scottish Executive, 2002.
26. Foss T, Gant R. Development of a clinical pharmacy technician training course. Hospital Pharmacist 2003; 10: 9-10
27. Department of Health. *Medicines Management Framework*. London: Department of Health, 2001.
28. Scottish Office Department of Health. *Clinical Pharmacy in the Hospital Pharmaceutical Service: A Framework for Practice*. (Ed Cromarty J). Edinburgh: Scottish Executive, 1996.
29. Anderson S. Reconfiguring the pharmacy workforce – is it time for a three tier Register? *Pharmaceutical Journal* 2007; 278: 306
30. Macintyre J, Dalrymple H, Maclean F, Lannigan N, Hudson S. Development of a system for reporting pharmaceutical care issues in patients receiving cancer chemotherapy. *Pharmaceutical Journal* 2003; 271: 266-267.
31. Fisher J, Macintyre J, Kinnear M, Hudson S. Design and evaluation of a documentation system to support continuity of pharmaceutical care of day-case oncology patients between hospitals and community pharmacists. *International Journal of Pharmacy Practice* 2006; 14: 149-157
32. Drab S, Lamsam G, Connor S, DeYoung M, Steinmetz K, Herbert M. Incorporation of Service-Learning Across Four Years of the PharmD Curriculum. *American Journal of Pharmaceutical Education* 2004: 68: 1-9
33. Zarembski DG, Boyer JD, Vlasses PH. A Survey of Advanced Community Pharmacy Practice Experiences in the Final Year of the PharmD Curriculum at US Colleges and Schools of Pharmacy. *American Journal of Pharmaceutical Education* 2005; 69: 10-18
34. Bates DW. Using information technology to reduce rates of medication errors in hospitals. *British Medical Journal* 2000; 320:788-791.
35. UK Department of Health. Supplementary prescribing by nurses and pharmacists within the NHS in England: A guide for implementation. London, March 2003
36. News Feature. All community pharmacies in Scotland will be connected to the NHSnet soon. *Pharmaceutical Journal* 2003; 271; 139
37. Hanlon JT, Lindblad CI, Gray SL. Can clinical pharmacy services have a positive impact on drug-related problems and health outcomes in community-based older adults? *American Journal of Geriatric Pharmacotherapy*. 2004; 2:3-13
38. Carter S. Medicines management: Opportunities for pharmacists in new GMS contract. *Pharmaceutical Journal* 2004; 272: 350-1
39. Wang L-N. How to make a success of medication use reviews (MURs). *Pharmaceutical Journal* 2007: 278; 315-318
40. Krass I, Smith C. Impact of medication regimen reviews performed by community pharmacists for ambulatory patients through liaison with general medical practitioners. *International Journal Pharmacy Practice* 2000: 8; 111-20
41. Bellingham C. Pharmaceutical model schemes set to underpin changes in practice. *Pharmaceutical Journal* 2003; 271: 575-6
42. Gruer L, Wilson P, Scott R, et al. General practitioner centred scheme for treatment of opiate dependent drug injectors in Glasgow. British Medical Journal 1997; 314: 1730-35
43. Roberts K, Hunter C. A comprehensive system of pharmaceutical care for drug misusers.. Harm Reduct J. 2004; 1: 6
44. Bell S, McLachlan AJ, Aslani P, Whitehead P, Chen TF Community pharmacy services to optimise the use of medications for mental illness: a systematic review. Aust New Zealand Health Policy. 2005; 2: 29
45. Maguire TA, McElnay JC, Drummond A. A randomised controlled trial of a smoking cessation intervention based in community pharmacies. Addiction 2001; 96: 325–31.
46. Bellingham C. Introducing the new Scottish contract. *Pharmaceutical Journal* 2005; 275: 637
47. Zermansky AG, Petty DR, Raynor DK, Freemantle N, Vail A, Lowe CJ. Randomised controlled trial of clinical medication review by a pharmacist of elderly patients receiving repeat prescriptions in general practice. *British Medical Journal* 2001; 323: 1-5
48. Cromarty E, Downie G, Wilkinson S, Cromarty JA. Communication regarding discharge medicines of elderly patients: a controlled trial. *The Pharmaceutical Journal* 1998; 260: 62-64
49. Burns JMA, Sneddon I, Lovell M, MacLean A, Martin BJ. Elderly patients and their medication; a post-discharge follow-up study. *Age and Ageing* 1992; 21: 178-81
50. Speedie MK. Advancing Our Pharmaceutical Care Agenda: Reaching Out. American Journal of Pharmaceutical Education. 2003; 67:1-2

Table 1: Pharmaceutical Care Issues and Drug Therapy Problems (Taxonomy)

Action Check	Drug therapy problem addressed by the care issue (actual or potential)	Action Change
Medication needs	• Additional Medication Needs • Unnecessary Medication Use	*Patient behaviour* • Patient expectations of treatment • Comprehension • Participation *Patient data handling* • Patient characteristics • History (indications, contra-indications) • Continuity of care *Treatment plan changes which address* • Drug Choice • Dose __ • Route, dose-form • Dose interval / timing • Course duration • With added precautions/ interactions • Stop drug pending review
Effectiveness	• Wrong Drug for the Patient • Dose too *LOW*	
Safety	• Dose too *HIGH* • Adverse Drug Reaction *Anticipated/ unanticipated*	
Compliance	• Inappropriate Compliance	

Table 2: The systematic role of the pharmacist in providing pharmaceutical care: Checks in the quality assurance of medication

Checks at the *Start of Treatment*	
Verification of appropriateness of medications in the proposed treatment plan	*Checks to make sure that for each medicine, the patient* • Is on the Right Medicine • Is on the Right Dose • Is not on Unnecessary Medication • Doesn't have any new needs for additional medication • Is not receiving a combination of interacting medicines • Understands how to take their medication and what it will do to them
Checks as treatment *Continues*	
Monitoring implementation of treatment is appropriate and checking for safety and effectiveness	*Checks should ensure that, for each medicine, the patient* • Is on receiving medication as intended • Continues to be on the most suitable Dose • Has no symptoms of unwanted (adverse) effects • Understands how to take their medication
Checks after a period of a *Course of Treatment*	
Confirmation ***Checking that medication is producing positive outcomes***	*Confirmation and documentation to identify that medication is* • Resulting in expected effects on the patient's condition. • Failing to control a condition. • Producing unwanted effects requiring clinical review

*__Checks__ address safety, effectiveness, the need for a medicine and compliance with the administration requirements (Cipolle and Strand23)

Table 3: The systematic role of the pharmacist in providing pharmaceutical care: Changes recommended in the quality assurance of medication

Changes recommended at the *Start of Treatment*	
Modification/Adjustment* of the proposed treatment plan	*Changes recommended to address initial inappropriateness to ensure the patient* • Is on appropriate medication • Is on appropriate medication regimen • Has all needs for medication addressed • Has the necessary understanding of how to take their medication and what it will do to them
As treatment *Continues*	
Modification/Adjustment* of the initial treatment plan	*Changes recommended should ensure that any necessary individualisation is implemented so that the patient has their* • Dose adjusted according to the treatment plan • Medicine choice changed if it is part of the initial treatment plan • Education re-inforced about their medication and their condition • Continuity of care maintained
After a period of a *Course of Treatment*	
Prompting a review of the initial treatment plan	*Changes recommended as a result of a review of the treatment plan by the health care team* • Dose changes outside the initial treatment plan • Choice of medication changed outside the initial treatment plan • New requirements for patient monitoring outside the initial treatment plan to ensure safety/effectiveness

****Adjustment*** is defined as a recommended change to patient behaviour, treatment regimen or continuity of care that individualises pharmaceutical care within the agreed treatment plan

****Modification*** is defined as any other recommended change other than the ***Prompting of a review*** which is defined as a complete review of the initial treatment plan

Figure 1: Pharmaceutical care model: A quality system feedback loop for the use of medication in individual patient care

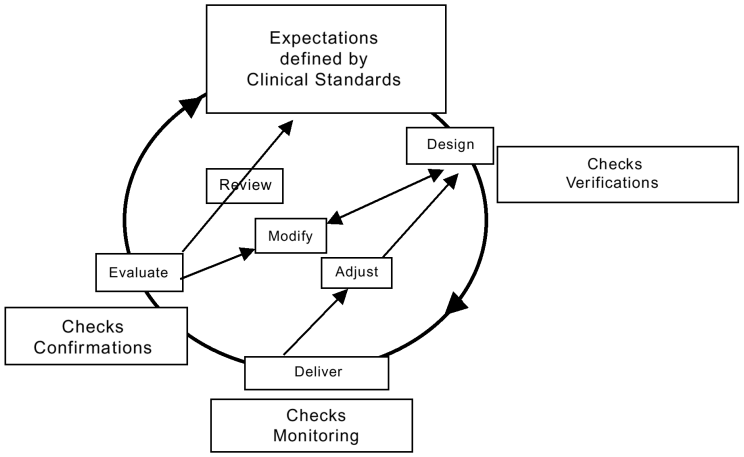

Figure 2: Horizontal Integration of in-patient pharmaceutical care