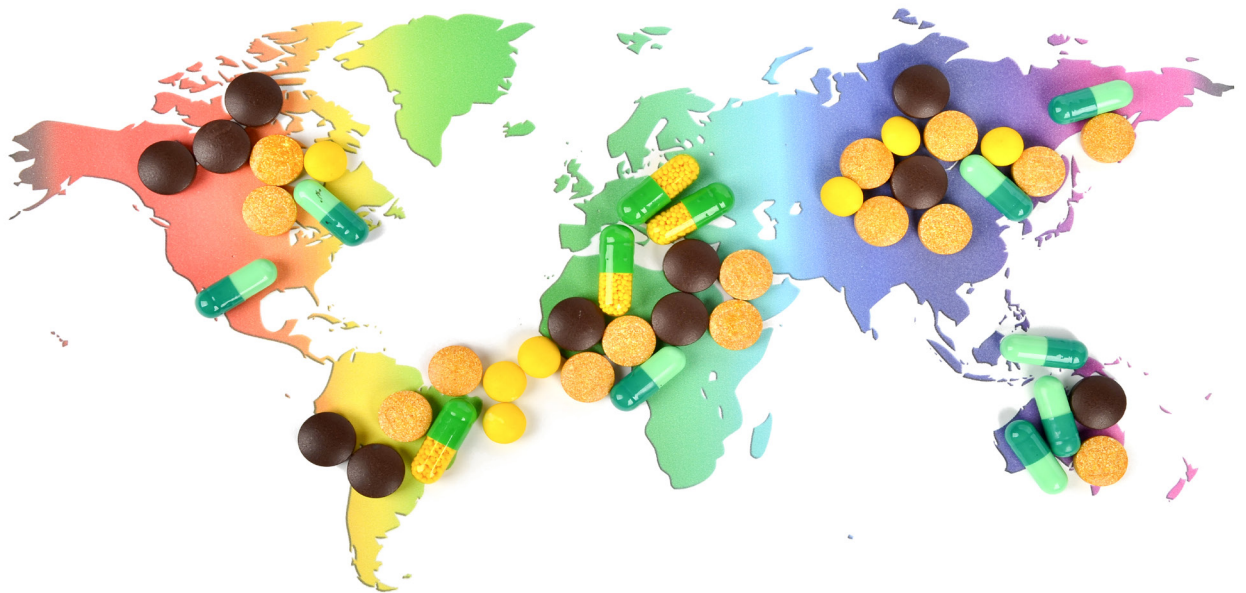


# The Global Pharmacist



This report has been funded by UK aid from the UK Government, however the views expressed do not necessarily reflect the UK Government's official policies.

The views expressed in this report are the opinions of the authors based on the experience gained during the Students as Global Citizens project and do not necessarily reflect the views of their institutions or wider professions.

# The Global Pharmacist

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## Foreword



Professor Duncan Q.M. Craig FRPharmS  
Director, UCL School of Pharmacy  
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I am delighted and honoured to provide a foreword for this publication, which outlines the outcomes of the 'Students as Global Citizens' project, run in collaboration with our partners in Institute of Education (University of London), the UCL Institute for Global Health, the Royal Veterinary College and the London International Development Centre.

The changing nature of global healthcare, communication and education now require us to look closely at ourselves and the manner in which we are preparing students worldwide for these new challenges and opportunities. As a well-established educational institution, we have a particular responsibility to begin such considerations close to home and I am very pleased to report that the work outlined in this project has had a significant influence on our own course design as we move forward into our new MPharm degree. We hope that other Schools will find it equally informative and stimulating and we look forward to an era in which we place much more emphasis on producing rounded and considerate individuals who will lead the profession forward to the maximum benefit of public health worldwide.

Our profound thanks go to the UK Department for International Development who funded the project and we look forward to continuing to develop our thinking and our courses, informed by these highly topical and vitally important considerations.



Professor Tina Penick Brock BPharm, MSc, EdD  
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Almost 25 years ago, as a new pharmacy graduate in the United States, I had only minimal understanding of the key issues associated with global health and even less appreciation for the tremendous impact these ultimately would have on my life – professionally and personally. Now, placing these in the context of a career that spans a variety of settings and locales, it is clear to me that purposeful exposure to global and development issues is critical for creating a pharmaceutical workforce with the knowledge, skills and attitudes to address the health needs of a society that has evolved into a ‘global village’.

In this report, the globally-engaged authoring team suggests that pharmacists must take responsibility for increasing access to and improving use of medicines in both *locally globalized* environments such as the United Kingdom and *globally localized* environments such as those further afield. Citing findings from the ‘Students as Global Citizens’ project and highlighting perspectives from educators, researchers, and students, the authors describe ways that this can be taught intentionally – from surface explorations to deep dives, by connecting across health professions, and inclusive of undergraduate and post-graduate instructional systems.

The next generation of healthcare professionals in our global village will surely benefit from the chance to work toward the proposed global pharmacy learning outcomes!





## Executive Summary

Globalisation can facilitate improvements in health through the speed and ease of shared information, advances in health care delivery and health policy, and the enhanced pace of discovery through international research collaborations. However, there are associated potential risks to health such as the spread of communicable diseases and antibiotic-resistance. Current international priorities in the development, supply and use of medicines reflect the influence of globalisation. This is relevant to all aspects of contemporary pharmacy, and means that graduates are increasingly working in a globalised profession.

The challenge for schools of pharmacy, as for other higher education institutions, is how to best prepare our students so that they develop an appreciation of the importance of global perspectives in health and medicines use, acquire the skills and aspirations to address new challenges, and recognise the career opportunities that this presents.

This publication reflects upon the experiences of the 'Students as Global Citizens' project from a pharmacy perspective. The project was a collaboration between the UCL School of Pharmacy, the Institute of Education (University of London), the UCL Institute for Global Health, the Royal Veterinary College and the London International Development Centre, and was funded by the UK Department for International Development. The main aim of the project was to develop and evaluate methods to integrate teaching and learning about global and development issues into undergraduate curricula in pharmacy, medicine and veterinary medicine.

This work has led to the development of a range of new teaching and learning activities within the UCL School of Pharmacy, as well as a draft set of Global Pharmacy Learning Outcomes. This report outlines these initiatives and is intended to generate further debate and dialogue regarding teaching and learning about global health concerns within UK schools of pharmacy and higher education institutions, as well as the pharmacy profession more widely. The report also aims to encourage pharmacy students to recognise the importance and relevance of global issues to their education and professional development and to understand the ways in which global issues will impact their future careers.

## Introduction

The processes of globalisation have led to an increasingly interconnected world, with both benefits and costs for health. The speed and ease of shared information, advancements to health care delivery and health policy, and the increased pace of discovery through international research collaborations, can all facilitate improvements to health. At the same time, a significant increase in international travel has assisted the spread of communicable disease, such as the 2003 epidemic of severe acute respiratory syndrome (SARS) and the growth of antibiotic-resistant *Pneumococcus*. Worldwide, non-communicable diseases which until relatively recently were principally associated with the most affluent regions have become a major concern across the globe. A range of particular problems in medicines and health, such as counterfeit and poor-quality antimalarial drugs, gaps in funding and immunisation for polio eradication, the expected increase in global cancer incidence rates, and drugs for neglected tropical diseases such as rabies, leprosy, Yaws disease and dracunculiasis, also highlight the importance of global perspectives on health. A lack of skilled professionals, in particular net migration from 'developing' to 'developed' countries is also recognised as a barrier to the delivery of effective health care around the world. Health priorities, for which the supply and use of medicines is often central, must increasingly be viewed from a global perspective.

The importance of global perspectives is recognised by both the UK government and international health organisations. The International Pharmaceutical Federation (FIP), in collaboration with the World Health Organization (WHO) and United Nations Educational, Scientific and Cultural Organization (UNESCO), has formed a Pharmacy Education Taskforce<sup>1</sup>, which promotes international collaboration in supporting, developing and strengthening pharmacy education worldwide. The Board of Pharmaceutical Sciences (BPS) of FIP similarly recognises the

importance of a global context for the future of the pharmaceutical sciences, acknowledging that educational programmes will need to reflect rapid changes in, and application of, new knowledge, as well as emerging issues of global concern<sup>2</sup>.

Pharmacy student bodies further endorse the need for a global perspective. Membership of the British Pharmaceutical Students' Association (BPSA) ensures automatic membership of the European Pharmaceutical Students' Association (EPSA) and the International Pharmaceutical Students' Federation (IPSF). The EPSA runs a number of schemes to encourage the mobility of their members, with the aim of enhancing cooperation between EPSA member countries. The IPSF also promotes student mobility, providing financial assistance through its Development Fund. Last year, the 'Student Declaration on the Future of Pharmacists' document produced by the EPSA and the IPSF was signed at the Centennial Congress of the FIP (see EPSA & IPSF 2012). In this declaration, the student authors make it very clear that pharmacists have an international role to play, for example, in crisis situations, in improving the access to medicines and health in impoverished areas and isolated populations, in solidarity work related to the support of health and social causes, in Non-Governmental Organisation (NGOs), in increasing the development of medicines for rare diseases and those affecting vulnerable populations, and in assessing the environmental impacts of research.

It was in the context of the challenges that globalisation presents for the higher education of health professionals that the UK Department for International Development (DFID) funded a 3-year research and development project called 'Students as Global Citizens' beginning in 2009. It was a collaboration between the UCL School of Pharmacy, the Institute of Education (University of London), the UCL Institute for Global Health, the Royal Veterinary College and the London

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1 See [www.fip.org/education](http://www.fip.org/education)

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2 See [www.fip.org/pharmaceutical\\_sciences](http://www.fip.org/pharmaceutical_sciences)

International Development Centre. The main aim of the project was to develop and evaluate methods to integrate teaching and learning about global and development issues into undergraduate curricula in pharmacy, medicine and veterinary science.

The work of the project led to the development of a range of new teaching and learning activities within UCL School of Pharmacy, as well as a draft set of Global Pharmacy Learning Outcomes (see page 20). This report outlines these initiatives and aims to generate further debate and dialogue regarding teaching and learning about global

health concerns within UK schools of pharmacy and higher education institutions, as well as the pharmacy profession more widely<sup>3</sup>. The report is also intended to encourage pharmacy students to recognise the importance and relevance of global issues to their education, professional development and future careers.

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3 Discussion of the project's work with medicine and veterinary medicine can be found in Willott et al (2012) and Maud et al (2012).

## The Patient – From a Global Perspective<sup>1</sup>

Consider the case of a 40 year-old woman who has recently been diagnosed with tuberculosis (TB). A migrant from Pakistan, she is currently living in cramped conditions in east London. Examining this patient's situation from a purely clinical perspective, one might argue that it is caused by the bacterium *Mycobacterium tuberculosis*, which interacts with the body at a cellular level to produce the symptoms of TB. The diagnosis indicates a particular kind of treatment, normally a long course of antibiotics. The clinical perspective might also look at the living conditions that led to TB being prevalent in the patient's environment, and consider whether this could have an impact on successful treatment.

A global perspective on this patient would be significantly different. First it might ask whether the patient is representative of broader trends in TB prevalence by gender, ethnicity and social class. When did she arrive in the UK? What circumstances led to her living in cramped, unhygienic conditions that led to her acquiring TB? This could initiate a discussion of the relative affluence or poverty of ethnic minority groups in different parts of the UK, which could lead to a further discussion of rising levels of social and economic inequality. It might examine recent changes to housing benefit laws that have forced poor families in London to find very cheap accommodation and has led to a surge in the numbers of people living in cramped, unhealthy conditions. It could lead to further discussion of the nature of poverty itself and its meanings for those experiencing it.

This perspective has significant implications for the treatment and advice that a pharmacist would give to this patient. For instance, given these circumstances, what factors may influence adherence to a prescribed drug treatment plan and successful completion of the course of treatment? Furthermore, what other determinants might impact on this (e.g. language, access to medication, understanding of instructions regarding timing and dosage of drugs)? Are there any particular health beliefs that could impact on treatment (e.g. previous experiences of using antibiotics, traditional medicines, diverse understandings of health and well-being)? Lastly, are there any cultural issues that have influenced her situation? Is the patient relying particularly on her husband, children or broader community for support with healthcare, including translation? Has this influenced her attitude to seeking care? Looking more deeply at this question may involve gaining a greater understanding of Pakistani immigrant communities in the UK, or whether there are social or cultural issues preventing the woman accessing care, or not having a positive experience when she does access it.

<sup>1</sup> This text borrows from a similar case study in Willott et al (2012: 7).

## What is Global Pharmacy?

The nature of contemporary pharmacy means that all graduates are *de facto* working in a highly globalised profession. In the UK, the roles most commonly undertaken by pharmacy graduates are those in community and hospital practice, with a smaller proportion pursuing a career in academia or the pharmaceutical industry. Pharmacists in the UK, and elsewhere, are likely to encounter increasingly diverse patient populations. They will also be involved in the management of diseases that have generally been associated with other regions but now have increased prevalence in the UK (e.g. malaria, tuberculosis).

Pharmacists also engage with and are part of the international pharmaceutical industry and supply chains. They encounter problems such as resistance to existing drugs or recreational drugs becoming drugs of abuse, which highlight the complex issues of international regulation and global markets. Medicines supplied through unregistered online pharmacies, online advertising of prescription drugs, direct-to-consumer websites,

and the distribution of SSFFC (substandard and spurious, falsely-labelled, falsified or counterfeit) medicines present further challenges. Thus, global perspectives are necessary for the profession to develop and maintain effective channels for the supply, and safe and effective use of medicines.

The work that pharmacists undertake in diverse settings provides a different range of challenges. These might include supporting the appropriate treatment and management of locally prevalent diseases, interacting with different health care systems, responding to medicines counterfeiting and the use of traditional medicines, and the development of new drugs and drug delivery systems to address specific or regional health needs. An international dimension is therefore increasingly pertinent to all aspects of pharmacy and medicines: discovery, development, formulation and use of medicines, health care systems and health priorities; and the roles of health professions including pharmacy.

### Pharmacists, traditional medicines and 'medicines of the shop'

Professor Michael Heinrich, UCL School of Pharmacy

People in the UK and practically all other countries utilise a wide range of foods and medicines with acclaimed therapeutic benefits. Often coming from local and traditional knowledge many of these products have become global commodities with new products from all corners of the world entering the world's markets on a regular basis. Such products are likely to be the latest (now often internet-driven) hypes in the market of globalised health-related commodities.



In the context of medicines, pharmacists will be among the first to know what patients may be using in addition to prescribed medicines. They are also able to offer advice on what changes to a person's lifestyle (including diet and the use of medicinal products) may help in managing chronic, and other, e.g. ageing-related disorders. Again many of these products are derived from local knowledge which has gone global. In addition, the common use of herbal medicines and other products in immigrant communities is now widely recognised, but still known only to a limited extent and again pharmacists need to engage with it.

However, there is a much larger challenge for pharmacists. A huge share of the world's population has no or very limited access to adequate levels of healthcare and medicines. For obvious reasons, in large parts of Africa, Asia, and the Americas, local and traditional medical practices and (often) herbal medicines are the first choice. 'Medicines of the shop' on the other hand, are what the name indicates – unlicensed or licensed products sold in general shops or by ambulant vendors, often with inappropriate or even outrageously wrong therapeutic claims and, of course, without adequate advice and a lack of quality assurance. Counterfeit medicines (including herbal medicines) are just one of the many problems linked to this.

Pharmacists are global citizens and face challenges and opportunities in engaging with these diverse responsibilities associated in essence with the widespread use of what are often called 'natural' medicines.

## The role of the global pharmacist in today's international pharmaceutical industry

Professor Nigel Ratcliffe, Head,  
School of Pharmacy, Keele University,  
Staffordshire, UK



The Pharmacist has always been a well-equipped individual and a valuable recruit for the Pharmaceutical industry. A key contribution they make and key leaders they can become. Long this must continue. What are the challenges that the industry faces?

The challenges are many, let's explore a few.

Who is prepared to pay for new medicines and what are they prepared to pay for? There is no doubt that a product now must without doubt have a major point of differentiation from what is currently available. Not just what is generically available but also differentiated from the first in class. The best illustration here is the Statin class. No doubt the incremental benefits of the 2nd, 3rd and 4th in class were clearly understood but the impact of generic simvastatin on the market was unprecedented. No longer may the search for best in class be the rationale for entering or remaining in an area of research science. First in class is today more important. This means that the stakes are even higher and the race to be first more important than before. The risk for big pharma of setting up a research foothold and being 'pipped to the post' is significant. The first in class may be reimbursed but the subsequent molecule may not. So the large companies are focusing on assessing and acquiring, through a variety of creative deal structures, science and products through externalisation i.e. the licensing in or acquisition of science. Risk share agreements, co-development, co-marketing are more the vogue today than the investment in multiple expensive research targets.

What does this mean for the Pharmacist today that enters industry? They need to be business savvy, they need to be able to spot opportunity, assess opportunity, and understand the market and unmet medical need and they need to act fast and decisively. What better all-round individual is there than the pharmacist to understand and adapt to serve the industry. The opportunities may also not be on your doorstep. In today's world we have to have a global medicine. All pharmacodynamic and pharmacokinetic differences must be understood. In today's small electronic world the global pull for an innovative first in class medicine will be immediate. No longer is a medicine available for a period of time in the home market and then other markets approached. Today's pharmaceutical developments have to be global. Today's pharmacists must emerge trained with a global perspective and must approach product development asking what they would want to know to be assured of a product's safety for all potential recipients. We also need pragmatic leaders and those who are prepared to lead objectively, to communicate well with the societies and governments served or the costs and delays incurred will reduce the number and speed of delivery of the remaining opportunities to patients.

So moving forward, the Pharmacist must emerge from University with a global awareness, they must have finely attuned communication skills but it remains crucial that they maintain their core proficiency in science. Science is their foundation, but those who can emerge with some insight into the global environment and business that is operating will be of high value.



## Medicines' counterfeiting and the role of pharmacists in preventing harm to global public health

Professor David Taylor, UCL School of Pharmacy



Medicines' counterfeiting is, because it is widely seen as a potential threat to every medicines taker, a highly newsworthy 'story', which is often reported in dramatic language. This modern reality builds on the fact that the quality and authenticity of medicines has been a cause for public concern throughout history. Even when populations were (as several billion individuals are in large part still today) reliant on herbal and other 'natural' treatments for treating sicknesses, there were dangers that medicinal plants would be misidentified by well-intended individuals, or deliberately misrepresented by others intent on fraud. In the 17th Century, for instance, widespread adulteration for a period undermined public confidence in the efficacy of Chinona bark (the natural source of quinine) as a treatment for malaria, which was then prevalent in many parts of Europe. The available evidence indicates that in today's world many more people are killed or otherwise harmed by a lack of access to health care professionals and appropriate, good quality, pharmaceuticals than by falsified medicines, defined as illegally made drugs that are dishonestly sold as products supplied by legitimate manufacturers. However, even though some estimates of the extent of medicines counterfeiting (such as claims that '10 per cent of the world's medicines by value are falsified') have on occasions been incorrectly attributed to the WHO and are almost certainly exaggerations, there is no doubt that hazards to the public's health exist. Even if in reality only 1 per cent by value of the world's medicines is supplied by counterfeiters who evade regulatory controls designed to assure product safety and effectiveness, this endangers millions of people.

Populations living in economically advantaged countries and regions such as the United States, Europe and Japan are in the main well protected. Yet even in these settings untoward incidents occur. In America, for example, there have been recent cases of falsified versions of drugs such as Avastin (made by Roche, and primarily used in cancer care) and Adderall (an ADHD treatment from the major generic manufacturer Teva) being supplied via legitimate health care providers, as well as via unregulated internet sources. By contrast in poorer parts of the world like sub Saharan Africa and large areas of south eastern Asia the risks associated with medicines falsification are greater. There is robust evidence that in the order of a third of the anti-malaria medicines supplied to vulnerable communities have in the recent past been falsified, and that this leads to not only avoidable deaths but in some circumstances increased drug resistance. Such problems will tend to increase in both low and middle income national settings if public expectations and demands for treatment rise faster than governments' abilities and/or willingness to provide affordable universal access to care, and as technologies like those needed to produce good quality fake pharmaceutical packaging and deliver medicines via the internet continue to improve. Effective action to protect the global public's health needs to take place at a variety of levels, from constructive co-operation between governments through to diligence and integrity amongst individual pharmacists and medicine purchasers and users.

## Developing a Global Pharmacy Curriculum at UCL School of Pharmacy

Research conducted as part of the project at UCL School of Pharmacy identified a desire from both staff and students to embed global issues more formally within the MPharm curriculum. It also highlighted further questions:

- What global issues are already being included within the current MPharm curriculum, and what kinds of teaching and learning approaches are being used (e.g. lectures, workshops, problem-based learning)?
- How do staff at the School perceive the relevance of global issues to pharmacy education and practice?
- How do students at the School perceive the relevance of global issues to pharmacy education and practice?
- Specific diseases such as malaria, elephantiasis and leishmaniasis
- Traditional and herbal medicines
- Clinical trials
- International patent laws
- Mental health and illness in diverse cultural settings
- Demographic and epidemiological transitions, and their social and economic impacts
- Inequalities in health and the extent to which they might be reduced, nationally and internationally
- Aspects of cultural diversity in the UK in terms of medicine-taking and access to healthcare

The project team conducted a range of activities to explore these questions, including a review of the current MPharm curriculum, surveys and interviews with staff and students, and piloting several new teaching and learning activities. The findings are discussed below.

### Global issues already included within the MPharm curriculum

A review of MPharm curriculum (2011-2012) documents and interviews with staff identified a number of existing opportunities for students to learn about global health topics. Global pharmacy issues are introduced to all MPharm students in the early years of study and further developed throughout the 4-year degree programme in diverse contexts, such as:

- Infectious diseases from a global perspective
- Impact of global travel on the spread of infectious diseases
- Global warming and loss of biodiversity
- Drugs of abuse
- Understanding the roles and activities of international organisations (WHO and UNICEF)

In addition, Global Pharmacy is the main topic of study in a dedicated optional module for final year MPharm students. Approximately 30 students take the module 'Health care, medicines and pharmacy in developing countries' every year. It provides an opportunity for students to examine a wide range of factors that affect health and medicines use in low and middle-income settings and to compare these with those found in higher income nations including the UK. Topics include patterns of mortality and morbidity, important diseases and health care needs in developing countries; health care systems and provision in different parts of the world and the place of pharmacy services; pluralism in health care, especially where 'western' and different forms of 'traditional' care and medicines use operate side-by-side; social, economic, environmental and educational factors which influence access to, and use of medicines; health and drugs policies, regulation and role of WHO, other NGOs and pharmaceutical industry; the context of culture: health beliefs, self-medication and the use of medicines in different cultures.

The majority of teaching staff (32/50) include global or development issues within their teaching, although to varying degrees. Delivery of material is often through discussion of international



## Pharmacists specialising in the care of older people

Dr. Mine Orlu Gul

Department of Pharmaceutics, UCL  
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Life expectancy in low-income countries is increasing in a similar manner to that in many European countries. Over 60% of the world's older population currently live in China and India. However, despite the changing demography, specialist medical services for older people in less developed countries are inadequate. The number of geriatric pharmacists is limited to providing healthcare to older patients with impairments and specific needs. Older patients are often prescribed a high number of drugs due to co-morbidities. Sensitivity to drugs and the susceptibility to side effects lead to increasing numbers of adverse drug reaction-related hospital admissions in older patients. Therefore ideally all seniors would receive high-quality pharmaceutical care from specialised pharmacists.

In the USA, geriatric certification for pharmacists is a growing trend. The only organization that offers a certification in geriatric pharmacy is the Commission for Certification in Geriatric Pharmacy. To become designated as a Certified Geriatric Pharmacist, one must be a licensed pharmacist, having practised for a minimum of two years, and successfully pass a written examination on geriatric pharmacy practice and principles of geriatric drug therapy. The Certified Geriatric Pharmacist (CGP) credential is ideal for pharmacists who provide medication management services to older adults. The examination is offered internationally and there are CGPs in several countries around the world. In USA, training in geriatric pharmacy can be received while enrolled on the PharmD programme. There are courses on assessment and pharmacotherapy of older adults and elective modules such as ageing, mental health of older adults and medical devices for home health care. In the rest of the world, geriatric pharmacy practice teaching is either in the form of a placement in an older people's ward or as an optional course to help students develop specialist knowledge and skills in geriatric pharmacy practice. Education with a focus on geriatric pharmacy practice should be standardised to provide a uniform pharmacy service to older people globally.

perspectives in lectures and tutorials, with staff both formally and less formally drawing on their own international experiences. Collaboration with community projects (e.g. the Green Light Pharmacy in London), and presentations by guest speakers with particular experience and expertise are further examples. A few staff explore global topics in more detail as part of MPharm research projects, group discussions or assignments.

However, in most cases, global health receives only a brief mention in relation to specific areas of study (e.g. disease prevalence or differences in patterns of medicines use in different parts of the world).

## Neurological and psychiatric disease Professor Alex Thomson, UCL School of Pharmacy

Neurological and psychiatric disease present enormous challenges to the economy in general and to health and social service provision in particular. Many difficulties are encountered in attempts to provide adequate treatment, not least an incomplete understanding of the root causes of many of these illnesses and why and how available treatments work. Since many treatments come with unpleasant side effects, the pharmacist has a fundamental role in advising and in encouraging adherence. In addition, there



is only limited reliable information about their incidence and prevalence, especially in the developing world and whether frequently encountered comorbidities are cause, effect, or arise, independently, from a common cause. Environmental factors, e.g. pollutants like pesticides and exposure to metals like manganese, which contribute to oxidative stress, also appear to play a significant role in, for example, the etiology of Parkinson's disease.

Gene polymorphisms have been linked to the pathogenesis of brain diseases. For some, different sites on several different genes are identified as risk factors, though penetrance varies. These identified familial risk factors do not yet explain the majority of cases of brain disease, however, and the incidence of genetic risk factors and their contributions to disease vary across ethnic groups. Predictions of the risk of developing schizophrenia include well established factors like genetic risk/familial history and a reduced incidence (of newly diagnosed disease) with advancing age. In contrast, factors for which there is some evidence, such as season of birth, maternal starvation and exposure to infections in utero, remain controversial. Etiological evidence suggests that susceptibility to Alzheimer's disease (AD) is controlled genetically, but the precise nature of the underlying risk genes and their relation to AD biomarkers remains unclear. As understanding increases, treatments will become directed towards patient subgroups requiring pharmacists to become increasingly involved in selection of the appropriate treatment.

Expectations that the pharmaceutical industry will make significant progress in the treatment of these diseases in the near future have been dulled by the recent closure of many major industrial neuroscience programmes. Perhaps particularly distressing is the effect of malnutrition, particularly in utero and during the first two years of life, on the risk of complications for cognitive development and many other brain diseases. Malnutrition is often exacerbated by intestinal worms, which compete for iron and nutrients and cause mucosal damage and inflammation, while poverty encourages the shift from nutrient-rich to high calorie, low nutrient foods. More than two billion people worldwide may be at risk of iodine deficiency, with the consequent risk of hypothyroid related neurological impairment. Salt iodization, adequate intake of energy, protein, and either foods rich in nutrients or dietary supplements have contributed to improved mental performance in schoolchildren. The importance of the local pharmacist in providing advice matched to local conditions cannot be overstressed.

## Staff perceptions of the relevance of global issues to pharmacy education and practice

Global issues are not mandatory to the MPharm curriculum, and in all cases the inclusion of global health topics is dependent on the interests and knowledge of individual staff members. This reflects the wide range of research concerning global health issues conducted by UCL School of Pharmacy staff, many of whom are prominent researchers in their fields. Those with international experience or who are themselves from other countries, for instance, are more likely to see global issues as relevant to their teaching, regardless of their area of expertise. While this kind of exposure is certainly valuable for students, its coverage and impact on learning are hard to assess and can be highly changeable. Such an approach to including global topics in the curriculum is also unlikely to be sustainable in the long term, especially without a supporting framework of agreed learning outcomes.

For those staff that, at the time of the research, stated that they did not include global issues in their teaching, three main reasons emerged. These included perceptions of the overall relevance of these issues to the everyday practice of pharmacy in the UK, concerns about how to incorporate them within an already-crowded curriculum, and the perception that teaching about global issues cannot be easily embedded in teaching more 'technical' subjects. As one staff member commented: 'I think it is "nice to know" about global and development issues but not "need to have" because I cannot see how knowing about global health inequalities will impact on the daily practice of a pharmacist'. Similarly, many staff members argued that the crowded nature of the MPharm curriculum means that priority should be given to material that is perceived to be more relevant to the practice of pharmacy in the UK.

Despite such concerns, discussions with staff members also highlighted that there was very positive support for the need to address global and development issues within the undergraduate curriculum. Many noted, for instance, that a

significant proportion of the School's students come from countries other than the UK (in 2012, these constituted approximately 25% of the student population). Since international students are likely to go back to their home countries to practise the profession, they will need the knowledge and skills to deal with global health issues. Moreover, a significant proportion of the School's 'home' students come from diverse cultural backgrounds, and so bring with them different perspectives on health and medicines which can enhance their learning.

For some staff, inclusion of global and development issues in the curriculum was also considered important for the broader and more rounded education of pharmacy students. It was commented that a role of higher education is to motivate individuals to tackle challenging issues. Some staff also stated that a pharmacy degree should not be limited to producing community or hospital pharmacists, but rather it should equip students with a broad set of skills and knowledge to be able to consider different career paths.

More broadly, a number of staff members argued that pharmacists hold a responsibility as healthcare professionals towards global health issues because they are not merely technicians, but rather active players in healthcare systems that are influenced by both national and international factors. As one staff member stated: 'You cannot understand many UK health problems without understanding global health issues'.

## Students' perceptions of the relevance of global issues to pharmacy education and practice

Students at the UCL School of Pharmacy were also surveyed in order to explore their perspectives on the relevance of global issues to their training, as well as how and where they thought that those issues should be included in the curriculum. The sampling was opportunistic and involved participants that were being taught by members of the project team in 2010 and 2011. In total, the survey was conducted with 164 students, of which 137 were in their 1st year of study, while the

remainder were in the 3rd and 4th years of study. As a result, the discussion below is not intended to be representative of perspectives from the student population as a whole, but nevertheless gives us some insight.

The survey showed that most students recognised the relevance of global issues to pharmacy training, and felt that they should have some level of exposure to such issues during the MPharm degree programme. In general terms, many students felt that this should be part of their development as healthcare professionals:

*Health issues, e.g. the outbreak of new diseases in other countries as well as possible solutions should be the concern of all healthcare professionals. (1st year student)*

*It is not uncommon for students to have been sheltered their whole lives and not know much about the lives of people in developing countries since they feel that it may not pertain to them. However, exposing them to new knowledge can never be a bad thing, and can only bring about a positive result, in my opinion. (1st year student)*

*Most students live in a 'bubble'. It would be better to have students that understand how education relates to the real world. (1st year student)*

*It is important to learn the issues so we, as trained, educated pharmacists, are available to help those who need it. (4th year student)*

Some students were particularly interested in learning about global health issues because they planned to work abroad at some point in their careers, but there was also limited recognition that global issues are relevant to those who planned to work only in the UK:

*As we have to deal with different people (patients) from different backgrounds, this would be extremely important. (1st year student)*

*We must be able to provide pharmaceutical healthcare to everybody. If we are not informed we wouldn't be able to do this. (1st year student)*

This recognition of differing perspectives on health and medicines may be partly linked to the diverse cultural backgrounds, knowledge and experiences of the School's students themselves.

Topics of interest identified by students were wide ranging and included new drug development, the emergence of new diseases and treatments, new drug delivery routes, infections and tropical diseases, susceptibility of specific groups to particular diseases/ illnesses, global supply chains, and personalised formulations, as well as more socially-oriented issues such as differing cultural beliefs around health and medicines, working with diverse patient groups, law and ethics related to pharmacy in particular contexts, the role of pharmacists in other countries, the work of international health organisations and NGOs, diverse health systems, access to medicines, and challenges to health provision in a range of contexts.

However, some students expressed doubts as to whether all pharmacy students need to learn about global issues, particularly given other priorities in the MPharm curriculum:

*If it is possible and there's enough time on the course they should learn, but as the majority will be practising in the UK, the main focus should be UK. Learning about global development is important because if we could help globally we should make the effort. (1st year student)*

*Many students want to stay and practise in the UK so they are less likely to take interest. (4th year student)*

*Students should be given the option to learn topics of their own interest. Some might just prefer to work in the UK where they won't need this training. (1st year student)*

*It's unfair to force students to learn about something that's not essential to their degree. (1st year student)*

Still other students saw it as something that all students should be introduced to, with more focused study reserved for those with a particular interest:

*Not all students want to go into global and development issues. But overall it should be taught in the MPharm course so students are aware of issues to do with health around the world. (1st year student)*

*I think a general overview should be taught to all students - however those students who have a specific interest could possibly take this as an optional unit where the subject goes into depth. (1st year student)*

*Some students may not have any idea what it is about until they are taught. (4th year student)*

## Conclusions of the initial research

In summary, the surveys and interviews demonstrated a general positive trend in the views of both students and teaching staff towards the importance of learning about global health. However, a major concern amongst teaching staff at the School was about how teaching and learning about global topics can be incorporated into an already-packed curriculum. One way of addressing this concern is to embed global topics within existing taught sessions, for instance by reorienting the ways in which material is taught (e.g. by including international case studies), rather than adding a large block of new teaching. Embedding global issues throughout the curriculum in this way can also have the added benefit of reaching all students, rather than just those with an existing interest. The findings of this research led to the development of a set of draft Global Pharmacy Learning Outcomes for inclusion in the core curriculum (see pg. 20) which have the potential to support these efforts.

## Medicines from natural products, sustainability and intellectual property rights

Dr. Sarah Edwards,  
UCL School of Pharmacy



With the world's increasing human population, now more than 7 billion, pressure on the natural resources on which we all depend has never been greater. The impact of humanity on planet Earth is so profound, that it has initiated a new geological epoch, the Anthropocene. Species extinction rates are currently estimated at 100-1000 higher than background rates, being on a par with the five catastrophic mass extinctions of geological history. Why is this of significance to pharmacists?

- In some developing countries, 80% of the population are dependent on traditional medicine for their primary healthcare, in which medicinal and aromatic plants (MAPs) play a significant role.
- OTC herbal medicines are also increasingly popular in the developed world, with about half a million tonnes of raw material sold every year on the global marketplace.
- The majority of traded herbal medicines are from wild harvested plants, which makes misidentification more likely and the possibility of unwanted plant material being included
- Collection of medicinal plants is unregulated in many countries and unsustainable collection practices are confounded by the low wages that many harvesters receive, which may be the only source of paid employment in some rural areas.
- This is a health issue as well as an environmental and socio-economic one, as the rarity of MAPs is likely to lead to inferior quality products on the market, which may contain harmful adulterants or substitutions.
- Many of the world's pharmaceutical medicines are also based on natural products: 68% of anti-infectives (anti-bacterial, -fungal, -parasitic and -viral) that came to market in the 30 years between 1981 and 2010 are naturally derived or inspired; and 48.6% of all new anti-cancer drugs since the 1940s are either natural products or directly derived from them.

'Bioprospecting' for novel compounds from natural sources has not been without controversy. A few high profile cases in the last 20 years have highlighted the misappropriation of traditional medicinal knowledge ('biopiracy'), without compensation and acknowledgement for the traditional knowledge holders and their intellectual property (e.g. the issue of a US patent on the use of turmeric as a wound healer). International agreements, including the World Trade Organisation's Trade-Related Aspects of Intellectual Property Rights (TRIPS), which sets global standards on the protection and enforcement of intellectual property rights, and the Convention on Biological Diversity, which addresses the acquisition and use of biological material and related information, have changed the nature of natural product research. Access and benefit sharing agreements are now a prerequisite, and national legislation (e.g. in Brazil) may prohibit scientists from collecting biological material without difficult-to-obtain permits.



## New Teaching and Learning Activities

In the course of the project, several new teaching and learning activities were piloted, with a view to exploring their feasibility for future use within the MPharm programme and UCL School of Pharmacy more widely. This included an introductory lecture and student poster project in the first year of the MPharm, the creation of a 'Global Awareness' resource pack for use in tutorial sessions with first year students, visits by external speakers, and an interdisciplinary workshop with students from UCL School of Pharmacy, UCL Medical School and the Royal Veterinary College.

### Lecture, poster preparation and in-class activity with first year MPharm students

In their first week of the degree course, first year MPharm students participated in a 1-hour session entitled 'The Global Pharmacist'. The aim of the session was to engage the students with issues related to global health. Using pictures and scenarios (such as the swine flu pandemic, a world map showing the locations of extreme drug-resistant tuberculosis, a patient with leprosy, a table giving examples of reported incidences of counterfeit medicines, and scientists studying plants in Kenya) the students were led into a discussion of global issues. These included the global nature of many diseases and their speed and mode of spread; the use and abuse of antibiotics; the influence of different government agencies and the spread of antibiotic resistance; old, neglected and poverty-related diseases which have still not been eradicated; drug donation by manufacturers, the latter's location and main drug targets; the international problems of substandard and counterfeit medicines; and the rights of societies to their traditional medicinal knowledge, among others.

The session was used to engender critical thought about global health issues, and to lead to the realisation of the inter-connectedness of the world, and of the pharmacist's role in reducing the burden of disease and associated causes and

consequences. Questions from students led to further discussion about children's health and the role of UNICEF, eradication of smallpox, and possible job opportunities with organisations such as *Pharmaciens Sans Frontières*.

In addition to the session described above, the first year students also participated in an optional session where they made posters entitled 'Pharmacy in My Country'. Students from countries including Malaysia, Vietnam, and Sudan took part. While one student contacted a Minister who sent him a presentation with lots of information about healthcare in Malaysia, another spent many hours outside the scheduled session to produce a very creative poster about healthcare in Vietnam. The session also allowed some discussion of sensitive issues such as poverty and its consequences, such as criminal activities. Due to the voluntary nature of the poster session and other factors, such as unfavourable timetabling, the poster session was not well attended. Consequently, the following year, the optional poster session was replaced by an in-class activity during the first Global Pharmacy lecture to the new MPharm students. The latter were asked to write about their last visit to a pharmacy (and whether this was in their country of origin), their impressions of it (positive and negative), and ways in which the practice of pharmacy might be improved. The aim was to encourage the students to reflect on and relate their experiences to their studies, and to start the students thinking about pharmacy settings and practices in different countries.

### Global Awareness resource pack

A 'Global Awareness' resource pack was also created and distributed to academic tutors to use in tutorial sessions with first year students. The pack included a range of suggested readings and sample activities that could be used to encourage students to explore the complex nature of global health issues and to consider their role as global professionals. This included a map of the world to initiate discussions of how the lives, priorities and

health of people in different parts of the world may differ, as well as graphs and charts illustrating changing patterns of disease to stimulate debate around wide-ranging political, social and cultural factors that may influence availability and use of medicines.

Many of the lecturers interviewed for the project also welcomed the idea of making global health issues the theme for journal club sessions which are run in the fourth year. In these sessions, each student presents two journal articles to a small group of students and the articles are then discussed amongst the group. As with the first year tutorials, these sessions would provide students with an opportunity to discuss the broader role of pharmacy professionals in addressing global health concerns with their peers and with guidance from tutors.

### Visits by external speakers

External speakers are regularly invited to talk about their experiences overseas. One example is a contribution by Rocio Villacorta-Linaza, a qualified pharmacist who spent several years working in Pakistan, Afghanistan, South Sudan and Algeria for NGOs such as Merlin, Médecins Sans Frontières and Medico International. The seminar was open to all students and staff from the School. The session highlighted particular problems of maintaining supplies of medicines relevant to the needs of local communities in countries in crisis. The identification and operation of systems for supply in these situations were discussed. In particular, the session emphasised the unique value of pharmacists in undertaking such a role.

This seminar provided students with an opportunity to learn how pharmacy training can be put to use as part of a diverse career path and the potential routes to such a career. Exposure to these ideas is important, given that many of our students see their career trajectory as involving work only in a UK-based clinical setting. Other potential career paths could involve, for instance, work for non-governmental or international health organisations such as the WHO, Médecins Sans Frontières, or Pharmaciens Sans Frontières, or in research and advocacy organisations.

Subsequently, Médecins Sans Frontières was invited to take part in the School's Career Fair, and interested students learned about the requirements of working with international health charities, such as the need for a few years' work experience and proficiency in a second language.

These visits and events have been particularly valuable as there is no obvious career path for students with these interests and they will be pioneers in pursuing new roles.

### Interdisciplinary workshop with students from UCL School of Pharmacy, UCL Medical School and the Royal Veterinary College

In partnership with the UCL Institute for Global Health, the Royal Veterinary College and the Institute of Education, the project team at UCL School of Pharmacy also organised two interdisciplinary workshops on Avian Influenza for students from all three colleges. The objectives of the sessions were to provide pharmacy, medical and veterinary students with the opportunity through role play to: (i) have an increased appreciation of the complex nature of global health concerns, and particularly zoonotic disease outbreaks, and (ii) develop an understanding of the need for, and challenges associated with, collaboration between health professionals and between actors and organisations at local, national, regional and international levels.

Students were presented with an outbreak scenario in South Sudan and then divided into interdisciplinary groups representing key national and international interests that respond to pandemics: local health professionals, officials from the Ministry of Health and Ministry of Animal Resources in Sudan, representatives from international health organisations (e.g. WHO, Food and Agriculture Organization, World Organization for Animal Health), multinational pharmaceutical industry representatives, and local and international media organisations. Within each group, the players were instructed to discuss the response they would make to the scenario and the questions this raised in terms of both human and animal health. At various points in the workshop,



### Pharmaciens Sans Frontières (Pharmacists Without Borders)

Pharmaciens Sans Frontières (PSF) was founded by pharmacists in 1985, in Clermont-Ferrand, France, and today has branches in a number of other countries such as Switzerland, Canada, Germany, Denmark, and Sweden. Its aim is to promote access to quality health care and medicines by all populations, and it has worked in many underprivileged parts of the world. PSF has raised awareness about the pharmacist's critical role in public health, good pharmaceutical practice, rational prescribing, and correct use of medicines. Its initiatives and operations include the construction of healthcare infrastructure, training the associated local personnel, activities to increase awareness about the dangers of street medicines and for the prevention of HIV/AIDS, and promotion of access to healthcare by vulnerable and isolated populations. PSF also organises meetings, such as the forum 'Pansons le Monde' (Heal/Bandage the World), and a round-table discussion to contribute to the strengthening of a regional strategy for the fight against falsified medicines in West Africa.

PSF campaigns and educates, for example, against the donation of unused patient medicines to poorer countries. According to PSF, unused patient medicines are not appropriate for donation for a number of reasons, including the inability to guarantee their quality, the fact that they do not enter inventories or the official medicine distribution channels, and they can participate in the development of illicit markets for medicines, which has a huge detrimental effect on public health and on the economic development of affected countries. In addition, PSF has noted on the ground that such donated medicines are not appropriate for the diseases prevalent in the recipient countries, are unknown to local health professionals, often arrive out of date and the accompanying information is in a language that is unknown or poorly understood locally. Furthermore, local populations become accustomed to expensive medicines, which short-circuit the official pharmaceutical channels and compete with the local economy.

the groups were also asked to 'negotiate' about their planned activities with other relevant groups, such as asking for greater financial assistance. At the end of the session, the whole group was brought back together for discussion and debate.

These interdisciplinary workshops were a particularly successful component of the project. Student feedback was overwhelmingly positive, with participants recognising the importance of working with other health professionals and the value in a multi-levelled approach to complex global health concerns:

*It is important for people from different disciplines to come together to work on issues, as each has different knowledge experiences and can contribute from different perspectives.*  
Pharmacy student

*It is important, especially for medical students, to leave our insular 'bubble' once in a while and see the wider political, professional and international aspects of medical issues.*  
Medical student

*It is important to realise how global issues regarding animals and humans are dealt with on a large scale (not just at the 'farm level').*  
Veterinary student

The teaching and learning activities that developed during the project provide models of new opportunities for the School's students to actively engage with international issues. They also introduced students to global and interdisciplinary perspectives that they might not otherwise have encountered as part of the core pharmacy curriculum.

Pharmacy education in Namibia  
 Dr Tim Rennie, Head of Department of  
 Pharmacy,  
 University of Namibia and UCL School  
 of Pharmacy Alumnus



I report from Namibia as a registered UK-trained Namibian pharmacist helping to set up the first Namibian School of Pharmacy in the country. Namibia is a newly independent, southern-African country with disease burden as you would expect – HIV/AIDS, TB and to a lesser extent malaria. However, there is also a burgeoning non-communicable disease burden and in this sense is characteristic of a developing setting with upper-middle income country status – something of a paradox. Namibia is the second least densely populated country with the highest degree of inequality as measured by the Gini index. The economy is driven by three main factors: mining, agriculture (particularly livestock) and tourism. Hence, the challenges as well as the opportunities compared to the UK are very different.

In the Pharmacy setting – and the reason a new School of Pharmacy has been established – there is a serious shortage of pharmacists both in the public and private sectors; the aim is to roughly double the current numbers. However, the landscape in the pharmacy profession is relatively well organised with all the major pieces of the puzzle in place – a medicines regulator and a professional regulator enacted by Parliament, a strong community sector and a developing public sector, pharmacy support staff training, professional regulation, healthy wholesale and supply chain, quality surveillance in terms of medicines quality and pharmacovigilance, and now tertiary pharmacy education. However, currently, there is a distinct lack of research and publication in pharmacy and approximately 99.9% of medicines are imported from outside Namibia.

This specific setting has dictated the way in which the Bachelor of Pharmacy (Honours) degree curriculum was articulated and is now being operationalised. A needs-based approach was applied in defining exit level competencies from which the curriculum has developed through a six-stage approach. This has sought to address the challenges of Pharmacy in Namibia through the future pharmacists it will produce. A graduate pharmacist will need to be a generalist as the likelihood of practising in, for example, regulatory pharmacy, policy development or veterinary pharmacy, are relatively high compared with the UK setting where the number of graduates are far greater and the majority will practice in community or hospital pharmacy sectors. In addition, there is a heavy emphasis on research as well as pharmaceuticals as we try to gear up the future pharmacists to develop research and industry. The students undertake four 1-month placements (rural, hospital, community, manufacturing/industry) as part of their curriculum to prepare them for their one-year internship that could be as broad.

In summary, what defines a pharmacist more than anything is their expertise in medicines, wherever they may practise. However, the application of the knowledge, skills and attitudes – as well as an appreciation of the finer details such as law, cultural practices and future needs – can result in a very different practice from setting to setting.

## Learning Outcomes for Global Pharmacy

It is important to note that the teaching activities described above took place as a result of the enthusiasm and energy of individual staff members at the UCL School of Pharmacy; these and similar activities have yet to be integrated formally into the MPharm curriculum. In an effort to begin developing more formal structures to support learning about global issues, a draft set of Global Pharmacy Learning Outcomes was devised in discussions with academic staff from all disciplines of pharmacy<sup>4</sup>.

Global health education for pharmacy students can be divided into two categories: compulsory teaching to prepare all pharmacists for practice or optional teaching for undergraduates with a special interest in global health, some of whom may plan to work overseas. The global pharmacy learning outcomes proposed here are for core teaching, and are intended to prepare all pharmacy

graduates to become globally-aware professionals – regardless of where in the world they intend to work. The outcomes focus on pharmacy education in the UK, but may also provide examples and stimulate debate for other disciplines and in other countries.

It is intended that the learning outcomes will be achieved through core teaching throughout the MPharm degree programme. There will be ‘horizontal integration’ focusing on international issues relevant across different subject areas within each year of study, as well as ‘vertical integration’ in which more complex international contexts are introduced as students progress through the 4-year programme. The learning outcomes have been organised into 6 domains: public health and chronic disease; political, economic, social and cultural dimensions of medicines and pharmacy; pharmaceuticals; international infrastructure for supply and use of medicines; professionalism; and interdisciplinary factors and their relevance to health, medicines and pharmacy.

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<sup>4</sup> Similar sets of learning outcomes have also been drafted for medicine (Johnson et al 2012) and veterinary medicine (Maud et al 2012).

## Draft Global Pharmacy Learning Outcomes

### Public health and chronic disease

- Explain changes in patterns of disease and their impact on international health priorities
- Identify current priorities and the potential for pharmacy to support public health goals
- Discuss concepts of and approaches to health promotion and prevention of ill health from an international and inter-sectoral perspective

### Political, economic, social and cultural dimensions of medicines and pharmacy

- Understand the importance of access to, and the rational use of, medicines in the global context
- Recognise the existence of inequalities / inequity in provision and access to medicines both in the UK and around the world
- Demonstrate awareness of the costs and resource implications of global pharmaceutical provision
- Discuss the relevance of the cultural context to the use of medicines
- Recognise the impacts of fragile states and crisis situations (e.g. armed conflict, natural disasters, trade embargoes) on pharmaceutical care

### Pharmaceuticals

- Describe the different pharmaceutical treatments available to, and affecting the health of the world's population, including that of the 'bottom billion'
- Recognise the need for, and identify the priorities regarding the development of pharmaceutical products that are suitable for different population groups (such as younger and older people) and sensitive to cultural preferences
- Identify how pharmaceutical science can be applied to formulate medicines and vaccines that are suitable for diverse environments and climates
- Explain the role of 'personalised medicine' in the context of global pharmacy

## International infrastructure for the supply and use of medicines

- Identify diverse international models of health care systems and provision, and explain how these impact on pharmacy services and medicines supply and use
- Discuss current concerns regarding the pharmacy workforce for international health and pharmaceutical care
- Demonstrate awareness of the challenges of ensuring universal supply of quality medicines
- Summarise the challenges associated with international regulation to ensure the safe use of pharmaceutical products, including those that can be used recreationally

## Professionalism

- Identify relevant UK and international codes of ethics for pharmacists
- Respect the rights and equal value of all people without discrimination and provide compassionate care for all
- Recognise that relationships with other health practitioners, and working effectively with colleagues from diverse backgrounds, is crucial to optimise pharmaceutical care

## Interdisciplinarity in health, medicines and pharmacy

- Recognise the role of poverty and inequality in health, and implications for medicines and pharmacy
- Describe how climate change and health interact at local and global levels
- Discuss the links between globalisation, food security, dietary transitions and health
- Describe the influence of biocultural diversity and environmental change on health, medicines and pharmacy
- Identify the links between human and animal health, particularly in terms of use of medicines

## Future Opportunities for Embedding Global Issues in the MPharm Curriculum

The Students as Global Citizens project explored a variety of methods for including global topics in the undergraduate curriculum. Based on the experiences of the project and a growing body of educational research, further ideas for embedding global awareness within the programme include more interdisciplinary and inter-professional collaboration, and the development of international partnerships, peer mentoring and student-led societies and organisations. These are discussed below.

### Interdisciplinary and inter-professional collaboration

One of the key successes of the project was the development of the interdisciplinary workshops on Avian Influenza for students from the three partner colleges. In addition to providing a rare opportunity for students in the three professions to interact, these workshops also reflected one of the wider aims of the Students as Global Citizens project – to encourage healthcare students to recognise the need for interdisciplinary approaches in order to address the multifaceted challenges of global health. Student feedback after the events revealed that the vast majority of participants would welcome further opportunities to take part in interdisciplinary teaching and learning activities, including interactive events and workshops as well as collaborative research projects.

Organising these workshops can be logistically challenging. It requires participating institutions to identify available spaces in their busy timetables. Workshop discussion also works most effectively with relatively small groups of students (around 30), which imposes limits on how many students can take part. Nevertheless, it may be possible to design a series of inter-professional workshops over the course of each academic year that would provide more occasions for a greater number of students to explore global health issues from different perspectives. It is also important for higher education institutions to find ways of

making these kinds of teaching and learning activities more sustainable, for instance, by linking them to learning outcomes and formal structures of assessment.

### International partnerships

The MPharm programme at UCL School of Pharmacy provides opportunities for students to study abroad during their third year of study. The School takes part in the Socrates-Erasmus Programme which offers student exchanges with 30 universities in 13 countries (North America, Australia and Europe). This possibility of international study is one of the features of the School's curriculum that is most commonly noted and welcomed by prospective students during recruitment events. Extending these exchange programmes to universities in middle and low-income countries may enable mutual learning and collaboration to the benefit of both students and staff in UK and overseas institutions. MPharm students could also be encouraged to exploit their membership of BPSA, EPSA, IPSF and FIP to create student-exchange opportunities.

Partnerships with other international health organisations supporting global health can also enable students to gain insights into different settings, circumstances and priorities in health as well as see the diversity in professional practice and potential career opportunities which are available to them once qualified.

Vulture mortality in India: An ecotoxicology case study  
 Professor Richard Kock  
 Royal Veterinary College, London

Cows throughout South Asia are often treated with diclofenac, a drug formulated for both veterinary and human use that reduces pain and inflammation. This drug is lethal to vultures that ingest both human (Parsee communities traditionally allowed scavengers to dispose of human carcasses) and animal carcasses after death. This problem has been exacerbated by the veneration of the cow into old age when large quantities of this drug, which is cheap and accessible, are administered to relieve discomfort up until death. The cows after death decompose in the environment or are scavenged.



Vultures, animals that have been reviled and revered throughout time, serve a highly valuable ecological role through the removal of dead carcasses of animals and thus contribute to the maintenance of public health (preventing the spread of disease agents) and the health of the ecosystem. From 1992-2007 several species of vultures experienced serious and rapid declines throughout Asia. It was found that experimentally, vultures ingesting cattle carcasses that were recently treated with diclofenac needed very little of the drug to succumb to kidney failure and eventual death. Diclofenac residues in the tissues of dead cattle are highly toxic to vultures, resulting in up to 99% mortality. The near extinction of several species of vultures was met with a resounding response from conservation. Drug manufacturing companies have also responded in kind by increasing production of the alternative anti-inflammatory drug meloxicam. While national and local governments banned veterinary use of the drug in 2006, unfortunately, continued use of the human equivalent has persisted.

A significant issue, that this story brings to light, is that research and development for pharmaceuticals does not take into account ecotoxicological risk of new products to birds (and many other species). There is an internationally agreed protocol for licensing of human drugs, which involves a series of drug evaluation trials starting from primitive organisms like daphnia to highly evolved vertebrates, like primates and finally on humans. Although the industry is sympathetic to the problem of failure to identify environmental risk, there is no legislative framework to reduce this risk. The cost of altering testing protocols to make them environmentally safe is considered prohibitive and discourages a voluntary change. Bringing a new drug to the market costs 100s of millions of pounds and the window for recovering investment is 10 years for the inventors. After this time the drugs are copied and generic products proliferate, making it virtually impossible after this time to recall. This was the case with diclofenac. The cause of the vulture mortality was only discovered after 15 years or so of the drug's use on the market. Long after it was a generic. With current laws focused on human safety, and ignoring human pharmaceutical impacts on biodiversity, little can be done to combat this devastation. Removal of the veterinary products from the market have not proven to be enough as farmers continue to use the human product on their animals, showing how important it is that there is greater integration of the human and veterinary health sectors to tackle these sorts of issues.

## Peer mentoring

UCL School of Pharmacy's student body comprises a significant international population, including international postgraduate students in MSc programmes and doctoral study, who are well-placed to share their expertise and provide peer mentoring for undergraduate students. Postgraduate students have provided significant support for the Students as Global Citizens project. For example, doctoral students were key collaborators in the development and facilitation of the Avian Influenza workshop mentioned above. In the future, postgraduate students could also share their knowledge and expertise through workshops, discussion groups, or one-to-one mentoring sessions, providing MPharm undergraduate students with the chance to interact with and learn about diverse international contexts of pharmacy practice and research.

In addition, the School's 'home student' population often includes a considerable number of individuals who are 1st, 2nd, 3rd generation migrants to the UK. This diverse cultural heritage provides a rich source of different backgrounds, experiences and perspectives on health that could make a significant contribution to discussions of global pharmacy. Through both formal sessions and informal discussion, students should be encouraged to reflect on this cultural knowledge and to appreciate its value to their professional practice, particularly in terms of their understanding of health and medicines, and their ability to work sensitively with diverse patient populations.

Students with experience of international study or work can also encourage fellow students' involvement in tackling and learning about global and development issues through a range of activities such as peer mentoring schemes or presentations and reports about their experiences. They could also provide support to undergraduate students who would like to study or work overseas, but who may find it challenging to identify ways of getting involved in international work, particularly in terms of finding a host organisation and arranging funding. An online database of

projects and research reports could be created to showcase the international work of the School's staff, undergraduate and postgraduate students, and to provide interested students with contacts for information and advice.

The School also has a number of visiting undergraduate pharmacy students from different universities, under the auspices of the Socrates-Erasmus Programme. These visiting students come to the School to conduct their research projects, and thus usually interact mainly with their laboratory colleagues and with other visiting students. Despite the fact that they have much in common, opportunities for interactions amongst the School's MPharm students and visiting pharmacy undergraduates are few. Events to bring the two student bodies together to increase interactions could be organised. For example, visiting and home students could give short presentations about their degree programmes, allowing the visitors to integrate more deeply into the School and for home students' knowledge about other pharmacy education systems and practices to be enhanced. This could also inform and encourage more of our home students to conduct their research projects abroad.



### Mr Anthony Ajose, MPharm, UCL School of Pharmacy Alumnus

Following the MPharm degree at the UCL School of Pharmacy, I undertook split Primary Care Trust (PCT) and hospital pre-registration placements, gaining experience in public health, medicines management as well as in clinical pharmacy; this complemented the theoretical experience gained from the pharmacy degree.

Following my growing interest in public health, I then undertook an MSc in Public Health and Health Economics at the London School of Hygiene and Tropical Medicine.

During this programme, I carried out an internship with the health economics team at Sanofi and carried out an economic evaluation of HIV prevention interventions for the Gates Foundation Avahan programme in India for the MSc project. I then embarked on research positions at the WHO in Geneva, working in the Patient Safety Information (PSP) and Essential Medicines and Pharmaceuticals policies (EMP) departments on capacity development projects.

I currently work in the field of market access and evidence based medicine, providing strategy-consulting services for the life sciences industry. In my spare time, I participate on medical missions, working as part of an allied health team, providing much needed medical services to people with little access to formal healthcare across countries in developing countries. I intend on becoming more active in the provision of high quality health services to these regions in the future.



### Student-led societies and organisations

As the surveys conducted during the project show, undergraduate students have a significant interest in learning and engaging with global health and pharmacy issues. Although UCL School of Pharmacy has a number of student-led societies, none has an explicit interest in global health. A new society might be formed at the School, or in coordination with an existing student organisation (e.g. the BPSA, EPSA or IPSF).

There are also a range of existing organisations in which pharmacy students could be involved. The BPSA has an 'International Pharmacy' page on its website, and as noted in the introduction, membership of the BPSA automatically provides membership to both the EPSA and IPSF. Pharmacy students can also usefully collaborate with other student health professionals interested in global health concerns, for instance, through membership in Medsin, which is actively involved in tackling global and local health inequalities through education, advocacy and community action<sup>5</sup>.

<sup>5</sup> See [www.medsin.org](http://www.medsin.org)

### The Treatment of Visceral Leishmaniasis

Dr. Abeer Mohamed Ahmed  
UCL School of Pharmacy

I am a pharmaceutical scientist. My PhD research was focused on the development of a stable, safe and cost effective pharmaceutical formulation of amphotericin B for the treatment of visceral leishmaniasis.

Visceral leishmaniasis (VL) is a parasitic infection which is considered a neglected disease and is endemic in resource limited regions of the world. It is fatal if untreated. Amphotericin B (AmB) is widely used for the treatment of systemic fungal infections. It is also effective against VL. Unfortunately AmB is very toxic and requires careful and repeated administrations over a 28-day period to VL patients. The best AmB formulation, AmBisome® (liposomal AmB) is too expensive and unstable for widespread use of a neglected disease in resource-poor settings.

Thus, my project aim was to prepare a stable, easy to sterilise, and non-toxic intravenous formulation of AmB that has similar activity as AmBisome®. I achieved this, and developed a formulation which essentially consists of a non-covalent association between AmB and poly(glutamic acid) (PGA). PGA is a biodegradable and biocompatible polymer that has been evaluated clinically. The polymer is used as a lipid replacement to produce vesicles of similar size and charge as are present in AmBisome®. The AmB-PGA complex was found to have an equivalent dose response to AmBisome® in an acute model of VL in vivo. This AmB-PGA complex is much more stable than AmBisome®. The project is now being funded by the charity, Drugs for Neglected Diseases Initiative and efforts are underway to develop this formulation in India where leishmaniasis is a major problem. Analysis of both the cost of goods and cost of manufacture suggest that if this formulation can be developed, the cost of the final dosage form will be about 10% of that of AmBisome®.



FIP Key Messages for the Global Student Project  
Professor Ian Bates, Director, FIP Education Development,  
UCL School of Pharmacy

The International Pharmaceutical Federation (FIP), as the global professional leader, ensures that education and training provides the foundation for pharmaceutical services and professional development and advancement, in order to meet global societal needs for medicines expertise. FIP represents over 3 million pharmacy healthcare workers from 127 countries worldwide.



Access to good quality medicines and competent and capable healthcare professionals are fundamental aspects of any healthcare system; uninterrupted supply of quality medicines to the population, their management, and responsible use, are vital components in improving the health of nations. However, pharmacy workforce per capita varies considerably between countries and WHO regions and generally correlates with country level economic development indicators. Countries and territories with lower economic indicators, such as those in Africa, tend to have relatively fewer pharmacists and pharmacy support workers. This has implications for observed inequalities in access to medicines and medicines expertise.

Strategic frameworks and policies related to the pharmacy workforce are being successfully developed and implemented at the country-level through multi-stakeholder processes involving ministries of health, health professional associations, regulators and educators, to drive and achieve both competence and practitioner excellence for care quality. We should share and adopt these best practices through the application of leadership values and partnership working across the globe.

Investment in transforming and scaling up professional education is crucial, as education provides the foundation for building a capable healthcare workforce. The capacity to provide pharmaceutical services in each country is dependent upon having an assured competent workforce and a similarly integrated academic workforce to train sufficient numbers of new pharmacists and other support staff at both foundation and advanced levels. On-going effort is needed to ensure capacity building of skilled medicines expertise to meet the pharmaceutical health needs of populations.

FIP advocates for a needs-based education strategy that will allow local systems to best assess the needs of its community and then develop (or adapt) the supporting educational system in order to produce a workforce relevant to these needs. National healthcare demands are diverse and complex, often varying widely within and between regions. Although broad and general frameworks may be beneficial at the macro level, a “one-size-fits-all” system does not offer the authenticity needed for full engagement and sustainability at the domestic level. Pharmaceutical Human Resources continue to be a priority issue for FIP Education initiatives (FIPeD) in order to engage in a collaborative way with all stakeholders; we need to work towards developing a profession that can meet present and future societal and pharmaceutical health needs around the world.

## Conclusions

Global issues, including development priorities, cross international boundaries and encompass different governmental sectors, disciplines, types of organisation and activities. Good health is not only a result of, but also a condition for, socio-economic development, security, and human rights. It is fundamental to the quality of life and well-being of people everywhere. In terms of health needs, medicines use and pharmacy practice, there is much that is common between countries, especially regionally. However, there is also much that is diverse both between countries and between population groups within any country. Access to, and ensuring appropriate use of, medicines is central to the professional roles of pharmacists.

The work of this project highlighted that UCL School of Pharmacy students are already exposed to a wide range of international issues and perspectives throughout their studies. However, this relied on the initiatives and expertise of interested teachers, as global pharmacy is not a core part of the MPharm curriculum. There is therefore a need to embed global pharmacy within the core curriculum in order to ensure sustainability and so that all pharmacy students are prepared to a greater extent for the various roles they could play as pharmacists in an increasingly globalising world. This led to the development of a draft set of Global Pharmacy Learning Outcomes for pharmacy students in the UK which are intended to stimulate the on-going integration of the global dimension within pharmacy education.

## Further Reading

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## Contributors

Sudaxshina Murdan, Reader in Pharmaceutics, teaches MPharm, MSc, QP and PhD students and researches in drug and vaccine delivery. Current projects include the formulation of topical medicines against cutaneous leishmaniasis and onychomycosis, and of a thermostable vaccine against Haemophilus influenzae type b.



Nicole Blum is a Senior Lecturer in Development Education at the Institute of Education, University of London. Her research interests include pedagogy and learning in development education, internationalisation and global perspectives in higher education and the ethnography of education. She has worked and conducted research in Costa Rica, Guatemala, India, the United States and the United Kingdom.



Sally-Anne Francis is an Honorary Senior Lecturer at UCL School of Pharmacy, having previously held academic appointments at the school for 10 years. During this time, she developed and launched a postgraduate M.Sc in Clinical Pharmacy, International Practice & Policy, specifically for pharmacists registered in countries other than the UK.



Emily Slater is a Citizenship education teacher with 15 years of experience working on global educational projects and campaigns for a range of organisations, including ActionAid and Save the Children. Emily combines her research and support role for the Development Education Research Centre with three other current professional passions: workshop facilitation, project evaluation and maternal mental health campaigning.





Naziha Alem is a pharmaceutical scientist. After obtaining her baccalaureate in Algeria, she completed her MPharm and PhD degrees at UCL School of Pharmacy. Naziha worked as an academic and community pharmacist before joining Vertex Pharmaceuticals as a research scientist. Her current work involves different aspects of drug preformulation and solid state analysis.



Dr Mike Munday is the Academic Director of Studies at the UCL School of Pharmacy and Director of the MSc programmes in Drug Discovery and Development/ Drug Discovery and Pharma Management. He travels the globe widely in his role as admissions tutor and is heavily involved in the recruitment of undergraduate pharmacy students and postgraduate MSc students to the School. He has research collaborations in type 2 diabetes with the United Arab Emirates.



Jean Taylor is a graduate of UCL School of Pharmacy and joined the staff as Deputy Programme Director of the MSc in Clinical Pharmacy, International Practice and Policy in 2008. Prior to this she held senior positions in the voluntary sector.



Felicity Smith is Professor of Pharmacy Practice at the UCL School of Pharmacy. Early in her career she read for an MA in African Studies at SOAS and since then has had a number of teaching and research collaborations with pharmacy schools in low-income countries. She leads an elective module for final year pharmacy students focussing on international perspectives on health and medicines, and is Course Director for the School's MSc (Clinical Pharmacy: International Practice and Policy).



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