

Link Between Clinical Pharmacy Services, Pharmacy Staffing and Hospital Mortality Rates

A group of US researchers has explored the impact of clinical pharmacy services and pharmacy staffing levels using a database constructed from a sequence of four national hospital and hospital pharmacy databases. Bond et al. initially investigated a link between 14 clinical pharmacy services and improved healthcare outcomes (drug costs, mortality rate, total cost of care, length of stay, medication errors).¹ They identified that a decentralised clinical pharmacy model and five clinical pharmacy services (drug information, adverse drug reaction monitoring, drug protocol management, admission drug histories, medical rounds) had an evidence-based relationship with improved healthcare outcomes.¹ They estimated that 38% of pharmacist full-time equivalent were devoted to clinical pharmacy services.

In their latest paper, they compared healthcare outcomes between hospitals that offered the 14 clinical pharmacy services with those that did not have these services.² They undertook both a correlation and a multiple-regression analysis, controlling for severity of illness. The key findings identified two staffing variables (number of pharmacy administrators per 100 occupied bed days, number of clinical pharmacists per 100 occupied bed days) and seven clinical pharmacy services with a significant association with reduced mortality rates. Similar data showing a link between clinical pharmacist full-time equivalents and a reduction in hospital standardised mortality rates are becoming available from the UK.³

The seven clinical pharmacy services are described by Bond et al. as 'a core set of clinical pharmacy services' for all patients.² These seven US clinical pharmacy services are:

- number of pharmacist-provided drug use evaluation;
- pharmacist-provided in-service education;
- pharmacist-provided adverse drug reaction management;
- pharmacist-provided drug protocol management;
- pharmacist participation on the CPR team;
- pharmacist participation on medical rounds; and
- pharmacist-provided admission drug histories.

The two clinical pharmacy services that had favourable associations with all seven improved healthcare outcomes were drug protocol management and admission drug histories. Statistically, the stand out activity was pharmacist-provided admission drug histories, as the number of reduced deaths was almost twice that of any other service investigated. However, only 5% of the hospitals in the study offered that clinical pharmacy service in 1998.

Bond et al. postulated reasons for each activity's benefit to healthcare outcome. The delivery of pharmacy services in patient care areas with a corresponding ability to undertake admission drug histories, influence prescribing, monitor adverse drug reactions and provide education services (linked to the number of clinical pharmacists per 100 occupied bed days) and drug use evaluation and protocol development/management (probably linked to the number of pharmacy administrators per 100 occupied bed days).

A decentralised service delivery model is a feature of clinical pharmacy services in most Australian hospitals. Undertaking an accurate medication history for all patients was one of the six clinical pharmacy activities listed in the first SHPA standards of practice for clinical pharmacy published in 1987.⁴ The importance of this clinical activity has been highlighted in the current iteration of these standards (one of three activities that describe a basic clinical pharmacy service). Undertaking an accurate medication history on admission is a cornerstone activity for medication reconciliation on admission, transfer and on discharge.

The 2005 hospital pharmacy workforce survey data suggest staffing levels in Australia are below the US (total pharmacists, clinical pharmacists, pharmacy technicians, pharmacy administrators) and that 47% of the estimated 1600 pharmacist full-time equivalent were devoted to clinical pharmacy services.⁵ The data also showed that no clinical pharmacy service was available for at least 22% of overnight inpatients and that an additional 150 clinical pharmacists were needed across Australia's public hospitals for all overnight inpatients to have access to a basic clinical pharmacy service.⁵

The link between the number of pharmacy administrators and reduced mortality rates may surprise some. However, as noted in the Australian paper on pharmaceutical review, non-patient-specific, or hospital-wide pharmacy activities, aimed at improving patient safety (institutional medicine policy management, adverse drug event alert systems, standardisation of protocols for high-risk medicines, reviewing systems to minimise incidents, staff education on procedures and policies) are needed for optimum patient care.⁵ These system-wide approaches are critical to underpin patient-specific services. The percentage of total pharmacists' time devoted to management activities has remained constant (15 to 16%) in all hospital types, across most states in the three workforce surveys.

The three streams of pharmacy activities: clinical pharmacy, distribution and pharmacy management are interdependent. Professor Bond's paper provides further evidence of the benefits patient-specific and non-patient-specific pharmacy services can deliver to patients.² It also challenges us to review the range of pharmacy services offered in our hospitals, the balance between patient-specific and hospital-wide activities and the service delivery method used to provide pharmacy services.

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Australian Pharmacists and Counterfeit Drugs

At the FIP Congress in Beijing, there were a number of remarkable presentations about the continuing problem of counterfeit drugs.¹ Although, this is not a new challenge, its evolving scale and consequences should be of concern to all pharmacists—regardless of where they live or practice.¹

WHO classifies counterfeit drugs within a broad group of substandard pharmaceuticals that can be dangerous to patients' health and ineffective for the treatment of disease. Specifically, counterfeits are 'deliberately and fraudulently mislabelled with respect to identity or source' and can include 'products with correct ingredients but fake packaging, with the wrong ingredients, without active ingredients or with insufficient active ingredients'.² Internet sales have increased the trade in counterfeit drugs,

especially those with a market in the developed world, e.g. sildenafil, anti-cancer drugs, antibiotics, antihypertensives, cholesterol-lowering drugs, steroids, and generic analgesics and antihistamines. According to WHO, over 50% of drugs purchased over Internet sites which conceal their physical address are counterfeit.² In developing countries, the greatest concern is with counterfeit drugs for malaria, TB and HIV/AIDS. In many countries, drugs are purchased privately and cost is a major factor forcing individuals to seek cheap forms. In the absence of government support, a suspect formulation purchased from an unlicensed source may be the only option.

Counterfeiting includes the deliberate supply of substandard ingredients for pharmaceutical manufacture. A recent case of diethylene glycol poisoning in Panama resulted from the fraudulent supply of an excipient from an unlicensed manufacturer in China. This was assumed to be glycerin and incorporated into a cough mixture by a government manufacturer in Panama. Investigations have shown that the material was diethylene glycol and the tragedy, which has caused over 100 deaths, resulted from false documents and a failure to apply basic standards of good manufacturing practice along the supply chain.³

The scale of the counterfeit drug problem is difficult to measure but there is no doubt that the financial rewards provide sufficient incentives for criminals to avoid (or overwhelm) current methods of detection. The consequences of counterfeit drug distribution can lead to death and the penalties should encompass those for manslaughter (some would say murder).⁴ However, in most countries the laws (and penalties) against counterfeit drug distribution are framed in terms of copyright protection rather than the potential consequences for individuals and public health. In many cases, there are harsher penalties for copying computer software than for manufacturing or distributing counterfeit drugs. Weak laws are often compounded by lack of law enforcement resources and endemic corruption.

The threat of counterfeit drugs not only affects individuals but also undermines public health campaigns where confidence in preventive medicines and vaccines is paramount. It is also difficult to promote the use of generic medicines in an environment where brand name products can be associated with a higher level of quality in terms of content alone. This increases the overall cost of pharmaceutical supply and encourages unproductive promotional activities. Ironically, it is expensive brand name products which are most often targeted by counterfeiters.

So how does this insidious trade in counterfeit drugs affect countries like Australia? We are fortunate to have a reliable pharmaceutical industry and there is no doubt that manufacturers and importers are aware of the potential for counterfeit products or ingredients to be used within Australia. New technologies are being developed to detect counterfeit pharmaceuticals but it is not clear to what extent the 'bad guys' will be able to stay ahead of these advancements in the future.⁵

The Australian regulatory system helps to ensure standards of manufacture but these can fail—as in the case of hyoscine toxicity due to a failure of quality control in 2003.⁶ Fortunately, this deficiency was rapidly detected by our national pharmacovigilance system. Health professionals must continue to report adverse outcomes (including unexpected failure of efficacy) to the Adverse Drug Reactions Advisory Committee. We should be particularly cautious with patients who may have imported unregistered drugs through the Internet.

Hospital pharmacists who import drugs through the SAS need to ensure that what has been obtained is of acceptable quality. Where feasible, content should be confirmed through local assay—as was done by a consortium of hospitals to establish a reliable supply of IV artesunate. In most cases, we cannot be confident about the quality of imported drugs and this additional risk should be factored into the therapeutic strategy.

The driving forces for counterfeit drugs are need and greed. For essential drugs, the needs are reflected in populations who require access to life-saving medicines at affordable prices. Australia has a health system which subsidises drug costs through public hospitals and the Pharmaceutical Benefits Scheme. This may prove to be to the most significant factor in protecting our pharmaceutical supply from the threat of the counterfeit drug industry. Australian pharmacists should be informed about what is happening outside Australia. We should also be alarmed at the global consequences of counterfeiting. Much is being lost—not only lives and wellbeing, but also the opportunity to focus global resources on public health initiatives.

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Integration—Putting it All Together

The excellent SHPA Federal Conference theme of *integration—putting it all together* captures the issues facing us in healthcare delivery. Without considering and involving education, research, continuity of care, safety, information technology and policy, we will never realise the goals of Quality Use of Medicines.

However, even further integration is needed across the health sectors, so that the contributions that can best be made by pharmacists are part of a 'whole of health care' approach. This needs to be more than a concept, but a tangible demonstration of these themes being translated into better health outcomes. As health professionals and patients, we have to demand this of our colleagues in health service delivery and in our own practices.

Reflect on your own practice environment—how much do you consider these themes and the integration message? How much would it have improved your practice activities today if you had applied an integrated approach?

Is this something that is seamless in your clinical decision making? Is this an overt approach to problem solving in your management decisions, or is it something that needs to be thought about and consciously planned in your practice? For most of us it needs conscious effort, planning, some training and reflective experience. A great outcome of this conference apart from the enjoyable and educational sessions, the happy social events and seeing friends and colleagues—will be if the profession takes a leap forward in reflective practice and leads the way in integrated healthcare delivery.

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