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Editorial

Medicines' management: a public health problem on nursing's agenda

> 'This popular belief is all but universal: sick people should feed on noxious substances'
>
> (Holmes 1861:1)

Technological advances since the third quarter of the twentieth century have enabled the pharmaceutical industry to offer more than symptom control (Beeson 1980). The therapeutic revolution, beginning with replacement therapies and the mass production of penicillins, has produced medicines which are effective cures and 'disease containment' strategies. Medicines are more effective than ever, but the consequences of any mismanagement are correspondingly severe. The need for scrupulous medication management is compounded by rising expectations and ageing populations, with increasingly vulnerable physiology. These developments present nurse managers and policymakers with a new challenge: universal provision of safe access to the benefits of the therapeutic revolution.

Medicines' management comprises the selection, procurement, delivery, prescription, administration and review of medicines to optimise the contribution that medicines make to producing the desired outcomes of patient care (Audit Commission 2001). It encompasses the steps taken to ensure patients make the best use of their medicines – the maximum benefit and the minimum harm, for both immediate and long-term outcomes (NMC 2007, 2010, Gabe *et al.* 2011). Our authors vividly portray medicines' management in 10 countries under three themes: avoiding errors, adverse drug events, medically underserved locations.

Medication errors

Errors feature prominently here (Hajibabaee *et al.*, Gunes *et al.*, Smeulers *et al.*, Xu *et al.*, Andrew and Mansour), as in contemporary iatrogenesis statistics. For example, medication incidents remain the second most common patient safety events reported to the National Reporting and Learning System for England & Wales, accounting for 150,631/ 1,364,483 (11%) incidents, resulting in 50 deaths between October 2011 and September 2012 (NPSA 2013). It is estimated that medication errors cost the USA between $15 and 28bn each year (Aitken & Valkova 2013).

Definitions of 'drug errors' are prone to inconsistency (Ferner 2009). Some authors focus on the 'five rights' of medicines' administration (right patient, drug, dose, route and time, Xu *et al.*),whereas others are equally concerned with failure to monitor for the impact of medicines on vital signs (Smeulers *et al.*, Hajibabaee *et al.*). Examples of medication errors provide useful learning. Some focus on 'medicines unmonitored': for example, overlooking patients' prescriptions when monitoring and interpreting vital signs allows drug-induced hypotension to go unrecognised, increasing patients' risks of falling (Smeulers *et al.*, Vogelsmeier, Hajibabaee *et al.*). More widely, unmonitored postural hypotension may explain the doubling of hospitalisations for severe hypotension during the first 4 weeks following prescription of the alpha blocker tamulosin for benign prostatic hypertrophy (Bird *et al.* 2013).

Doses: an orphan topic

The crucial issue of doses – a key component of medicines' management – is largely absent from our edition. Xu and colleagues found very few dose errors in Chinese hospitals. In contrast, in UK primary care, the commonest prescribing errors concern doses, either incomplete instructions (74/247, 30.0% errors in 1777 patients), or incorrect doses (44/247, 17.8% errors in 1777 patients) (Avery *et al.* 2013). However, many adverse drug reactions only occur at higher doses, and prescribers are sometimes more willing to reduce doses than not prescribe. For example, epidural opioids administered for pain relief in labour affect breastfeeding at higher doses (Jordan *et al.* 2005). When guidelines adopted the recommendation to reduce doses of epidural analgesia (NCC 2007), breastfeeding rates increased, but then plateaued (DoH 2013).

Adverse drug reactions, adverse drug events, and the best use of medicines

There is more to medicines' management than avoiding errors. Commentators suggest that, in 2012, the USA spent $213bn (8% of total healthcare spend) on the additional healthcare needed as a result of

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medicines' mismanagement: non-adherence, delayed evidence-based treatment, antibiotic misuse, medication errors (prescribing, dispensing, administering and monitoring), use of branded products, mismanaged polypharmacy. Most of these costs relate to the additional 10 m hospitalisations (Aitken & Valkova 2013).

The boundaries of medicines' management and monitoring are ill-defined. The Protean manifestations of adverse drug reactions do not respect professional boundaries: one of the major drug disasters of the 1970s, blindness from practolol-induced oculomucocutaneous syndrome, was discovered by ophthalmologists, not the prescribing cardiologists (Wright 1975). Although definitions of errors encompass 'preventable events related to monitoring' (NCC MERP 2005: 4), there is no guidance on how comprehensive monitoring should be. Gabe & Jordan suggest as thoroughly as possible, including facets of health promotion vulnerable to the adverse effects of medicines. For example, nurses are asked to ensure that patients visit opticians regularly to check for corticosteroid-induced cataract and glaucoma, because early detection of glaucoma can prevent irreversible retinal damage.

The 'pill for every ill' medical model has universal appeal; however, some treatments, which relieve immediate problems, may show disbenefit, when subjected to long-term surveillance. For example: potassium bromide prescribed to 'shell shocked' soldiers of the 1914–18 war to treat 'nerves – a vital war-time problem' (Scull 2011) or to women to treat hysteria (most useful at the menstrual periods) (Burney Yeo 1894: 435) offered immediate sedation and relief, at the cost of long-term psychotic symptoms. Similarly, while antipsychotics and antidepressants may relieve short-term aggression or agitation, they are associated with worsening cognitive impairment (Vigen *et al.* 2011) or paradoxical aggression (Healy *et al.* 2006, Jordan *et al.* 2014). Timeframes and remoteness from point of administration are further extended for transgenerational adverse effects. Following the thalidomide disaster, surveillance for congenital anomalies has improved (Mitchell 2003), but there is insufficient work on the impact of prescribed medicines on breastfeeding (Amir *et al.* 2012).

Adverse drug reactions: cost the USA some $30bn each year (Sultana *et al.* 2013); cause 10% (68/678) hospitalisations in US Veterans' Affairs Medical Centres (Marcum *et al.* 2012); are an increasingly common reason for hospital admission in the UK 1999–2009 (Wu *et al.* 2010); and contribute to 20.8% (16.4–25.6%) (60/290) of mainly preventable emergency re-admissions within 1 year of discharge (Davies *et al.* 2010). However, adverse drug events (injuries resulting from interventions related to drugs) due to sub-therapeutic effects of medicines and untreated conditions are as common as ADRs in primary care: 7.6% (95%CI 7.0–8.2), 8.1% (7.5–8.7%) and 7.8% (7.2–8.4%) respectively (n = 7099) (Hakkarainen *et al.* 2013). The problems of medical science unapplied are illustrated by Chiegil and colleagues. Rather than follow the advice of Sir William Osler (1849–1919) and exhort healthcare professionals 'to educate the masses not to take medicine' (Osler 1997:255), some nurses are embracing the complexity of contemporary medicines and devoting scarce resources and time to proactive medicines' management and prevention of adverse events, as illustrated by Hyrkas & Wiggins, Gabe & Jordan, Xu *et al.*, Hemingway *et al.*

Although our contributors argue that medicines' management is crucial to the optimisation of long-term conditions and avoidance of harm, others suggest that some primary care physicians are only willing to undertake medication review if offered suitable financial incentives, including an upfront payment of £350 (US$ 538, 411 Euros) (Grant *et al.* 2014), and our authors propose nurse-led strategies.

Medicines' management in medically underserved locations

Compelling accounts in this issue depict the challenges of medicines' management in areas of physician shortage. Vogelsmeier graphically illustrates the life-threatening problems arising when people needing long-term care transfer between institutions without their current prescription charts, and doctors are unavailable. Chiegil *et al.* describe how nurses glue together the antiretroviral therapy service and cope with interruptions in drug supplies and laboratory testing to ensure the service users' access to pharmacotherapy and, consequently, their survival. Gunes *et al.* report that many nurses are forced into committing procedural errors, and independently administer life-saving diuretics and inotropes, when it is not possible to contact a doctor. A clinical area sometimes falling outside the medical gaze is the physical health of users of mental health medicines, and Hemingway *et al.* describe an initiative to empower nurses to fill this 'care gap'.

That nurses are willing to compensate for the absence of other professionals reflects on their professional commitment: if universal health care is to be delivered safely and effectively, nurse managers, educators and policy makers need to invest in nurses to equip them to

work in the professional territory formerly occupied by doctors. This may require prescription authority. The links between medicines' management and nurse prescribing are rarely discussed: only one of our papers features nurse prescribing. Romero-Collado *et al.* consider nurse prescribing an important component of nursing's professionalization project, essential for the timely delivery of several aspects of care, including immunisation programmes. As Romero-Collado *et al.* say, nurse prescribing is an idea whose time has come, if only to ensure that aging and enlarging populations have access to the benefits of pharmacotherapy. Nurse prescribing could usefully be developed *in tandem* with enhanced medicines' monitoring, patient-centred 'teach back' and motivational interviewing as Gabe & Jordan and Hyrkas & Wiggins describe.

The agenda of 12 research groups

This issue defines the problems in medicines' management throughout the international nursing community: knowledge (Hemingway *et al.*, Gabe & Jordan, Hyrkas & Wiggins, Hajibabaee *et al.*, Mendes *et al.*), pressures in the workplace (Smeuler s*et al.*, Guens *et al.*) and organisational systems and constraints (Vogelsmeier, Xu *et al.*, Andrew & Mansour, Chiegil *et al.*, Romero-Collado *et al.*). We also offer practical solutions: education (Hemingway *et al.*, Andrew and Mansour), structured nurse-led medicines' monitoring (Gabe & Jordan), patient-centred 'teach-back' and motivational interviewing (Hyrkas & Wiggins), the five-point management plan (Xu *et al.*), and nurse prescribing (Romero-Collado *et al.*). However, they are all predicated on further research.

Knowledge underpinning safe and effective medicines' management

Medicines' management, particularly in medically underserved locations, even in the richest country in the world, taxes nurses' ingenuity and knowledge of pharmacotherapeutics. Our authors are almost unanimous in their call for increased pre- and post-registration education in pharmacotherapeutics. This includes understanding the effect of medicines on physiology and the vital signs: to safeguard their patients, nurses need to be able to interpret vital signs in relation to the drugs they administer (Hajibabaee *et al.*, Smeulers *et al.*). However, the theory-practice gap in nurses' pharmacotherapeutics' education remains (Mendes *et al.*) and the clinical outcomes of education initiatives remain unexplored (Jordan 2000). Medicines' management is one of five skills' clusters in the UK 2012 nursing curriculum (NMC 2010), and the impact of this initiative requires evaluation by cluster randomised controlled trials. Meanwhile, concerns over sub-optimal and error-strewn prescribing have reinforced moves to increase undergraduate pharmacology teaching in medical schools and proposals for a new medical school curriculum include the 'ability to recognise adverse drug reactions' (Maxwell 2012).

Workplace pressures

Taken together, this international collection of papers demonstrates that drug errors are common, their reporting less so. Mendes *et al.* indicate a similar problem of under-reporting adverse drug reactions. Our contributors echo calls to establish blame-free error reporting (Reason 2000, Vincent 2010). Nurses also feel that pressure of work hampers reporting, and patients' immediate clinical needs take priority over data collection: while patient safety statistics seem remote from the workplace, patient care is urgent. Without strategies to involve nurses in the deployment of healthcare statistics, the problems of under-reporting identified here will continue to erode the value of routinely collected data (Williams *et al.* 2003). The interventions described in this edition will consume nurses' time: Gabe & Jordan indicate that their intervention will take 10–25 minutes per patient in busy clinics. However, given the financial implications of the excess hospitalisations emanating from suboptimal medicines' management, nurse-led initiatives, if implemented, are likely to prove cost-effective: without research investment, we shall never know.

Systems

The Hippocratic Corpus (1923) states: 'The physician must... have two special objects in view with regard to disease, namely, to do good or to do no harm'. Contributors suggest that this will be promoted by changing the way that medicines' management is organised. Initiatives will require expenditure, which may be relatively low, such as nurse prescribing (Romer-Collado *et al.*), policies and procedures (Xu *et al.*) or expensive, such as laboratory facilities (Ciegil *et al.*) or additional medical input (Vogelsmeier, Gunes *et al.*). World-wide, there is growing recognition that the key to ensuring universal access to the therapeutic revolution, and improving health care for all, may be the expansion of nursing roles. This necessitates nurses assuming new responsibilities, including

medicines' management and monitoring, which lie on inter-professional boundaries. For this to succeed, new education programmes, administration, compliance and monitoring procedures, and reporting systems will need to be devised and evaluated.

Research investment

Adverse event research in nursing needs to move from observation to testing interventions. Our 12 contributors describe the need for change, and call for further research. Only two had the resources to test interventions against outcomes (Xu *et al.*, Hyrkas & Wiggins), and we have no randomised controlled clinical trials, reflecting the availability of funding for nurse-led research. Commentators suggest that the *status quo* for allocation of research funding is ineffective, in that it excludes research outside established groups and 'areas of interest' (Macleod *et al.* 2014). In an age when practice change requires evidence from large, multisite randomised controlled trials, this poses a challenge for medicines' management research and nurse managers seeking to improve medicines' management.

Conclusion

This themed edition unifies an international body of empirical work to deliver a powerful message to nurse managers and policy makers and trigger a dialogue for investment and change. Effective and error-free medicines' management requires knowledge, minimal workplace pressures, and sound systems for medicines' administration, monitoring, and error reporting. However, without resources for evaluation, any initiatives risk being subsumed by the pressures of the workplace. To succeed, medicines' management initiatives first need experimental evidence of their impact on harm reduction and the $213bn *per annum* bill for medicines' mismanagement.

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