Commentary

A national in-patient prescription chart: the experience in Wales 2004–2012

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Prescribing in the NHS

After the founding of the United Kingdom National Health Service, it was decided that there should be a single prescription form for general practice (where 90% of all prescribing occurs), so that all doctors would be familiar with it and prescriptions could be more easily processed for reimbursement and audit purposes. Thus the FP10 was born and it has remained relatively unchanged since then as a UK national prescription form for general practice. However the FP10 is a relatively simple form and did not meet the more complex requirements of hospital prescribing. Individual hospitals in the UK were left to design their own prescription charts for in-patient use and therefore many different charts were developed throughout the UK. Here I describe the development and implementation of a single national prescription chart in Wales since 2004.

A national prescription chart in Wales

Wales has a population of 3.0 million and since 1999 has had a devolved National Health Service, but with continuing close links to its sister services in England, Scotland and Northern Ireland. To ensure that patients in Wales have the best health outcomes from medicines, the All Wales Medicines Strategy Group (AWMSG) was set up by the Minister for Health and Social Services in Wales in 2002. At its meeting in Wrexham in March 2004, AWMSG endorsed the introduction of a single harmonized standard in-patient medication administration chart across Wales to promote safe prescribing. It was produced by a subgroup of the Welsh Pharmacists Committee, and after approval by AWMSG, was rolled out across Wales in autumn of that year.

The chart has been regularly updated since then and the latest edition is available on the AWMSG Website [1] (Figure 1). This is the acute in-patient version, but a long

stay in-patient medication administration record is also available [2] and a version for paediatric use has been produced [3]. A chart (differently coloured) which student health professionals can use to practice their prescribing is available [4], with Web addresses of the organizations in Wales which support prescribing education printed on this educational version of the chart. The chart is used in conjunction with several supplementary charts (e.g. an anticoagulant prescribing chart).

All these charts are supported by nationally agreed prescription writing standards based on national guidelines and legislation, and which apply to all prescriptions, including in-patient charts, out-patient prescriptions and take-home prescriptions in Wales [5]. These standards are also useful for training and audit purposes. An e-learning programme was originally developed to support the roll-out of the new all-Wales Drug Chart and the Prescription Writing Standards, and these three elements were part of the overall project which won the UKCPA/Pfizer Patient Safety Award in 2005 [6]. The NHS Wales Prescribing and Administration e-learning programme was developed by pharmacists in the sub-group [6] in conjunction with Learning Industries, and is available on the Web, after registration [7].

As well as the need for charts tailored to duration of stay and to adult vs. paediatric use (these issues have been addressed by producing different versions), The prescription chart sub-group considered (and continues to meet regularly each year to reconsider) the challenging issues around the need for and design of supplementary charts, including anticoagulant charts, fluid infusions, insulin administration, oxygen, patient controlled analgesia and epidural analgesia and syringe drivers. The sub-group's recommendations are then considered and endorsed by AWMSG, which advises the Minister for Health and Social Services for Wales on medicines strategy, so that the final national charts have the full support of Welsh Government for use in NHS Wales.

DRUG ALLERGIES & SENSITIVITIES THIS SECTION MUST BE COMPLETED	NONE KNOWN		HOSPITAL No:							
	SIGNED	DATE	SURNAME:							
	YES		FIRST NAME:							
	SIGNED	DATE	ADDRESS:							
	Drug / Allergen:	Description of Reaction:	DATE OF BIRTH:							
			Height (m)	Weight (kgs)	Surface Area (m ²)	Age (if under 12)				
DATE OF ADMISSION HOSPITAL WARD CONSULTANT			MULTIPLE MEDICATION CHARTS CHART OF		DETAILS OF SUPPLEMENTARY CHARTS TICK APPROPRIATE BOX					
			MEDICATION ON SUPPLEMENTARY CHARTS SHOULD BE RECORDED ON THE DRUG CHART	ANTICOAGULANT ☐ OXYGEN ☐ SUPPLEMENTARY INFUSION CHART ☐ PATIENT CONTROLLED ANALGESIA/EPIDURAL ☐ INSULIN ☐ SYRINGE DRIVER ☐ OTHER (PLEASE SPECIFY) _____						
PRESCRIPTION FOR ONCE-ONLY and PRE-ANAESTHETIC MEDICATION										
DATE	MEDICINE (APPROVED NAME)	DOSE	ROUTE	TIME TO BE GIVEN	PREScriBER'S SIGNATURE	PHARMACY	DATE	TIME GIVEN	GIVEN BY	CHECKED BY
					bleep No.					
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MEDICINES MANAGEMENT										
MEDIATION HISTORY OBTAINED FROM: PATIENT ☐ GP ☐ NH/RH ☐ CARER ☐ PODS ☐ OTHER						COMMENTS / NOTES				
COMPLIANCE ISSUES										
INITIALS DATE										
MEDITATIONS RECONCILED INITIALS DATE										
GP DETAILS		COMMUNITY PHARMACY DETAILS		DISCHARGE PRESCRIPTION WRITTEN INITIALS DATE						

The all Wales in-patient medication administration record

The value of a national prescription chart

It has been estimated that that around 150 deaths occurred as a result of medication errors in England and Wales in 2001 [8]. Errors in prescriptions were the subject of an important report (the EQUIP study) commissioned by the General Medical Council [9]. In 124 260 medication orders checked on 7 'census days' in 19 acute hospital trusts in North-west England, a mean error rate of 8.9% occurred. An error rate of 8.4% was found in the first year foundation (FY1) graduates compared with 10.3% in foundation year 2 doctors. The errors most often occurred at the time of patients' admission to hospital, and most frequently involved analgesics, antibiotics, bronchodilators and anti-anginal agents. Potentially lethal errors occurred in less than 2% of the medication orders, but this figure leaves no room for complacency when one considers the total number of prescriptions written in the NHS on any one day.

In the EQUIP study, the authors recommended five main targets to minimize what was termed 'prescribing errors' [9], but others prefer to call medication errors [10]. The first of these was to improve the clinical working environment, one factor of which was the design of in-patient prescription chart, which they considered to be a primary cause of medication errors by junior doctors. They therefore recommended that a standard drug chart should be introduced throughout the NHS [9]. This was not the first time that such a recommendation had been made. In 2006 the British Pharmacological Society advocated a move towards a national prescription chart [11, 12] and the General Medical Council [13], several Medical Royal Colleges, the Royal Pharmaceutical Society and Royal College of Nursing have since supported this approach.

Doctors are perhaps the most mobile of health professionals. Their training requires them to be able to work across the UK and in their travels they will encounter a variety of different clinical environments, with unfamiliar charts, forms and procedures. This mobility was recognized in the 2010 annual report of the UK Foundation training programme, which stated that: *'Just over half (58%) of UK medical school graduates started foundation training in the foundation school most closely associated with the medical school from which they graduated. ... a significant proportion of UK graduates are moving to a different area for their foundation training by choice, since over 90% of applicants were allocated to their first choice foundation school'* [14]. Their unfamiliarity with the clinical working environment in the new foundation school may be one factor predisposing these inexperienced prescribers to commit medication errors.

In the EQUIP study, the error rate was higher in Foundation Year 2 doctors (10.3%) than in Foundation Year 1 doctors (8.4%) or consultants (5.9%) [9]. Foundation Year 2 doctors are just starting to prescribe independently from perhaps a wider range of medicines than when they were

Foundation Year 1 doctors, and their mobility (see above) may also mean that the prescription chart in each new hospital may be unfamiliar to them [8].

The evidence for standardization

A similar approach to standardization has been adopted elsewhere. Introduction of a standard revised medication chart in a Queensland hospital was associated with a significant reduction in the frequency of prescribing errors, improved ADR documentation and a decrease in the potential risks associated with warfarin management [15]. The chart was subsequently endorsed for use in all public hospitals in Queensland and, then after adaptation, was piloted by a national collaborative process before it became the Australian National In-patient Medication Chart [15].

Rozich and co-workers have observed that when patterns of care are widely divergent, clinical outcomes suffer and, as a result, safety may be compromised so that harmonization of processes can reduce the risk of error [16]. These authors showed that standardization of a sliding scale protocol for insulin was associated with better patient outcomes in a hospital setting. For the last 8 years, all health professionals trained in Wales have been taught prescribing skills using only the national chart alongside the supplementary charts, and this has facilitated standardized training.

Towards a national prescription chart in the UK

The UK Academy of Medical Royal Colleges recently collaborated with the Royal Pharmaceutical Society (RPS) and Royal College of Nursing (RCN) to produce a report entitled *'Standards for the design of hospital in-patient prescription charts'* for promotion throughout the NHS. The purpose was to ensure that these standards were referred to in the design of future editions of in-patient prescription charts in either paper or electronic form. Extensive consultation occurred within medicine, nursing and pharmacy, and the final report, together with supporting documents, is available on the Academy's Website [17]. A letter was also sent to all Trusts in England by Sir Bruce Keogh (Medical Director of the NHS in England) and Sir Neil Douglas (Chairman of the UK Academy of Medical Royal Colleges) bringing the standards to Trusts' attention in England. The All Wales in-patient prescription chart already shows very close concordance with these design standards, but is currently being revised to adhere even more closely to them.

Since the first study showing the beneficial effect of computerized prescribing on medication error rate [18], it has been generally acknowledged that Clinical Decision Support (CDS) in electronic prescribing (eRx) systems can improve the safety, quality, efficiency and cost-

effectiveness of care [19]. However, more research is still needed into whether such systems can reduce serious prescribing errors and subsequent patient harm in hospitalized patients [20]. Dornan and colleagues recommended the introduction of electronic prescribing systems into hospital care, but warned that their introduction should be monitored to identify any new errors associated with their use [9]. The standards for the design of hospital in-patient prescription charts identified by the Academy of Medical Royal Colleges are equally applicable to paper and electronic charts, and a number of the standards could be automatically embedded into the latter when they are available to prescribers in the hospital setting [17].

Electronic prescribing has not yet been widely adopted across UK hospitals, and until it is, it is important to ensure that prescribers are as familiar as possible with the particular in-patient chart used in their part of the NHS when they qualify. Thus education in the use of the chart from an early stage of training is an important priority. It is of note that of the five recommendations by Dornan and co-workers, the first related to improvements in the clinical working environment (including the use of a standard chart) and the other four were all related to a particular aspect of undergraduate or postgraduate medical education, vital prerequisites of continuing safe prescribing. The standards for the design of hospital in-patient prescription charts identified by the Academy of Medical Royal Colleges might also enable the development of a standardized chart across a larger part of the NHS than just NHS Wales. Working Groups are presently addressing these issues in England (S. Jackson, personal communication) and Scotland (S. Maxwell, personal communication). The impact of introduction could be determined by comparison between medication error rates in areas where it was introduced and areas in which it was not, and/or by examining medication error rates before and after full area-wide introduction, the latter being used by Coombes and co-workers [15].

Conclusion

The adoption of an All Wales chart has demonstrated the feasibility of obtaining consensus across a much wider variety of users. Common prescribing standards (like those existing in Wales) to accompany and support the prescription chart, could also be agreed across a broader constituency in the interests of patient safety and rational prescribing. Convergence of charts across the UK home nations would require the support and input of the professions eligible to prescribe in each nation, but I believe that patients can only benefit when those who prescribe for them are already very familiar with a standard in-patient prescription chart, ideally after having trained to prescribe safely and effectively using a similar edition of that same agreed chart. A nationally, agreed paper chart, informed

by agreed design standards could also help in the design of forms for electronic prescribing in hospitals, as this approach is adopted more widely in the future.

Competing Interests

There are no competing interests to declare. The author is presently Chairman of the All Wales Medicines Strategy Group and President of the British Pharmacological Society. He was a Royal College of Physicians (London) representative on the Academy of Medical Royal Colleges /Royal Pharmaceutical Society/Royal College of Nursing working group on *Standards for the design of hospital in-patient prescription charts* in 2011.

Mr David E. Roberts, previous Chairman of All Wales Drug Chart Sub-group of the All Wales Chief Pharmacists' Committee, Ms Jenny Harries, the Chairman, and members of the Sub-group (including Mr S.G. Gage and Ms S. Scott Thomas) were responsible for leading the development of the All Wales National In-patient Prescription Charts, the prescribing standards and (with Learning Industries) the production of the e-learning programme. The Patient Quality and Safety sub-group continues to update these resources on behalf of the All Wales Chief Pharmacists' Committee and the All Wales Medicines Strategy Group. Ms Helen Day developed the student version of the chart.

REFERENCES

- 1 All Wales Medicines Strategy Group. 2011a. All Wales Acute In-patient Chart. Available at <http://www.wales.nhs.uk/sites3/Documents/371/Acute%20in-patient%20chart.pdf> (last accessed 4 March 2012).
- 2 All Wales Medicines Strategy Group. 2011b. All Wales Long Stay In-patient Chart. Available at <http://www.wales.nhs.uk/sites3/Documents/371/Long%20stay%20in-patient%20chart.pdf> (last accessed 4 March 2012).
- 3 All Wales Medicines Strategy Group. 2011c. All Wales Paediatric In-patient Chart. Available at <http://www.wales.nhs.uk/sites3/Documents/371/All%20Wales%20Paediatric%20In-patient%20Chart.pdf> (last accessed 4 March 2012).
- 4 All Wales Medicines Strategy Group. 2011d. All Wales Student Drug Chart. Available at <http://www.wales.nhs.uk/sites3/Documents/371/Student%20Drug%20Chart.pdf> (last accessed 4 March 2012).
- 5 All Wales Medicines Strategy Group. 2011e. All Wales Prescription Writing Standards. Available at <http://www.wales.nhs.uk/sites3/Documents/371/All%20Wales%20Prescription%20Writing%20standards%20April%202011.pdf> (last accessed 4 March 2012).
- 6 United Kingdom Clinical Pharmacy Association. 2011. Available at <http://www.ukcpa.net/wp-content/uploads/2010/11/Pfizer-Award-Leaflet-2012-FINAL.pdf> (last accessed 4 March 2012).

- 7 Wales NHS. Prescribing and administration e-learning programme. 2011. Available at <http://www.learningindustries.com/content/891/prescription-writing> (last accessed 4 March 2012).
- 8 Audit Commission 201 'A spoonful of sugar: medicines management in NHS hospitals'. 2001. Available at <http://www.audit-commission.gov.uk/SiteCollectionDocuments/AuditCommissionReports/NationalStudies/nrspoonfulsugar.pdf> (last accessed 4 March 2012).
- 9 Dornan T, Ashcroft D, Heathfield H, Lewis P, Miles J, Taylor D, Tully M, Wass V. Final Report 2009: an in depth investigation into causes of prescribing errors by foundation trainees in relation to their medical education. EQUIP study. 2009. Available at http://www.gmc-uk.org/FINAL_Report_prevalence_and_causes_of_prescribing_errors.pdf_28935150.pdf (last accessed 4 March 2012).
- 10 Aronson J. Medication errors: what they are, how they happen, and how to avoid them. *QJM* 2009; 102: 513–21.
- 11 Aronson JK. A prescription for better prescribing. *Br J Clin Pharmacol* 2006; 61: 487–91.
- 12 Aronson JK, Henderson G, Webb DJ, Rawlins MD. A prescription for better prescribing. *BMJ* 2006; 333: 459–60.
- 13 Anon. GMC calls for a national prescription chart to reduce errors. 2009. Available at <http://www.gmc-uk.org/news/5156.asp> (last accessed 4 March 2012).
- 14 United Kingdom Foundation Programme Office. United Kingdom Foundation Programme Annual Report 2010. 2010. Available at <http://www.foundationprogramme.nhs.uk/pages/home/keydocs> (last accessed 4 March 2012).
- 15 Coombes ID, Stowasser DA, Reid C, Mitchell CA. Impact of a standard medication chart on prescribing errors: a before and after audit. *Qual Saf Health Care* 2009; 18: 478–85. Available at [http://www.health.gov.au/internet/safety/publishing.nsf/content/com-pubs_NIMC-con/\\$File/31005-baa-audit.PDF](http://www.health.gov.au/internet/safety/publishing.nsf/content/com-pubs_NIMC-con/$File/31005-baa-audit.PDF) (last accessed 4 March 2012).
- 16 Rozich JD, Howard RJ, Justeson JM, Macken PD, Lindsay ME, Resar RK. Standardisation as a mechanism to improve safety in health care. *Jt Comm J Qual Saf* 2004; 30: 5–14.
- 17 Academy of Medical Royal Colleges. 2011. Standards for the design of hospital in-patient prescription charts. Available at <http://www.aomrc.org.uk/publications/reports-a-guidance.html> (last accessed 4 March 2012).
- 18 Bates DW, Leape LL, Cullen DJ, Laird N, Petersen LA, Teich JM, Burdick E, Hickey M, Kleeffeld S, Shea B, Vander Vliet M, Seger DL. Effect of computerized physician order entry and a team intervention on prevention of serious medication errors. *JAMA* 1998; 280: 1311–6.
- 19 Teich JM, Osheroff JA, Pifer EA, Sittig DF, Jenders RA, CDS Expert Review Panel. Clinical decision support in electronic prescribing: recommendations and an action plan: report of the Joint Clinical Decision Support Workgroup. *J Am Med Inform Assoc* 2005; 12: 365–76.
- 20 Reckmann MH, Westbrook JI, Koh Y, Lo C, Day RO. Does computerized provider order entry reduce prescribing errors for hospital inpatients? A systematic review. *J Am Med Inform Assoc* 2009; 16: 613–23.

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