ROYAL ACADEMY OF ENGINEERING | Royal College of Physicians | Future Hospital | The Academy of Medical Sciences

Engineering better care

a systems approach to health and care design and continuous improvement

Case study 2

Oral methotrexate
A response to clinical problems

Following the death of a Cambridgeshire patient in April 2000 from a suspected overdose of methotrexate, an inquiry was established as the "incident appeared to have resulted from failings within all stages on the patient's care pathway."[1] This led to 28 recommendations, of local and national relevance, to reduce the risk of further incidents.

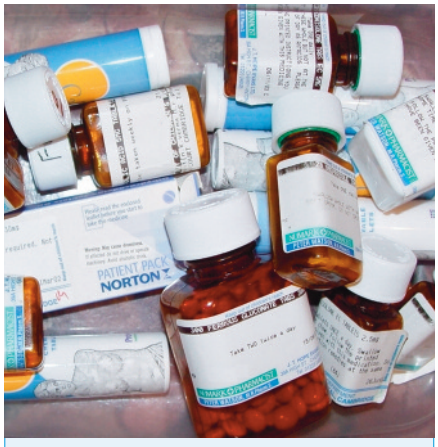
Methotrexate is a folic acid antagonist and is classified as an antimetabolite cytotoxic immunosuppressant agent. As well as being a therapy for cancers, it is widely used as a disease modifying drug for rheumatoid arthritis. Because of its toxicity, it is only given weekly and its use is carefully monitored through regular blood tests, often leading to changes in the weekly dose prescribed.

Following the inquiry, the National Patient Safety Agency took a systems approach, working with health professionals, patient groups, the pharmaceutical industry, and medical and pharmaceutical software suppliers, to identify risks associated with the delivery of methotrexate and to co-design safer solutions.[2]

Subsequent changes included better information for patients and patient-held records, improved warnings for GP prescribing and pharmacy dispensing, and the repackaging of the tablets to ensure that the two doses available were more easily distinguishable.

The changes made to the methotrexate supply system, requiring the cooperation of a variety of stakeholders, led directly to a measurable reduction in patient harm and an approach that focuses on enabling the patient to take the right dose at the right time.

Further details of the application of a systems approach to this case study can be found in Annex 1: *Applications of the approach.*



Success factors

The success of changes to the methotrexate supply system may be attributed to:

- **People** — **improvements to patient information, clinician knowledge and prescribing policy**
- **Systems** — **consideration of the wider prescribing, monitoring and medication supply system**
- **Design** — **improvements to GP protocols, prescribing software and medication packaging**
- **Risk** — **acknowledgement of the role of the patient in ensuring safe medication practice**

1 *Methotrexate toxicity: an Inquiry into the death of a Cambridgeshire patient in April 2000,* Cambridgeshire Health Authority, July 2000. www.blacktriangle.org/methotrexate-toxicity.pdf

2 *Towards the safer use of oral methotrexate*, National Patient Safety Agency, July 2004. www.nrls.npsa.nhs.uk/EasySiteWeb/getresource.axd?AssetID=59985&type=full&servicetype=Attachment