The Reduction of Oral Methotrexate Prescribing Errors Through the Introduction of a Structured Electronic Prescribing Pathway.

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Introduction

The National Patient Safety Agency (NPSA) recognises Methotrexate as a high-risk agent. The Agency has identified 25 patient deaths and a further 26 cases of serious harm linked to the use of oral Methotrexate over a period of ten years[1]. The Cambridgeshire Health Authority report into a fatal case of Methotrexate toxicity clearly highlighted the potential risks associated with administration of Methotrexate[2]. In July 2003 the NPSA issued a statement outlining the steps it is taking to prevent deaths linked to Methotrexate[3].

This statement prompted a review at our large district general hospital into local prescribing systems in an attempt to reduce Methotrexate errors. Oral Methotrexate was prescribed for non-oncological indications on the hospital's electronic prescribing system. (*See Figure 1 and 2*) As the drug was not in the medicines index prescribers were required to free-type Methotrexate on the computer system then select a dosage and frequency from the default schedule screen. This allowed prescribers to select from a wide range of dose schedules. Pharmacist perception was that orders for oral Methotrexate therapy were frequently prescribed incorrectly and required subsequent modification. Therefore, in response to both national and local concerns, the Trust set out to review and improve the prescribing of Methotrexate

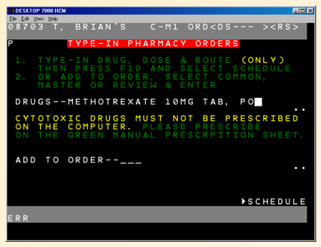


Figure 1. Old Methotrexate Prescribing Screen

Figure 2. Old Methotrexate Schedule Screen

Objective

To determine whether a new electronic prescribing pathway improved the quality of Methotrexate prescribing for non-malignant disease.

Method

The hospital Electronic Data Warehouse was interrogated to identify oral Methotrexate electronic prescriptions during the period January 2001 to June 2003. A review of pharmacist documented clinical interventions was performed in the same time period. Any interventions documented for Methotrexate before the implementation of the structured prescribing pathway were analysed. Data was also obtained from the Trust's Risk Management department of any clinical incidents reported involving Methotrexate.

Following implementation of the prescribing pathway the hospital Electronic Data Warehouse was analysed from November 2003 to October 2004 to examine the number of Methotrexate prescriptions created using the new pathway and to identify any scheduling problems. Similarly, a review of clinical pharmacist interventions and the Trust's Risk Management department clinical incidents was performed following introduction of the new prescribing pathway.

Results

Over a 30 month period, from January 2001 to June 2003, (prior to introduction of the new Methotrexate screens) pharmacists documented 16 potential Methotrexate overdoses. These comprised 10 cases of daily dosing instead of weekly dosing, 3 cases of three times daily dosing instead of weekly dosing, and 3 overdoses because of selection of the wrong product.

There were 3 reports of oral Methotrexate prescribing incidents reported to the risk management department over this period. All were related to the drug being prescribed on a daily schedule.

In the twelve months 1st July 2002 until 30th June 2003 there were a total of 758 free typed oral Methotrexate orders on the computer system. Analysis of these orders showed that on 30 occasions the Methotrexate was prescribed with a frequency other than weekly.

The large number of prescribing problems with oral Methotrexate supported the case to develop a structured electronic prescribing pathway. This was developed by a team comprising the electronic prescribing pharmacists, specialist clinical pharmacists and the rheumatology team.

It was decided that, upon selection of Methotrexate from the electronic medicines index, prescribers would be asked to select an indication for the oral Methotrexate then they would be directed to a screen that only offered a weekly dosing schedule. The dosing screen was designed to have seven pre-defined dose selections and an eighth option where the dose could be free-typed. The seven pre-defined doses accounted for the majority of doses prescribed according to the analysis of previous prescribing patterns. The draft pathway was presented to a Physician's meeting and was revised on the basis of feedback received. The final pathways were approved and tested, and were introduced into the live system at the beginning of October 2003. (See Figures 3-6)

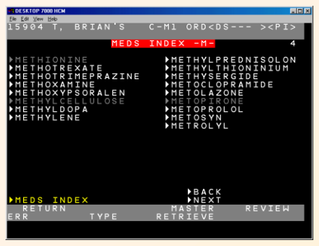


Figure 3. Methotrexate Prescribing Screen

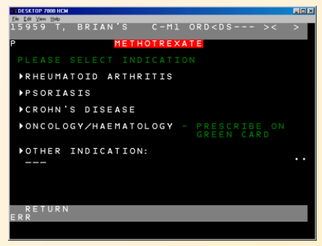


Figure 4. Methotrexate Indication Selection

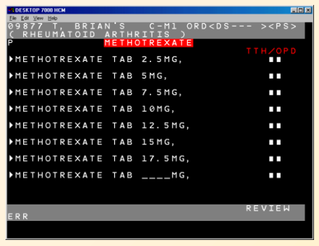


Figure 5. Methotrexate Dose Selection

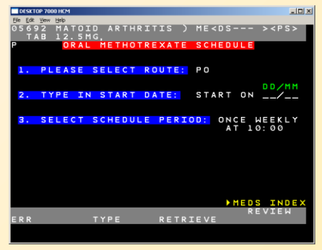


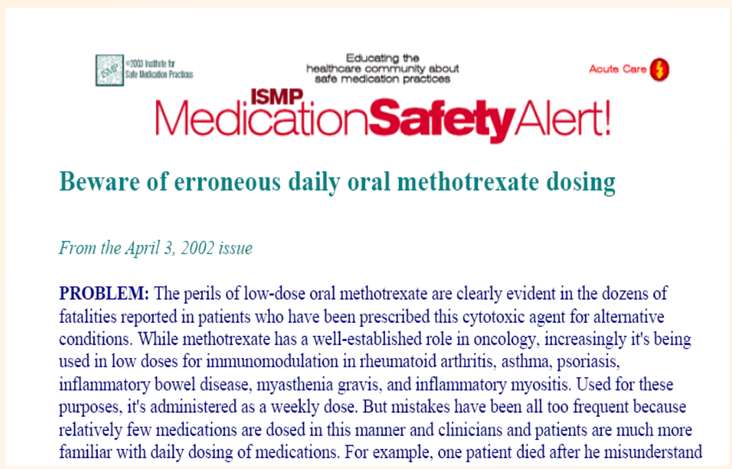
Figure 6. Methotrexate Schedule Screen

	Before Pathway Introduced (7/02-6/03)	After Pathway Introduced (11/03-10/04)
Number of Prescriptions	758*	878✦
Number of Errors (%)	30 (3.9)	1 (0.1)

*All prescriptions free-typed
✦93.5% adherence to prescribing pathway

Since the introduction of the new prescribing pathway, pharmacists have reported one intervention to correct inappropriate methotrexate prescriptions. This was due to a design flaw in the pathway and this was subsequently corrected.

Since the introduction of the new prescribing pathway from 1st November 2003 until 31st October 2004, oral Methotrexate was prescribed for in-patients on 878 occasions. In 93.5% (821) cases the pathway was used with only one single error reported (see previous paragraph). The remaining 6.5% (57) orders were free-typed i.e. outside of the structured pathway, and 27 of these are attributable to a single directorate. No errors were reported with these prescriptions.



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Beware of erroneous daily oral methotrexate dosing

From the April 3, 2002 issue

PROBLEM: The perils of low-dose oral methotrexate are clearly evident in the dozens of fatalities reported in patients who have been prescribed this cytotoxic agent for alternative conditions. While methotrexate has a well-established role in oncology, increasingly it's being used in low doses for immunomodulation in rheumatoid arthritis, asthma, psoriasis, inflammatory bowel disease, myasthenia gravis, and inflammatory myositis. Used for these purposes, it's administered as a weekly dose. But mistakes have been all too frequent because relatively few medications are dosed in this manner and clinicians and patients are much more familiar with daily dosing of medications. For example, one patient died after he misunderstand

Discussion

The introduction of the new oral Methotrexate prescribing pathway for non-malignant disease has improved the quality of prescribing of this drug. This has been achieved by facilitating weekly scheduling of this agent. Work remains to eliminate the outstanding free-typed prescriptions in order to further minimise the risk of prescribing errors with Methotrexate.

This project illustrates how modification of information technology (IT) systems can be used to make prescribing systems safer for high-risk drugs. However continuous monitoring of the prescribing process is essential to identify any unforeseen problems caused by these modifications.

BBC NEWS UK EDITION

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Warning to patients on toxic drug

Patients taking a toxic drug for psoriasis or rheumatoid arthritis have been given safety warnings by a health watchdog.

The move by the National Patient Safety Agency follows 25 deaths and 26 cases of serious harm linked to methotrexate in the last 10 years.

Prescribing errors to blame

Two-thirds of these incidents involved prescribing errors by doctors.

Doctors, pharmacists and patients have been reminded to check the dose and frequency is correct.

Oral methotrexate tablets are taken by thousands of people in the UK for rheumatoid arthritis and psoriasis.

There are 13,000 medicines currently licensed for use in the UK. Oral methotrexate is one of only six medicines that should be taken weekly.

"In most cases these are not isolated events, but can be traced to weaknesses in systems and processes"

Chief Medical Officer, Sir Liam Donaldson

Methotrexate is also used to treat some cancers, such as leukaemia, in daily oral or injectable doses.

References

1. Society and NPSA in safety project. Pharmaceutical Journal, 18 October 2003; 271: 562.
2. Methotrexate toxicity. An inquiry into the death of a Cambridgeshire patient in April 2000. Cambridge: Cambridgeshire Health Authority; 2000
3. Methotrexate patient safety solutions – Background briefing. National Patient Safety Agency. Available at http://81.144.177.110/web/display?contentId=2484 Accessed on 21st February 2005

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