

Incidents involving ranitidine liquid preparations for children

Key points

- Analysis of data from 6,796 pharmacies suggests that around **60 dispensing incidents occur every year** involving ranitidine liquid for children in England.
- Around **40 of these incidents** affect children under two years old.
- Further implementation of robust procedures in community pharmacy could help to reduce the prevalence of these incidents, and other incidents involving liquid preparations.

Introduction

Working from high street, local and rural locations, community pharmacy teams safely supply medicines together with information and advice every day as a fundamental part of their regular practice. Around 950 million prescriptions are dispensed from community pharmacies in England each year¹ and the vast majority of these medicines are dispensed without incident. In the largest UK study to date, Pharmacy Voice aimed to quantify the number of dispensing incidents made in pharmacies in 2013 and found that on average, 1.44 incidents were reported for every 10,000 items dispensed.² This suggests that 99.98% of prescription items are supplied without a reported incident.

Given the scale of the dispensing and supply chain in community pharmacy, there are very few instances of medication-based incidents that actually reach the patient. However, most dispensing incidents are often a potentially preventable source of harm and even those which do not cause harm, can cause distress and suffering for all parties involved, especially for patients and their families. Incidents can lead to a loss of confidence in the health service and can unsettle the professional relationships between pharmacy teams and their patients.

Dispensing incidents affecting babies and children are particularly traumatising for patients' families, and for pharmacy staff. As such, Pharmacy Voice conducted an audit to quantify the occurrence of dispensing incidents involving ranitidine liquid in children and looked at providing some recommendations and effective shared learning for pharmacy teams to reduce the frequency of these incidents. The decision was made at the first meeting of Pharmacy Voice's Patient Safety Group because a number of Medication Safety Officers had detected reoccurring incidents with these preparations. The meetings of this group provide an opportunity for Medication Safety Officers to share important learning on patient safety matters and take action to improve patient safety in community pharmacy. Pharmacy Voice is also a member of the Specials Advisory Group looking at updating advice to healthcare professionals on the purchasing, prescribing and supply of specials, unlicensed and off label medicines.

Ranitidine is listed on the World Health Organization's List of Essential Medicines as one of ten essential gastrointestinal medicines needed in any basic health system.³ Ranitidine is an H₂-receptor antagonist used to treat certain conditions caused by too much acid being produced in the stomach.⁴ These conditions include stomach ulcers, ulcers of the upper part of the intestine, acid reflux or heartburn, and indigestion. Ranitidine can also be used to treat irritation and ulceration of the stomach which has been caused by the use of non-steroidal anti-inflammatory drugs (NSAIDs).⁵

In England, approximately 4 million prescriptions for medicines containing ranitidine (as ranitidine hydrochloride) are issued every year.⁶ Approximately 160,000 of these prescriptions are for ranitidine in liquid

¹ Health and Social Care Information Centre (2014) General Pharmaceutical Services in England 2004-5 to 2013-14. Available at: <http://www.hscic.gov.uk/catalogue/PUB15933>

² Davies, J. and Darracott, R. (2014) Quantifying the incidents of dispensing incidents in community pharmacy.

³ World Health Organization (2013) WHO Model List of Essential Medicines. Available at: http://apps.who.int/iris/bitstream/10665/93142/1/EML_18_eng.pdf?ua=1

⁴ Allen, H. (2012) Ranitidine to reduce stomach acid. Patient. Available at: <http://www.patient.co.uk/medicine/Ranitidine.htm>

⁵ Joint Formulary Committee (2015) British National Formulary (online). BMJ Group and Pharmaceutical Press. Available at: <https://www.medicinescomplete.com/mc/bnf/current/PHP414-ranitidine-non-proprietary.htm>

⁶ In 2013, 3.98million prescription items containing ranitidine hydrochloride were dispensed in total, 153,567 of which were for liquid preparations. In 2014, 4.29million ranitidine hydrochloride items were dispensed in total, 173,448 of which were for liquid preparations. Source: HSCIC (2015) Prescription Cost Analysis, England – 2013 and 2014. Available at: <http://www.hscic.gov.uk/catalogue/PUB13887> and <http://www.hscic.gov.uk/catalogue/PUB17274>.

form.⁷ Ranitidine is available on prescription for children under the age of sixteen for the short-term treatment of ulcers or to reduce the symptoms of indigestion and heartburn. For young children, especially those under two years of age, ranitidine will most often be prescribed as ranitidine hydrochloride in oral liquid form as an unlicensed preparation. For some older children, ranitidine can be prescribed in the form of tablets or effervescent tablets.

The dose of ranitidine in liquid form prescribed should be calculated by a doctor in millilitres based on a child's weight. For the treatment of stomach and duodenal ulcers the usual dose is 2mg for each kilogram of body weight, twice a day for four weeks.⁸ For the treatment of heartburn, the usual dose is 2.5mg for each kilogram of body weight, twice a day for two weeks.⁹

The most frequently dispensed oral solution containing ranitidine in the UK contains 75mg of ranitidine (as hydrochloride) in each 5ml of solution.¹⁰ This is the licensed formulation and 95% of the prescriptions for ranitidine in liquid form are for this strength of solution. The second most frequently dispensed strength of oral solution contains 5mg of ranitidine (as hydrochloride) in each 5ml of solution, and, as an unlicensed medicine, would have to be ordered specially for each individual patient. Therefore the most frequently dispensed oral solution is 15 times stronger than the second most frequently dispensed. As the weaker solution has to be specially ordered it is most likely that pharmacies may only have the stronger solution in stock.

Due to the necessary calculations taking into consideration body weight when preparing the correct oral liquid dose of ranitidine for children, errors can be made, resulting in patient safety incidents. Although ranitidine is very specific in action and no particular problems are expected following an overdose¹¹, pharmacy teams strive to reduce the likelihood of **any** patient safety incidents, especially those affecting young children.

Data collection and discussion

Through the use of internal company reporting systems, Pharmacy Voice collected data on the number of dispensing incidents involving ranitidine liquid preparations during 2013 and 2014. Nine large multiples and five smaller, regional multiples provided incident data. In total, data were collected from 6,796 pharmacies. This sample represents around 60% of the community pharmacies in England (n=59.47%).

The data collection revealed that there were 36 incidents involving ranitidine liquid preparations in the 6,796 pharmacies that provided data in 2013, and 34 incidents in 2014. These incidents were divided into two categories, incidents affecting children aged under two years old and incidents affecting children between two years old and 12 years old. These data are presented in Table 1 below.

Table 1 – Number of incidents involving ranitidine liquid preparations in 2013 and 2014 based on data from 6,796 community pharmacies

Incidents involving ranitidine liquid preparations	2013	2014
Affecting children aged under 2 years old	26	25
Affecting children aged between 2 and 12 years old	10	9
TOTAL	36	34

Cautious proportional extrapolation of the data presented in Table 1 suggests that, at the national level of around 11,500¹² pharmacies in England, in the region of **sixty dispensing incidents may occur each year**

⁷ Ibid.

⁸ Electronic Medicines Compendium (2014) Ranitidine 150mg/10ml Oral Solution Summary of Product Characteristics. Available at: <https://www.medicines.org.uk/emc/medicine/29292>

⁹ Ibid.

¹⁰ HSCIC (2015) Prescription Cost Analysis, England – 2014. Available at: <http://www.hscic.gov.uk/catalogue/PUB17274>

¹¹ Electronic Medicines Compendium (2014) Zantac® Syrup Summary of Product Characteristics. Available at: <https://www.medicines.org.uk/emc/medicine/18438>

¹² 11,495 community pharmacies in England in 2013, 11,647 community pharmacies in England in 2014. Source: HSCIC (2014) General Pharmaceutical Services in England: 2004-5 to 2013-14.

affecting babies and children prescribed ranitidine liquid preparations. Using further cautious extrapolation, **over 40 of these incidents (70%)** are likely to affect babies **under 2 years old**.

In 2013, 3.98million prescription items containing ranitidine hydrochloride were dispensed in total, 153,567 of which were for liquid preparations.¹³ In 2014, 4.29million ranitidine hydrochloride items were dispensed in total, 173,448 of which were for liquid preparations.¹⁴ Against a background of over 160,000 liquid preparations of ranitidine being dispensed every year in England¹⁵, this suggests that **99.96% of ranitidine liquid preparations are dispensed without incident**. In other words, 1 incident affecting a child occurs in approximately every 2,700 prescriptions for ranitidine liquid dispensed.¹⁶

Whilst this is a low rate, there are still sixty patients who have been issued with the incorrect dosage of their medication and whose families may have experienced distress as a result of these incidents. There is clearly room for improvement and members of Pharmacy Voice's Patient Safety Group have shared learning on what individual companies are doing to reduce the number of dispensing incidents involving measuring out liquid prescriptions for children. These recommendations are not specific to prescriptions for ranitidine, but to all medications which require calculations of dosage taking into account body weight, especially those which could in fact cause harm to a baby or child.

Using these findings, Pharmacy Voice also arranged a meeting with the Medicines and Healthcare products Regulatory Agency (MHRA). The issues with licensed and unlicensed presentations of ranitidine liquid were discussed. At the meeting, Pharmacy Voice and the MHRA discussed the packaging of ranitidine liquid preparations which are licensed and subject to a marketing authorisation and considered whether greater prominence could be given to the expression of strength. Additionally it was felt that there may be a need for greater communication between primary and secondary care when products are being prescribed for children.

Recommendations

Community pharmacy teams should note the following recommendations when prescriptions for liquid preparations for babies and children come in:

- Always **check the date of birth** on a prescription and consider this when completing all clinical checks. If the prescription is for a patient under the age of 12, this should be **highlighted by the branch colleague who receives the prescription**, or an **age sticker** can be used during the prescription assembly process.
- Any medication which has been prescribed outside the recommended age range should be **discussed with the prescriber**. The prescriber should also be reminded that this is an **unlicensed indication**, and as such carries additional liabilities and responsibilities for all healthcare professionals involved. Any discussion with the prescriber should be recorded on a child's Patient Medication Record (PMR) and discussed with the parent or carer.
- Consider the **suitability of the prescribed medication** for the individual child or infant, including the active and other ingredients. If the product contains alcohol, consider whether this is a suitable product and whether there is any risk of potential harm. Many liquid preparations are available in paediatric formulations.
- Calculations of dosage taking into consideration body weight of patient should be **double checked by another pharmacist** if possible. The **actual weight of a child should be obtained** in order to carry out an accuracy check on the dosage.
- Any calculations made should also be **recorded in the Patient Medication Record (PMR)**.
- **Clarification should be made to parents** or carers on the exact volume in **ml** needed to give the intended dose in **mg**, especially if a dose is prescribed only in mg. If the parent or carer is unsure, the volume required in ml should be added to the labelled instructions.

¹³ HSCIC (2014) Prescription Cost Analysis, England – 2013. Available at: <http://www.hscic.gov.uk/catalogue/PUB13887>

¹⁴ HSCIC (2015) Prescription Cost Analysis, England – 2014. Available at: <http://www.hscic.gov.uk/catalogue/PUB17274>

¹⁵ Ibid.

¹⁶ Calculated using an incident rate of 0.0375 (60 incidents per 160,000 prescriptions)

- All pharmacies should **ensure that small enough syringes are always in stock** and **supplied with the prescription** to make measuring out prescribed doses easier for the parent or carer. If necessary, some pharmacies may need to contact a wholesaler to acquire these. Parents or carers should be **taught how to use these oral syringes** correctly.