



MEDICATION SAFETY IN PAEDIATRIC CARE REPORT BY THE DEPUTY HEALTH AND DISABILITY COMMISSIONER

In April 2007 the Health and Disability Commissioner received a complaint from Mr A¹ (advocate for Baby B's parents) about the services provided at Palmerston North Hospital to Baby B in July and August 2006. The key concern identified in Mr A's complaint was that Baby B's weight had been recorded incorrectly, resulting in the administration of higher doses of medication, nutrition and fluid than were prescribed.

Summary of events

In the early hours of 28 July 2006, one-month-old Baby B was taken by her mother to the Emergency Department at Palmerston North Hospital (the Hospital), with a two- to three-day history of being unwell with a chesty cough, difficulty breathing, and decreased feeding. The Senior House Officer assessed her as "mild" (with normal hydration, oxygen saturation 99% in room air, and a respiratory rate of 46 with mild recession), and she was sent home with instructions to return if she got any worse.

Baby B's mother returned with her at about 3.30pm on 28 July, as she was concerned that Baby B's condition had deteriorated. On assessment, Baby B had a low oxygen saturation of 89%, a rapid respiratory rate of 64 breaths per minute, and a "blanching erythematous rash"² on her face. Baby B was given oxygen and admitted to the Children's Ward with a diagnosis of bronchiolitis.³ The registered nurse (RN) assigned to care for Baby B recorded Baby B's weight in the clinical notes and "Nursing Assessment Documentation" as 6.82 kilograms (kg). Baby B's birth weight as recorded in the Hospital records was 2.74kg (6lbs).

On 29 July, Baby B was recorded as "struggling with oral intake" and was commenced on nasogastric feeding at 1.45pm. Her fluid regime was recorded (by a Senior House Officer) as 120 millilitres per kg (ml/kg) daily, and calculated as 818 ml/day (100ml every three hours) based on the recorded weight of 6.82kg.

On 30 July, Baby B was commenced on continuous positive airways pressure (CPAP) assistance, after her respiratory distress worsened and she required increased oxygen. Chloral hydrate (a sedative) was also prescribed, for tolerance of the CPAP nasal prongs. Baby B was administered a loading dose of 50mg/kg (340mg) chloral hydrate, and then a dose of 25mg/kg (170mg four hourly, which was calculated by another staff member on the recorded weight of 6.82kg).

¹ Names (other than MidCentral District Health Board, Palmerston North Hospital, and the Commissioner's expert advisors) have been removed to protect privacy. Identifying letters are assigned in alphabetical order and bear no relationship to the person's actual name.

² Erythematous refers to an abnormal redness of the skin caused by congestion of blood vessels.

³ Bronchiolitis is a viral infection of the airways in the chest.

On the evening of 31 July, Baby B experienced episodes of oxygen desaturation when coughing, and her oxygen requirements increased. She was started on amoxicillin (50mg/kg 12 hourly) and gentamicin (3.5mg/kg 24 hourly). Later that night Baby B suddenly stopped breathing while the CPAP headpiece and nasal prongs were being cleaned (oxygen therapy was given by a Hudson Mask), and she required “sternal rub stimulation” to recommence breathing. Chloral hydrate was discontinued because of concerns that it could be contributing to her respiratory depression.

Baby B slowly improved from this point, and the CPAP was removed on the evening of 1 August. On 2 August, after Baby B had been administered two doses of 23mg, gentamicin was discontinued. On 3 August, Baby B’s assigned RN weighed her as “? weight loss” due to being unwell, and Baby B was found to weigh 3.7kg.

The RN discussed this finding with the charge nurse, and concluded that the recorded initial weight was incorrect. The RN completed an incident form, the weight was changed in the documentation, and medical staff were informed of the error. Baby B’s parents were promptly informed of the error and advised that, although the gentamicin dose did not exceed the recommended maximum dose for Baby B’s correct weight, there was a remote possibility of high-range hearing damage. Audiology tests were therefore offered and undertaken. Baby B does not appear to have suffered any hearing loss, but “the small possibility of a minor degree high frequency hearing loss” cannot be excluded until she is old enough to undergo the appropriate tests.

Baby B continued to improve and was discharged at 11am on 5 August 2006.

DHB response to incident

Explanation

MidCentral District Health Board (the DHB) acknowledged that the wrong weight was recorded in Baby B’s file by the nurse who weighed Baby B on admission. Baby B’s medications and feeding regimen were then calculated on the admission weight (using the mg/kg calculation), as is standard practice at the Hospital.

The DHB explained that the two registered nurses who gave the loading dose for chloral hydrate thought that the dose appeared high, and checked the prescribed 50mg/kg against MidCentral Health policy to ensure it was correct. When confirmed as correct, they proceeded to administer the dose using the recorded weight of 6.82kg. No staff member questioned the accuracy of the weight recorded, as the other medication doses did not seem excessive.

Investigation

The incident was investigated by the DHB. The investigation involved staff interviews, a review of Baby B’s clinical file, a check of all the weighing scales, drug and fluid protocol reviews, literature reviews, checking infant weighing practice in other DHBs, and a staff education programme.

The Investigation Report noted the following:

- The recommended dose of medications and feeding regimens for Baby B had been exceeded, but the maximum recommended dosages for Baby B’s correct weight had *not* been exceeded.

- The medication checking procedures used by staff included verifying the correct prescribing against either a DHB policy or by using the *Notes on Injectable Drugs* manual (5th edition) or the *British National Formulary*.
- The accuracy of Baby B's recorded weight was not questioned by staff at any point.
- The children's ward scales (Avery E 320 infant scales), which record in both kilograms and pounds, were checked and were found to be calibrated accurately.
- A literature review was undertaken but failed to find any literature that provided a best practice option.
- Paediatric departments at other DHBs were consulted but no new options were discovered, and other DHBs had identical standard practices.
- Discussions with nursing staff were held and double checking of all admission weights was suggested. However, the Clinical Nurse Specialist and charge nurse considered that it would not be a failsafe option due to the nature of the admission process and general ward work flow.

Baby B's parents were advised of the outcome of this investigation by letter dated 30 November 2006. The DHB apologised for the mistake, which "was made as a result of human error", and advised that a number of changes were being implemented to make sure such a mistake does not happen again.

Changes made

Following the conclusion of the investigation, a number of changes were made in the Children's Ward:

- Admissions to the ward have their weight charted on a percentile chart (with average weights for age) at the time of admission.
- The average weight chart is located in the drug room and staff office.
- The "rights for checking medicines" checklist displayed on the drug room wall was amended to include checking the child's weight against the average weight chart.
- Posters alerting staff to check the accuracy of the recorded patient weight were placed in the medication room.
- An unsuccessful search was undertaken for scales that print the weight measurement at the time weighed, and for infant scales that measure only in kilograms.
- Staff education was carried out:
 - All nurses underwent a competency assessment in the use of the scales, and all new staff to the ward undergo this assessment.
 - All nursing staff underwent a formal training programme on the changes required to implement the additional check of weight against the average weight chart.
 - All staff have been trained in the use of the average weight charts.
 - Changes have been made to the ward's Clinical Practice Development programme.
 - The incident has been used for teaching purposes.

Independent advice

Expert advice was sought from Dr Johan Morreau, Paediatrician. The purpose of Dr Morreau's advice was to enable the Commissioner to identify any clinical care issues, and to determine whether the action taken by the DHB in response to this matter was adequate, or if there was anything further that could be done to prevent the same thing happening again.

Dr Morreau advised that children are not generally weighed repeatedly during a hospital admission of just a few days, unless there is a clinically identified reason for doing so. Repeat weighs of an ill and potentially unstable baby would be inappropriate.

Dr Morreau stated that he was surprised that the nurses and doctors caring for Baby B did not identify earlier that the weight recorded was inconsistent with her age, gestation and appearance. Dr Morreau also expressed "some reservations" about Baby B being sent home from the Emergency Department after being diagnosed with bronchiolitis, given that babies of her age are at high risk and require careful observation and early access to medical care if they deteriorate. He advised that he had identified no other areas of concern regarding the hospital care provided.

Dr Morreau advised that Baby B is very unlikely to have suffered any long-term issues from either the oxygen desaturation episode (which was likely caused by the transient disruption of the CPAP ventilatory support) or the medications administered (which were not above maximum acceptable levels).

Commissioner's decision

This is a decision of Rae Lamb, Deputy Commissioner, and is made in accordance with the power delegated to her by the Commissioner.

In light of the prompt disclosure to the family, the investigation already undertaken into this incident by the DHB, and the changes implemented to prevent a similar incident occurring in the future, I decided that further investigation was not warranted as it was unlikely to elicit any further useful information.

However, there is a wider issue that needs to be followed up. The issue of medication safety in infant care is an important one, and accuracy and checking procedures are essential to ensure any errors are promptly identified. Babies and small children are particularly vulnerable to medication errors, as almost all dosages are calculated based on the weight of the child. There is little margin for error. These sorts of errors can have serious and harmful consequences. Accuracy in measuring and recording an infant's weight before calculating any medication dosage is therefore crucial. Large variations in doses prescribed in children's wards mean that overdoses may go unnoticed by staff. Therefore checking procedures are essential to ensure any errors are promptly identified and remedied.

As noted by Alan Merry and Mary Seddon (experts in healthcare quality improvement):⁴ “To reduce harm to patients from error we will need to accept human fallibility, and concentrate on improving the design of the healthcare system.” In my view, the error that occurred during Baby B’s care was the result of human fallibility, which has been acknowledged and responded to appropriately. I commend the staff involved for promptly disclosing the error to Baby B’s family after discovery of the error and discussing with them the possible consequences for Baby B. The incident has been investigated by MidCentral DHB, and comprehensive changes have been made. The DHB has taken steps to improve the systems in place at the Hospital, to ensure that such an error does not occur again. However, the information from the DHB and Dr Morreau indicates that the checking procedures in place at the DHB during Baby B’s stay at the Hospital are typical of hospitals nationwide. Therefore Baby B’s case highlights the need for better systems in our hospitals for identifying paediatric medication errors.

In my view, scales that measure only in kilograms would reduce the likelihood of wrongly recorded weight measurements.⁵ I am advised that such scales are not readily available. However, weighing and recording weights only in kilograms is an important step to prevent such errors, and I encourage all healthcare providers to avoid the use of pounds and ounces in the weighing of babies, infants, and children. Measures such as recording the child’s weight on all documentation and visually confirming the child’s weight at the bedside would provide additional opportunities for any error to be identified.

Follow-up action

A copy of this report will be sent to:

- All District Health Boards, to highlight the changes made by MidCentral DHB, and to draw attention to the importance of having systems in place to ensure that such errors are identified before harm is done.
- DHBNZ’s National Safe and Quality Use of Medicines Group and the National Quality Improvement Committee, with a suggestion that the medication safety issues identified in this report are addressed nationwide.
- The Midwifery Council of New Zealand, the Nursing Council of New Zealand, the Medical Council of New Zealand, the Royal New Zealand College of General Practitioners, the Paediatric Society of New Zealand, and the New Zealand College of Midwives to draw attention to the importance of weighing and recording weights for children only in kilograms.

⁴ Alan Merry and Mary Seddon “Quality improvement in healthcare in New Zealand. Part 2: are our patients safe — and what are we doing about it?” *New Zealand Medical Journal* (21 July 2006) Vol 119 No 1238.

⁵ It is possible that the use of scales that can provide both pound and kilogram measurements may have contributed to the wrongly recorded weight in Baby B’s case. However, it does not appear that it was a simple case of the pound (lb) reading being documented instead of the kg reading, given that 6.82lbs is only 3.1kg, her last known weight before admission to hospital was 3.4kg (7.48lbs), and her weight when re-weighed was 3.7kg (8.14lbs).

A copy of this report will also be placed on the HDC website, www.hdc.org.nz, to draw public attention to the important issues raised by the case.

Rae Lamb
Deputy Commissioner
Complaints Resolution