Paediatric House Officer, Dr B

Bay of Plenty District Health Board

A Report by the

Health and Disability Commissioner

(Case 08HDC04311)

Health and Disability Commissioner
Te Toihau Hauora, Hauātanga

Overview

This case relates to the care provided to a 2½-year-old child after he presented at Tauranga Hospital with a moderately severe exacerbation of asthma at midday in late 2007. Following initial assessment and treatment at the Emergency Department, his condition stabilised and he was transferred to the paediatric ward later that afternoon. He initially improved. However, overnight he experienced increasing respiratory distress, and suffered a cardiorespiratory arrest at 4.30am the following morning. He was resuscitated and transferred to the Intensive Care Unit where he suffered three further cardiorespiratory arrests. Later that morning, the boy was airlifted to Starship Hospital. After he was stabilised, it became evident that he had suffered severe brain damage. Life support was withdrawn, and he died the following day.

This report considers the appropriateness of the care provided by the overnight paediatric house officer and Tauranga Hospital. It also discusses the remedial measures taken by both providers to prevent a similar event.

Parties involved

Master A	Consumer
Ms A	Complainant/Master A's mother
Mr A	Complainant/Master A's father
Dr B	Provider/Paediatric house officer
Dr C	Consultant paediatrician
Dr D	Specialist paediatrician
Dr E	Paediatric senior house officer
Dr F	Paediatrician, another DHB
Bay of Plenty District Health Board	Provider

Complaint

On 17 March 2008, the Commissioner received a complaint from Ms A and Mr A about the services provided to their son Master A at Tauranga Hospital in 2007. The following issue was investigated:

- *The appropriateness of the care provided by Bay of Plenty District Health Board to Master A during his admission to Tauranga Hospital.*

An investigation was commenced on 14 April 2008. Independent expert advice was provided by Dr John Doran, a consultant paediatrician. Following review of the expert

advice, the investigation was extended on 1 August 2008 to include the following issue:

- *The appropriateness of the care provided by Dr B to Master A during his admission to Tauranga Hospital.*

Information gathered during investigation

Background
Master A, aged 2½, had a history of asthma, which was treated with Flixotide inhaler.[1] He had episodes of coughing and wheezing several times a day, which usually responded to salbutamol.[2] Master A also had allergies to a range of foods including egg, milk, wheat, peanuts, and gluten, and tended to develop welts on his skin when exposed to dogs. Prior to late October 2007, he had never been admitted to hospital with asthma, but the frequency of his symptoms and his range of allergies placed him at risk of hospitalisation.

Master A's asthma was managed locally with input from the community respiratory nurse. In September 2007, the respiratory nurse referred Master A to Tauranga Hospital's Paediatric Outpatient Clinic for assessment of his asthma and food allergies.

Outpatient paediatric review
The following month, Master A was reviewed by Dr D, specialist paediatrician at Tauranga Hospital. Dr D noted the frequency of Master A's asthma attacks, and changed his medication to Seretide — a combined inhaler that consists of salmeterol and fluticasone.[3] Dr D prescribed "Pepti Junior" (a low allergen milk formula) and recommended that Master A avoid milk and soy protein. Master A was also referred to a dietician and a further paediatric review was planned for two months' time.

Care at Tauranga Hospital ED
At 12.30pm four days later, Master A presented at Tauranga Hospital's Emergency Department (ED) with a moderately severe exacerbation of asthma. He was accompanied by his mother, Ms A. The triage nurse noted that Master A had been unwell since that morning, and had symptoms of vomiting, lethargy and persistent

[1] Pressurised metered-dose inhaler that is released through the mouthpiece. Flixotide is an asthma preventer, and preventers act by reducing the swelling and narrowing inside the airways. Master A was on Flixotide 50mcg/dose, two doses twice daily.

[2] Salbutamol is a short-acting medication for relieving bronchospasm (spasmodic contraction of the smooth muscle of the bronchi). Asthma relievers relax the muscle in the airway when it is tight.

[3] A combination inhaler contains both preventive and symptom controller medicines.

coughing. Master A was assessed as triage category 3 using the Australasian Triage Scale,[4] and Pamol (pain relief for infants and children) was prescribed.

At about 1pm, Master A was assessed by an ED senior house officer. Ms A reported that Master A was "slightly worse" than he had been when Dr D reviewed him four days earlier. The senior house officer noted that Master A was "very agitated" and wheezy, and was using accessory muscles to breathe. His pulse and breathing rates were elevated (170bpm and 40/minute respectively) and his oxygen saturation[5] was low (90%). Master A was placed on high flow oxygen and given salbutamol and ipratropium[6] nebulisers[7] (to dilate the bronchioles), and was moved to the ED resuscitation bay for close observation. The paediatric team was also contacted.

At 2.15pm, Master A was seen by paediatric senior house officer Dr E, who observed that he was distressed and that his breathing had become more laboured. Dr E telephoned the on-call paediatric consultant, Dr C, to discuss Master A's management. Dr E informed Dr C that Master A had been taking Seretide for the past three days, and had received two doses of salbutamol nebulisers, oral prednisone and paracetamol whilst at ED. Dr C recommended commencing Master A on intravenous antibiotics and "back-to-back" nebulisers[8] for one hour (three doses at 20 minute intervals). She offered to come in to hospital to review Master A but Dr E considered this unnecessary. Dr C instructed Dr E to monitor Master A closely, and to update her an hour later.

At 3.45pm, Dr E telephoned Dr C again to report that Master A had improved significantly. He was saturating well on room air, and his wheezing and respiratory distress had decreased following an hour of continuous salbutamol nebulisers. Dr E and Dr C discussed transferring Master A to the High Dependency Unit (HDU). However, as Master A had responded well to the treatment initiated, Dr E did not consider it necessary to transfer Master A to HDU. Instead, a collective decision was

[4] Patients in this category are considered "urgent" and should be seen by a doctor within 30 minutes of presentation.

[5] Oxygen saturation is a measure of how much oxygen the blood is carrying. An oxygen saturation level below 90% is termed hypoxaemia (below-normal oxygen content in arterial blood).

[6] Ipratropium is another asthma relieving medication.

[7] A nebuliser works by turning liquid medicine into a fine mist which a patient can breathe easily into the lungs through a mask or mouthpiece. It is either powered by an electrical air pump or oxygen, and it takes between 10 to 15 minutes to breathe in the dose of medication. In general, a nebuliser is used for managing severe asthma.

[8] Bay of Plenty DHB explained that this term means the delivery of salbutamol via sequential nebulisation, ie, one nebule to be given directly after the other with no pause between doses. Bay of Plenty DHB considers "back-to-back" nebulisers synonymous with continuous nebulisers. The use of this term is also commented on by Dr Doran in his initial advice (see **Appendix A**).

made to admit him to the paediatric ward and to administer hourly salbutamol spacers.[9]

Transfer to paediatric ward
At approximately 5pm, Master A was transferred to the paediatric ward. Observations were commenced, and Master A was placed on one-hourly salbutamol spacers. Over that afternoon and evening, Master A's condition improved, and he was able to eat and drink in small amounts. His family visited him in the ward.

At 7.30pm, Dr E reviewed Master A again. There was no audible wheeze and Master A was observed to be running around the ward. In light of his improvement, Dr E decreased the frequency of Master A's spacers to two hourly. At about 8pm, Ms A remained with her son, while the rest of the family returned home.

In preparation for completing his shift, Dr E telephoned Dr C a third time at 9pm to update her on the events of the afternoon and evening. Dr E informed Dr C of the improvements in Master A's condition, and his decision to decrease the frequently of the salbutamol spacers. (Master A received two-hourly spacer therapies between 8.50pm and 11.30pm.) Although Dr C was reassured by Dr E's report, she advised him to highlight to the oncoming paediatric house officer the need to monitor Master A at regular intervals overnight. Dr C also reiterated that she should be contacted if there were any concerns.

At 9.30pm, Dr E verbally handed over Master A's care to paediatric house officer Dr B. Dr E detailed Master A's progress throughout that day and requested Dr B to "review [Master A] at some point in the evening" with a view to decreasing the frequency of spacer therapy from two hourly to four hourly. Dr E documented in his notes "review PRN [as required] by night SHO[10] [senior house officer]".

Dr B was the only doctor on duty for paediatrics that night.[11] Dr B had been a doctor for 14 months,[12] and had worked in Tauranga Hospital's paediatric ward for two months as a second year house officer.[13] Because of his limited experience, the DHB

[9] Bowl type arrangement attached to a face mask in which the dose of salbutamol is sprayed into the end opposite the face mask and mixed with oxygen for inhalation. The medicine remains suspended in the spacer for 15–30 seconds, allowing time for the child to take it in while taking six normal breaths. A spacer is a smaller and more convenient alternative to a nebuliser.

[10] Dr B subsequently clarified that he was employed as a paediatric house officer, and not a senior house officer.

[11] Bay of Plenty DHB clarified that junior doctors in paediatrics have access to other specialties such as the Intensive Care Unit and general medicine, and may contact their colleagues if the situation warrants another specialty's input.

[12] Dr B gained his medical degree from an English University in 2006. Most medical schools in the United Kingdom run five-year undergraduate training programmes which do not involve an equivalent of the "trainee intern" year making up the sixth/last year of medical training in New Zealand.

had delayed rostering him to be the sole doctor on duty for paediatrics, to give him time to "come up to speed". That night was Dr B's seventh night as the sole doctor for paediatrics. Two senior registered nurses were on duty with him. Dr B recalls that the paediatric service "was not busy".

At 10.45pm, a paediatric nurse on the afternoon/evening shift administered intravenous cefuroxime (an antibiotic) and ventolin via a spacer. Prior to this, Master A was "upset and coughing ++" but "improved after ventolin 6 puffs". His oxygen saturations increased to 94–95% (having previously been 86–88% from 10.15–10.30pm). The nurse documented "will require close observation & regular ventolin overnight". This was conveyed at handover (shortly before 11pm) to the two senior registered nurses on overnight duty.

Late on the Sunday evening, Master A became increasingly unsettled and agitated. He was wheezy and his coughing was keeping him awake. Around midnight, nursing staff administered salbutamol six puffs via the spacer but this did not alleviate Master A's coughing. Further salbutamol was given, and Master A was placed on continuous oxygen at 12.30am. Nursing staff asked Dr B to review Master A.

Overnight

At 1am, Dr B went to the paediatric ward to see Master A. (This was the first time Dr B had met Master A and his mother.) According to Dr B, he attended to Master A "without being prompted to do so by nursing staff". Dr B spoke to Ms A and nursing staff, and reviewed the clinical notes. He stated:

> "... I was told [that Master A] had been getting worse throughout the evening and had been receiving salbutamol nebulisers at an increasingly frequent rate. He was sitting up in bed and appeared to be using his accessory muscles to breathe. His respiratory rate was increased at 36 breaths per minute, he had a temperature of 38.3°C[14] and his pulse rate was raised at 145 beats per minute. His oxygen saturation was 97%. I listened to his chest and heard an inspiratory and expiratory wheeze and reduced air entry. I recognised [Master A] as having severe asthma. On consultation with the nursing staff, I made a plan to continue the back-to-back nebulisers for a further hour and then review him again. I communicated this to [Ms A], and wrote my findings in the notes. I then went to the computer in the nurses' station and spent some time

[13] Dr B worked as a Foundation Year 1 doctor in the United Kingdom before starting his paediatric run at Tauranga Hospital. He was in many respects closer to a New Zealand first-year house officer, in terms of his clinical experience. He was appointed by the RMO Office of the Bay of Plenty DHB, after an interview by a junior doctor, without any input from senior paediatric staff.

[14] The normal body temperature is between 36°C and 37°C. A person has fever when the body temperature rises above 37.2°C.

> reviewing the two sets of Starship [Hospital] Guidelines for managing asthma: the Acute Asthma guidelines, and the Life Threatening Asthma guidelines."[15]

At 1.40am, Dr B returned to see Master A, and documented in his notes (at 2.45am) that Master A was "coughing, active, kicking, crying". Dr B also recorded that there was a "small amount of wheeze. Otherwise silent chest". He recalls:

> "I … found that [Master A's] condition had not improved. He was sitting upright in bed, his oxygen saturations were reassuring being still in the high 90s but he appeared to be still working hard to breathe and still using his accessory muscles. His salbutamol nebuliser had run out. On auscultation[16] of his chest, his breath sounds were much quieter; there was a faint inspiratory and expiratory wheeze. Because of this deterioration, I decided to stop the nebulised treatment, and start the inhaled treatment that was recommended in the Starship Guidelines[17] (which I believed to be preferable to the treatment that he had been on). The nurses were busy attending to other patients on the ward, and so I administered the spaced salbutamol and ipratropium myself. I went into [Master A's] and [Ms A's] cubicle, [and] explained the plan, which was to administer spaced therapy every 20 minutes for an hour, and call the consultant, if he had not improved. I administered the 10 puffs of salbutamol and four puffs of ipratropium. The nurses came in and helped put [Master A] on low flow oxygen via nasal cannulae. He didn't like having the nasal cannulae in at first, but he sat in [Ms A's] arms, and settled down, albeit still working hard to breathe. I went back to the nurses' station and relayed to the nurses [Master A's] management plan.
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> I also returned to speak to [Ms A]. I tried to reassure her and explained the need to try and stay as calm as possible. We also talked about [Master A] and the rest of the whanau. During this time, [Master A] breastfed for about five minutes, which was reassuring. The nurse then came in and gave the second set of salbutamol and ipratropium.
>
> I then returned to the nurses' station to document my examination findings and the plan. I also went back into the sideroom to review [Master A] after his

[15] Dr B stated that he "had become familiar with using the Starship Hospital guidelines for acute asthma" having been involved with the care of approximately 20–30 children with asthma during his two months as a paediatric house officer. He also "felt confident with using spaced bronchodilator therapy and oral steroids to treat asthma" but "had never used nebulisers [prior to Master A's case] as [he] had been taught that these were inferior to spacers in children". Dr B stated that none of the children he previously cared for had been admitted to ICU.

[16] The act of listening for sounds within the body, chiefly for ascertaining the condition of the lungs, heart, pleura (serous membranes covering the lungs), abdomen and other organs.

[17] Attached as **Appendix C**. The guideline that Dr B followed stated that children assessed as having an asthma severity score of 6 should be treated initially with either salbutamol via a spacer or a nebuliser every 20 minutes.

> third set of spaced salbutamol and ipratropium. He now had an audible wheeze from the end of the bed, and seemed to be moving more air in and out of his lungs than an hour previously. I counted 38 respirations over a minute. Looking at the pulse oximeter,[18] his pulse was 170 and his oxygen saturations were 96% on 2 litres per minute of oxygen via nasal cannulae. My clinical impression at this point was that he had made an improvement, and I conveyed this to [Ms A]. Nevertheless, he still had an asthma severity score of 6[19] and I considered I should ring the consultant for further advice."

Dr B subsequently clarified:

> "I also documented that [Master A] was kicking and crying. This was not because I felt that he was agitated due to hypoxia,[20] but at the time I formed the clinical impression this was a normal and reassuring reaction of a young child to being upset at being examined and having to have oxygen via nasal cannulae and spaced bronchodilator therapy. I had previously been taught that worrying signs in asthma were drowsiness and cyanosis,[21] and was unaware that it was possible for a child to suddenly arrest in as dramatic a way as [Master A] did."

Shortly before 3.30am, Dr B telephoned Dr C and reported that Master A had become more unwell over the preceding one to two hours with increasing respiratory effort. (This was Dr B's first telephone call to Dr C since commencing his shift that night.) Dr B stated that Master A was upset and crying, and had a respiratory rate of 38/minute. He had an audible wheeze and was using his accessory muscles to breathe. Dr B also said that Master A had oxygen saturations of 96% and a pulse rate of 170bpm.

According to Dr C, she enquired what treatment Master A had received since Dr E last assessed him and Dr B explained that he had increased Master A's treatment to salbutamol and ipratropium via a spacer every 20 minutes for the preceding hour. In contrast, Dr B does not recall Dr C asking this and understood that she was enquiring what treatment Dr B had given to Master A at that point. Dr B stated that his treatment had resulted in an improvement in Master A's clinical condition. However, Dr B

[18] A medical device that indirectly measures the oxygen saturation of a patient's blood and changes in blood volume in the skin. It is often attached to a medical monitor so that staff can see a patient's oxygenation at all times.

[19] The Starship Children's Health Clinical Guidelines considers a score of 6 as "severe" asthma. A score of 0–2 is indicative of mild asthma, while 3–5 is indicative of "moderate" asthma.

[20] A deficiency of oxygen in the tissues.

[21] Bluish discolouration of the skin and mucous membrane resulting from an inadequate amount of oxygen in the blood.

omitted to inform Dr C that Master A had also received nebulised salbutamol several hours earlier, as he "did not regard this as significant".[22]

In light of the information Dr B provided, Dr C formed the impression that Master A had deteriorated from mild asthma earlier in the evening to moderate asthma but that he had been improving over the preceding hour following an increased frequency of spacer therapy. Dr C stated:

> "… Based on the information provided by [Dr B], I detected no clues to indicate that [Master A] would not continue to follow the usual course of improvement seen after institution of appropriate therapy, especially as he was reported to have improved over the preceding hour. However, I was aware he was still moderately unwell compared to his condition at 9pm and as he had improved significantly earlier in the day with the implementation of continuous salbutamol nebulisers, I asked [Dr B] to commence [Master A] on continuous salbutamol nebulisers for an hour. As I was not aware that [Master A] had already received salbutamol nebulisers for several hours prior to his treatment with salbutamol via a spacer, I believed that increasing to continuous salbutamol nebulisers was a significant and appropriate increase in his treatment, given his clinical condition, as described by [Dr B] and given his response to this treatment earlier in the day. We had a short discussion about whether the intention was for continuous salbutamol spacers or nebulisers and I clarified to [Dr B] the instruction to give [Master A] continuous nebulisers. I offered to come into the hospital to review [Master A] but [Dr B] reported that he felt that this was not necessary especially as it was his impression that [Master A] was at that stage better than he had been an hour previously. I asked [Dr B] if he was happy with the management plan made and he replied that he was. Overall, the information provided led me to conclude that I did not need to attend at this time. I asked [Dr B] to keep a close watch on [Master A] and to ring me back in 1 hour to report on his progress, or sooner if he had any concerns in the intervening period."

In contrast, Dr B stated that Dr C "did not ask [him] whether she should come in and review [Master A], although at that point in time [he] did not consider that she needed to come in because [he] felt that [Master A] was improving". Dr B disagrees that he was asked "to keep a close watch on [Master A's] progress" and to telephone Dr C again in an hour or sooner if he had any concerns. Dr B commented:

> "From my perspective [Dr C] was reassuring — predicting that [Master A] would improve, as he had done earlier in the day, and that he would need '*at least*' an hour of nebulised salbutamol therapy. I told her at the end of the

[22] Dr B subsequently clarified that if Dr C had specifically asked him what treatment Master A had received since Dr E last assessed him, Dr B would have given Dr C a "full account of all the treatment [Master A] had received including the nebulisers".

> conversation that I would ring her if I had any concerns, although her reassuring manner implied to me that this would probably not be necessary.
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> However, if [Dr C] had told me to ring her back in the intervening period and to keep a close review on [Master A], I would have of course done so and would not have left the ward, and also would have picked up on the nurses' and [Ms A's] concern earlier and therefore called [Dr C] back sooner.
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> The fact that [Dr C] told me that [Master A] would need at least an hour of continuous nebulised therapy left me with the impression that she considered it appropriate to wait that long before assessing [Master A] again. My intention at the end of the telephone conversation was to leave the ward as I believed my continuous review and presence, as an unfamiliar person, around [Master A] would keep him from settling. Having received what I took as reassurance from [Dr C], my prediction was that [Master A], with the comforting presence of his mother and with less intervention from myself, would soon settle down to sleep and recover."

Dr B acknowledges that he should have informed Dr C of Master A's nebulised salbutamol therapy during their telephone discussion at 3.30am:

> "When I telephoned [Dr C] at 0330 to say that [Master A] was not settling after an hour of spaced therapy I regret that I did not say that he had also had a trial of nebulised salbutamol therapy. I should have been more assertive on the telephone and questioned her advice to start continuous nebulisers, given that at that point I thought they were inferior to spacers. I should have also mentioned that I had previously been wondering about transferring [Master A] to HDU or ICU. I communicated the rest of the information appropriately; my current clinical findings, observations including the tachycardia,[23] and the fact that I felt he had improved from having quiet breath sounds to wheezing from the end of the bed."

Following the discussion with Dr C, Dr B requested nursing staff to put Master A on back-to-back nebulisers. One of the senior paediatric nurses attending to Master A commented:

> "At this point, I started to become confused about the plan and treatment, but given that [Dr B] had received instructions from the consultant, and he had just listened to [Master A's] chest, and stated that [Master A] had better air entry, we continued the care as ordered."

Half an hour later (at approximately 4am), nursing staff informed Dr B that Master A had become more agitated after being put on nebulisers, and that Ms A was concerned about her son. Dr B returned to the ward to review Master A. He recalls:

[23] Increase in heart rate above normal.

> "… On examination, [Master A] appeared restless and active. His oxygen saturation was still 97%, respiratory rate 44 breaths per minute and heart rate was now 196. On listening to his chest, I was relieved to hear that [Master A's] breathing had improved further. There was still a wheeze on inspiration and expiration, but he had good air entry into his lungs. [Ms A] asked if the paediatrician should come and review [Master A], but in my opinion I considered this was not necessary. I was concerned that [Ms A's] understandable stress and anxiety was being reflected on [Master A].
>
> I explained to [Ms A] that [Master A's] breathing had improved, and that the fact that he was active and crying was reassuring. I also told her his oxygen saturations were 97%, meaning that he was getting enough oxygen. I emphasised that [Master A's] chest sounded like it was getting better, and that at the moment I did not think it necessary for the paediatrician to come in. [Ms A] asked a second time whether I could get the paediatrician. The nursing staff agreed, and I immediately went to call [Dr C] again. At 0430 I phoned the consultant [Dr C]."

Ms A recalls:

> "… [T]he doctor said that [Master A] was improving and getting plenty of oxygen into his lungs, which I told him that [Master A] wasn't improving and that he was distressed as he couldn't breathe properly. I said my son is distressed because he's not getting any air into his lungs. He said no that's a good sign that he's crying it means he's getting air into his lungs, but I told him that I know my son and he only cries if he is really distressed, he pretty much fobbed off my concerns. I asked him to go and get the paediatrician as did the nurse, which he did very hesitantly. …"

Dr B clarified that the discussion Ms A refers to occurred between 4.10pm and 4.20pm and "not to any communication [he] had with her earlier in the night". Dr B said that he "was only trying to allay [Ms A's] fears" by explaining his observations about Master A and it was "in no way meant to give [Ms A] the impression that [Dr B] was fobbing off her concerns". However, "with hindsight" he "understand[s] how [Ms A] formed this opinion". He decided to contact Dr C again immediately after his discussion with Ms A as "clearly [his] efforts to reassure her had failed".

In relation to Dr B's second telephone call at 4.30am, Dr C stated:

> "… During this conversation, [Dr B] reported that [Master A] had improved over the preceding hour, his air entry was better and he was happier with his general condition. However, he reported that [Master A's] mother was very distressed and he requested that I attend the hospital with the purpose of discussing the situation with her, so that I would be able to reassure her. I immediately became very concerned about this situation, as in my experience, parental concern is usually very much in keeping with a child's clinical

> condition. In addition, I was concerned about the fact that children with asthma can, as then transpired, deteriorate very quickly. Therefore, while talking with [Dr B], I was preparing to come into the hospital."

Whilst still on the telephone with Dr C, Dr B heard Ms A shouting that Master A had "gone blue and had stopped breathing". Dr B conveyed this to Dr C who instructed him to initiate cardiopulmonary resuscitation (CPR) immediately. Dr B rushed back into the room and assisted nursing staff with intubation and ventilation measures.

At 4.40am, shortly after commencing CPR, Dr C arrived and took over the ventilation which was proving difficult owing to Master A's severe bronchospasm.[24] Input was sought from the anaesthetic registrar and medical house officer. At approximately 4.50am, following 20 minutes of resuscitation and six doses of adrenaline, Master A was successfully resuscitated and intubated, and was transferred to the Intensive Care Unit (ICU) for ongoing management. Dr B had no further involvement with Master A's management.

Transfer to Paediatric Intensive Care Unit

Following his transfer to ICU, Master A was placed on intravenous fluids and sedated and Dr C assisted the ICU team with Master A's ongoing management. She explained to Master A's family the sequence of events that had occurred and the need to transfer Master A to Starship Hospital's Paediatric Intensive Care Unit (PICU) after his condition had stabilised. Dr C also explained that "[Master A] was seriously ill".

Whilst in ICU, clinical staff experienced ongoing problems with Master A's ventilation owing to his severe bronchospasm. Input was sought from Starship Hospital's PICU team who advised making some changes to Master A's ventilation. Following these changes, Master A's oxygenation deteriorated, and Master A suffered three further cardiorespiratory arrests at 7.20am, 8.05am and 9am.

At 9.15am, the retrieval team from Starship Hospital arrived. Dr C and the ICU consultant explained the course of events in detail and handed over Master A's care to them. Both Dr C and the ICU consultant remained to assist the retrieval team, who transferred Master A to their equipment and stabilised him for transfer. At 11.30am, Master A was airlifted to Starship Hospital.

Transfer to Starship Hospital

Following admission to Starship Hospital, the PICU team was able to stabilise Master A. However, after stopping his analgesia,[25] it became evident that Master A had suffered a major neurological insult. The findings were confirmed by a CT scan which revealed swelling in the brain and severe brain damage. Following prolonged

[24] Spasmodic contraction of the smooth muscle of the bronchi.

[25] Medication that blocks the sensation of pain.

discussion with Master A's family, ventilatory support was withdrawn and Master A died in his father's arms at 10pm the following day.

Subsequent events
On 21 November 2007, Master A's family met with Dr C, Dr D, the paediatric clinical nurse manager, and the DHB's Quality and Risk Team Leader, to discuss the care Master A had received. Master A's family were also informed that the Bay of Plenty DHB intended to request an independent review, and they would be advised of the findings.

A paediatrician from another DHB, Dr F, was asked to review the events surrounding Master A's care. On 11 January 2008, Dr F provided his report to the Bay of Plenty DHB. According to Dr F, it was "probable that [Master A] had a fairly prolonged period of severe hypoxia and respiratory failure leading up to his arrest that was unrecognised by the [overnight paediatric house officer] but hinted at by nursing staff in their notes". Dr F concluded that Master A's clinical outcome may have been different "if the severity of his situation had been identified earlier and [if] he had been transferred to a High Dependency Unit with appropriate intensive care".

A copy of the report was given to Dr B, who commented (in his letter of apology to Master A's parents):

> "I read the report … and I agree with [Dr F] that I did not recognise the severity of [Master A's] asthma and should have called for help sooner. I agree that the outcome may well have been different if he had gone up to the ITU [Intensive Therapy Unit] earlier. I am so sorry, and apologise for my part in what happened."

Dr B also noted:

> "This has been a huge educational process for me; not only have I learnt about the treatment of severe asthma, but also about some of the wider issues about being a doctor, such as working in a team and community with colleagues … "

Bay of Plenty DHB commented:

> "Overall, the DHB concurs with [Dr F's] conclusions. However, with regard to his comment that '*It is probable that this patient had a fairly prolonged period of severe hypoxia and respiratory failure leading up to his arrest that was unrecognised by the [overnight paediatric house officer] but hinted at by the nursing staff in their notes*,' the DHB feel it is difficult to be certain of this conclusion, especially given that the observation chart documents that [Master A] was well saturated with oxygen prior to his arrest. We feel that it is more likely his cardiorespiratory arrest was due to hypercarbia[26] leading to

[26] An excess of carbon dioxide in the blood.

> dysrhythmia,[27] however, it was not possible to elucidate the underlying cause at the time, nor is it possible to do this now. These issues notwithstanding, the DHB agrees with [Dr F's] conclusions."

On 5 February 2008, Master A's family met again with Dr C, Dr D, the paediatric clinical nurse manager, and the Quality and Risk Team Leader to discuss Dr F's report. During the meeting, Bay of Plenty DHB informed Master A's family that the DHB had initiated a root cause analysis and corrective action plan[28] in response to the report. Issues identified included the need to provide ongoing education to house officers on the management of asthma, reinforcing to all staff that they can request a consultant review at any point, and the need to pay greater attention to parental concerns about a child's condition (discussed below). Master A's family were advised that the DHB intended to continue developing and reviewing this plan.

Dr C commented:

> "… At both meetings we expressed our deepest sympathies to the family and extreme regret at the course of events which led to the loss of a much loved son, brother and grandson. Although nothing can be done to bring this little lad back to his family now, the aim must be that we learn lessons from the events which occurred and do everything possible to ensure an event does not occur again. We are committed to doing this."

Support for junior doctors in paediatric department
Bay of Plenty DHB advised HDC of the support arrangements for junior doctors in the paediatric department, as follows:

> "It has always been a basic working tenet of the paediatric department that junior medical or nursing staff must call the Paediatrician on call at any time, day or night, if they have any concerns or doubts about a patient's clinical condition or the appropriate course of management for a particular patient. This is communicated clearly and emphatically, both verbally and in writing, to all new Paediatric junior medical staff during their orientation to the Department on the first day of their clinical attachment. This was the case for [Dr B] when he commenced employment in the Paediatric Department at Tauranga Hospital, together with a number of other junior staff who commenced in the Department at the same time.
>
> All new junior doctors are given a copy of the Paediatric SHO Handbook … on their first day of employment in the Department and the importance of the information contained within this document is stressed at this time. Instructions contained within this document regarding appropriate

[27] Defective heart rhythm.

[28] A copy was supplied to HDC by the Bay of Plenty DHB during the investigation.

communication with senior staff are particularly emphasised. … The final summary paragraph within this document states:

> Welcome … these introductory comments are really meant to welcome you to your general Paediatrics run, which we are sure you will enjoy. Make good use of the experienced nurses and allied health professions who have a wealth of guidance to offer you. If in doubt phone your Registrar or your Consultant at any time, day or night.

Paediatricians continuously try to be open, available and approachable to their junior medical and nursing staff to facilitate optimal lines of communication at all times. This is of utmost importance to the functioning of the Department, particularly given that they do not have full time middle grade (registrar) support. It is standard practice for all senior staff within the Department to communicate with junior staff frequently when on call and the message to 'call if you have any concerns' is reiterated time and time again. … "

Remedial measures

Since the events in question, various remedial measures have been initiated by the Bay of Plenty DHB and Dr B.

The DHB has increased its number of paediatric doctors by employing two senior paediatric registrars. Since January 2008, the Bay of Plenty DHB has started holding weekly teaching sessions on paediatric resuscitation, which all junior doctors in paediatrics are required to attend. The DHB has also reiterated to junior medical and nursing staff the importance of contacting senior medical staff promptly if there are doubts or clinical concerns about a patient. In light of the potential for confusion in the wording of Starship Hospital's guideline for management of acute asthma, the DHB paediatric staff have contacted Starship Hospital to discuss ways the guideline could be clarified. An asthma severity score tool has been introduced to ensure standardised recording of asthma severity in children in the ED, on admission to the paediatric ward, and at regular intervals throughout their hospital admission.

Other steps taken by the DHB include:

"1. Prior to this event, an issue was identified in the recruitment process of paediatric junior doctor positions … To ensure employment of junior staff with an appropriate level of experience for Paediatrics, senior Paediatric staff are now involved in employment of all Paediatric junior staff through assessment of CVs and an interviewing process. Furthermore, medical graduates from the United Kingdom, who may have only completed 5 years of training and present as 2nd year House Officers, are now recognised as being equivalent to NZ 1st year House Officers.

2. Although not identified as a root cause on our initial investigation or raised as a concern in [Dr F's] report, it was evident from a nursing perspective

that providing specialist paediatric high dependency care for children such as [Master A] was difficult with 2 rostered nurses on the paediatric ward on night duty (additional nursing resource can always be called upon via the Duty Manager). Subsequent to this event, the number of nurses on duty over night on the Paediatric ward has been reviewed. Consequently, the number of nurses on night duty on the Paediatric ward has been increased from 2 to 3 on a permanent basis, seven nights a week.

3. The service has also recognised the need to emphasise to nursing and medical staff the importance of taking parental concerns about their child's condition extremely seriously. Education sessions have emphasised the need to fully consider parental concerns in the assessment process. This process of education will be ongoing for all nursing and medical staff."

The DHB advised HDC:

> "The Bay of Plenty DHB deeply regrets that [Master A] died after his admission to our hospital. As an organisation, we have tried hard to examine the underlying factors which contributed to this event and believe that the changes implemented since this event in our organisation, and specifically within the Paediatric Department, will improve the quality of care provided to our patients and ensure that such an event does not occur again. …"

Dr B accepts that he made mistakes in his assessment and treatment of Master A, but states that "at all times … I considered I was acting professionally and in good faith".

Dr B commented:

> "I was aware that I was an inexperienced house officer with little paediatric experience on night duty, and that I should call the consultant if there were any concerns. However, up until I called [Dr C] at 0330, I felt in control of the situation, and was confident with my assessment and management.
>
> …
>
> This incident and its aftermath have had and continue to have a significant effect on me. It has been the focus of a number of learning points.
>
> **Management of Childhood Asthma**
> Immediately following the incident and in the subsequent nine months I have taken the opportunity to discuss the case with a large number of Paediatric, Intensive Care, Respiratory and Emergency physicians in Tauranga Hospital and [another hospital][29] in order to get as much feedback and advice as

[29] Dr B worked as a house officer in another hospital following his time at Tauranga Hospital. He has since returned to the United Kingdom.

possible. I have read widely around the subject of asthma and respiratory distress in children and attended the Advanced Cardiac Life Support Course and the Paediatric Life Support courses as soon as possible after the incident. As a result of these things I have become better at diagnosing, assessing and managing asthma. Specifically in relation to [Master A's] management I have learned that continuous nebulised therapy is better than spacers in severe asthma.

…

Communication with Patients and Relatives
… [A]s a result of this case I have been vigilant in checking verbally to see if patients and relatives are happy with my management plan and checking verbally to see if there are further concerns. …

Communication with Colleagues
Over the previous nine months of practice I have become much more assertive in my communication, especially in the context of unwell patients. I have a structured way of thinking about patients and accordingly I communicate information in a structured and understandable way. Whilst on-call in medicine over the previous six months at [the second] Hospital, I have encountered a number of patients whose clinical condition had been worsening. In each case I contacted the Medical and ICU registrar quickly and gave an accurate and concise summary over the phone. In each case the patient had a senior review and was transferred early to the ICU where their treatment was escalated.

Involvement of ICU
Because of the events of the night [Master A] arrested and the subsequent education that I have undertaken, along with my increasing medical experience, I have become better at recognising when patients are sick and when the intensive care unit physicians need to be involved with patients."

Dr B described the impact of Master A's case on him:

"I have found the whole process from the initial events [after admission] to the subsequent investigations very traumatising and difficult to cope with, especially given the fact that I was part of the team that made mistakes that led to suboptimal treatment of a patient who may have survived if better treatment had been given. I will have to live with this for the rest of my life. … I acknowledge that the treatment I gave to [Master A], whilst being in good faith and to the best of my ability at the time could have been better. …"

Dr B concluded:

> "I have been working as a house officer in New Zealand in the nine months following this incident, and my experience as a doctor has almost doubled in that time. I have worked hard to improve myself and believe that the things that I have learned as a result of this case as outlined above, as well as my continuing experience, have helped me to develop into a more effective doctor.
>
> …
>
> I often think of [Master A's parents] and can see from the various communications that their suffering is ongoing. One of the things I most regret is that I was trying to reassure [Ms A] that [Master A] was improving only minutes before he arrested. I can imagine how that memory along with seeing [Master A] go blue, floppy and unresponsive must continue to haunt her. I unreservedly apologise for the mistakes I made and have … written a letter to [Master A's parents] to this effect."[30]

ACC

On 13 March 2008, Master A's parents submitted a treatment injury claim to ACC, together with a copy of Dr F's report.

On 4 November 2008, ACC accepted the claim for a treatment injury and noted that there had been a "failure to diagnose and provide treatment [in] a timely manner for severe asthma, resulting in cardio-respiratory arrest, severe brain injury (hypoxic ischaemic encephalopathy) causing death". In reaching its decision, ACC obtained external clinical advice from an independent paediatrician,[31] who concluded:

> "[Master A] was admitted with severe asthma in spite of being on a significant amount of treatment prior to his admission. He had cardio-respiratory arrest on the paediatric ward at Tauranga Hospital while being treated. I believe that the severity of his illness had not been recognised and he should have been looked after on an HDU or ICU. His later management should have included intravenous bronchodilators prior to his arrest, when it was clear that deterioration was occurring in spite of increasing inhaled treatment.
>
> …
>
> While all care was given here with the best will in the world, the severity of [Master A's] situation was under-recognised by those providing his care, especially between 2200 hours [the first night] and 0400 hours [the following morning] 2007. It is probable that by 0400 he had already gone too far to avoid

[30] A copy of Dr B's apology was provided to HDC during the investigation.

[31] The independent paediatrician for ACC has declined to be named.

> artificial ventilation. That should not have happened while under observation in hospital."

Independent advice to Commissioner

Independent expert advice was obtained from paediatrician Dr John Doran. His initial advice is attached as **Appendix A** and his further advice as **Appendix B**.

Responses to provisional opinion

Dr B
Dr B clarified several matters which have been incorporated into the "information gathered" section of the report. In relation to my provisional opinion that he did not provide Master A with an appropriate standard of care and breached Right 4(1) of the Code, Dr B commented:

> "… I particularly object to be[ing] singled out and blamed solely for the modifiable factors which potentially contributed to [Master A's] tragic outcome. It is clear there were mistakes made by all members of the health professional team including, but not limited to, myself who cared for [Master A] that night."[32]

Bay of Plenty District Health Board
The CEO responded on behalf of the Bay of Plenty District Health Board, and stated:

> "The BOPDHB acknowledges that the [Health and Disability Commissioner] Act provides for a finding of vicarious liability against a District Health Board. However it is my understanding that the DHB may raise as a defence to this finding that it has done everything reasonably possible to ensure that its employees do not perform an act or omission that would be in breach of the patient's rights.
>
> You have acknowledged in your provisional report that the BOPDHB provided [Dr B] with a good orientation to the paediatric service and that he received good collegial support.

[32] However, Dr B did not provide details of what mistakes he considered were made by each member of the paediatric team who cared for Master A.

You further acknowledge that he was in no doubt of the fact that he could phone his Registrar or Consultant at any time and in fact did so a number of times that night. [Dr B] also correctly accessed and followed the Starship guidelines on the management of Asthma in children. I note that these guidelines are now being reviewed as a result of this case.[33]

You do however question whether [Dr B] was ready to be the sole doctor on that night shift. Sole doctor night shift cover is a normal duty for a second year House Officer. The BOPDHB acknowledges that there were some questions of [Dr B's] readiness when he was first employed and as a result there has been an amendment to the recruitment policy to ensure senior consultants are able to review applicants' CVs before appointments are made.

Following a programme of training [Dr B] was assessed by his Medical Council supervisor as performing to an acceptable standard for a second year House Officer and in line with normal practice was ready for night duty.[34] Whilst the Medical Council supervisor is often a DHB employee this role is performed as part of a contract they hold with the Medical Council and is totally independent of DHB processes and monitoring.

In hindsight it is easy to see how this event unfolded; that is a doctor who was at that time somewhat over confident in his own abilities attempting to follow flawed guidelines. There is however no way that the BOPDHB could have reasonably anticipated these events.

Given our discussion, and the above, I would therefore ask you to reconsider your finding of vicarious liability. I do so on the basis that it was reasonable for the BOPDHB to accept a performance evaluation from an independent supervisor appointed by the Medical Council that the doctor in question was performing to an acceptable standard for a second year House Officer and when coupled with the orientation and other support provided by the DHB for the DHB, to make a duty assignment based on the assessment of that supervisor."

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[33] Starship Hospital has acknowledged that greater clarity is needed in its guidelines concerning the recognition of life-threatening asthma, and is currently revising the guidelines following submissions from various parties, including Bay of Plenty DHB. Starship Hospital plans to issue updated guidelines during 2009.

[34] Dr B's Medical Council supervisor was Dr D. His first report to the Medical Council was completed a week before the events in question occurred, in which Dr D commented: "[Dr B] has worked hard & shown pleasing progress in his competence in paediatric medicine."

Code of Health and Disability Services Consumers' Rights

The following Right in the Code of Health and Disability Services Consumers' Rights is applicable to this complaint:

RIGHT 4

Right to Services of an Appropriate Standard

(1) Every consumer has the right to have services provided with reasonable care and skill.

Other relevant standards

The Medical Council of New Zealand's publication *Good Medical Practice — A Guide for Doctors* (2004) states:

> "Good clinical care must include:
>
> …
>
> - Taking suitable and prompt action when necessary …
>
> In providing care [a doctor] must:
>
> …
>
> - be willing to consult colleagues
> - be competent when making diagnoses and when giving or arranging treatment …"

Opinion: Breach — Dr B

Standard of care

Dr B gained his medical degree from the United Kingdom in 2006. At the time of the events in question, he had been a doctor for 14 months and had worked for two months as a paediatric house officer at Tauranga Hospital, where he was employed as a second year house officer. The night of Master A's admission was his seventh night as the sole doctor on duty for paediatrics. He had relatively limited experience, and had never treated children with life-threatening asthma warranting admission to ICU.

Early on a Sunday afternoon, 2½-year-old Master A presented to the Emergency Department (ED) with moderately severe exacerbation of asthma. Following initial assessment and treatment at ED, Master A's condition improved and he was transferred to the paediatric ward for ongoing management. Paediatric senior house officer Dr E reviewed Master A twice in ED during the afternoon, and a third time at 7.30pm on the ward. On each occasion, Dr E telephoned the on-call paediatrician, Dr C, for advice.

At 9.30pm, Dr B received a verbal handover from Dr E, who detailed Master A's progress throughout that day, and requested that Dr B review Master A "at some point" that night. It is not clear whether Dr E passed on Dr C's advice to monitor Master A at regular intervals overnight and contact her if necessary. Dr E simply documented "review PRN by night SHO".

Dr B first saw Master A at 1am [the day after admission], in response to Master A's deteriorating respiratory condition and increased agitation. Based on his review, Dr B recognised that Master A had severe asthma and made an appropriate decision to restart the nebuliser therapy with a dose of ipratropium. Dr B documented and explained his decision to Master A's mother. He also consulted Starship Hospital's clinical guideline for managing acute asthma.

Dr B's actions up to this point were appropriate. However, he should have contacted the on-call paediatrician, Dr C. Consultant input could have reassured Dr B that his decision to re-start the nebuliser therapy was appropriate, since he was unfamiliar with this treatment. It would have also allowed him to clarify his understanding of the use of nebulisers and spacers at an earlier stage (given the potential for confusion in the guidelines), update Dr C, and receive any guidance from her on Master A's ongoing management. Dr B acknowledges that, with hindsight, he should have contacted Dr C earlier.

At 1.40am, Dr B returned to see Master A and noted that his condition was worsening. During the second review, there was a small amount of wheezing and Master A's breath sounds were quieter. According to my paediatric expert, Dr John Doran, these findings "should have rung alarm bells that there was in fact very poor air entry", especially in conjunction with Master A's agitation and worsening tachycardia, and

his mother's escalating concern. Dr B should have appreciated the need for aggressive treatment and initiated the Severe Life Threatening Asthma protocol. Instead, Dr B decided to stop the nebuliser therapy and put Master A back on spacer therapy as he erroneously believed at that point that nebuliser therapy was "inferior to spacers". I accept Dr Doran's advice that the change to spacer delivery "represents unclear thinking about acute asthma management and poor understanding of asthma protocol", and that "[t]he clinical assessment and management decisions at this time were significantly below the expected standard".

It also appears that Dr B failed to understand Ms A's increasing level of concern about her son. Dr B disagrees that he overlooked Ms A's concerns at an early stage and commented that "nowhere in the notes, before 0400 is it documented that [Ms A] was concerned". However, I endorse the following comment of Dr Doran:

> "The key communicator for the child [is] his parent(s) … [Master A's] mother recognis[ed] … that her son was getting into trouble and attempted to convey that message on a number of occasions. Her communication was misinterpreted and its importance not respected or understood. If greater due had been paid to what she was saying more intensive intervention would have appropriately been started sooner and the consultant on call contacted at an earlier stage. Parents usually know their children very well and are mostly very accurate in recognizing when things aren't right."[35]

Finally, I note that Dr B omitted key information when he telephoned Dr C for the first time at 3.30am. In particular, he did not inform Dr C that Master A had required increasing nebuliser treatments from midnight, and mistakenly thought that Master A was making improvements after his treatment was downgraded from nebuliser to spacer therapy.[36] Consequently, Dr C advised Dr B to increase Master A's treatment to continuous salbutamol nebulisers believing that this was appropriate based on the information Dr B relayed, and Master A's response to this treatment the previous afternoon.

Conclusion

Dr B knew that he was (in his own words) "an inexperienced house officer with little paediatric experience on night duty" and that he "should call the consultant if there were any concerns". Because of his inexperience, he did not realise the gravity of Master A's condition. As he commented, "up until I called [Dr C] at 0330, I felt in control of the situation, and was confident with my assessment and management". Dr B's self-confidence was misplaced. He was out of his depth but did not know it. Paediatrician support was available to him, but he did not seek it soon enough.

[35] This issue is also discussed in another recent case, 07HDC10316 (1 December 2008), pages 10–11.

[36] According to Dr B, he omitted this information because Dr C did not specifically ask him what treatment Master A had received since he was last assessed by Dr E. Dr B's recollection differs from Dr C's. In any event, I would expect a junior doctor to volunteer all relevant treatment information without being specifically prompted by the consultant.

There were some mitigating factors. Dr B was put in a position of clinical responsibility where he was out of his depth. I have some doubt about the extent of the handover he received. The wording of the Starship guideline was somewhat unclear. There was a lack of nursing response at the stage when Dr B's management should have been questioned and when concerns about the care being provided should have been escalated. These factors help explain but do not excuse Dr B's errors of judgement.

Junior doctors who accept responsibility for the care of patients (as Dr B did when working as the sole doctor on duty for paediatrics) should expect to have their actions scrutinised when their patient's care is compromised. Being held accountable for one's actions is the flipside of the privilege of registration as a health professional and of accepting responsibility for the care of patients. Accountability goes with the territory. It must be applied fairly, taking into account the context in which the health professional was working (including any "system factors"). Subject to that proviso, and uncomfortable though it may be, health professionals should be willing to accept the findings of regulatory bodies without seeking to sidestep responsibility by claims of being "singled out and blamed". To his credit, in his apology to Master A's parents, Dr B accepted responsibility for his shortcomings.

I conclude that Dr B failed Master A and his parents. He did not provide Master A with an appropriate standard of care and breached Right 4(1) of the Code.

Opinion: Breach — Bay of Plenty District Health Board

Treatment on ED and transfer to paediatric ward

On initial presentation at Tauranga Hospital's ED, Master A was triaged promptly, and appropriate treatment was initiated by putting him on oxygen and salbutamol nebulisers. During the 4½ hours Master A spent at ED, he was monitored closely by clinical staff, who recorded his vital signs at regular intervals and delivered seven doses of Ventolin by nebuliser. Master A was transferred appropriately to the paediatric ward (rather than ICU) in the afternoon once his condition had stabilised at ED.

Care on paediatric ward — vicarious liability

A district health board may be vicariously liable for the acts or omissions of its staff.[37] The onus is on the employer to show that it has taken "such steps as were reasonably practicable to prevent" any failings in care provided by its staff.[38] I am not convinced that the Bay of Plenty DHB has discharged this onus in relation to the shortcomings in Dr B's or nursing staff care.

[37] See Skegg & Paterson (eds), *Medical Law in New Zealand* (2006), para 2.8.2.

Despite a good orientation and collegial support, it is evident that Dr B was not ready to be the sole doctor on duty for paediatrics overnight. This is notwithstanding his Medical Council supervisor's assessment (a week before the events in question) that he had "shown pleasing progress in his competence in paediatric medicine", and that sole doctor night shift level is a normal duty for a second year house officer.

As noted earlier,[39] Dr B was in many respects closer to a New Zealand first year house officer, in terms of his clinical experience. He had been recruited from the United Kingdom. I note that the DHB has now tightened the recruitment process for appointment of junior doctors in the paediatric department to ensure the input of senior paediatric staff.

A lack of nursing response to highlight the severity of the situation, and request for consultant review, was an additional contributory factor. A potential "safety net" was not used. I endorse the following statement from Dr Doran:

> "Experienced senior nurses who are concerned about a patient should feel able to discuss that patient's care directly with a consultant if they are uncomfortable with the appropriateness of junior doctor management. This is perhaps especially so in a specialty such as paediatrics where the junior medical staff may have limited experience in child health."

The DHB protests that it could not have "reasonably anticipated these events". I disagree. Junior doctors will inevitably find themselves out of their depth at times. That is why good support systems (including the safety net of vigilant senior nurses and readily available consultants) are so crucial. The DHB's actions[40] both before (in recognising the need for additional support so that Dr B could "come up to speed"), during (the lack of nursing response) and after (in tightening up the recruitment process) these events lead me to believe that it had not done all it reasonably could have to prevent Dr B's shortcomings on the night in question.

In my view it would not be fair for Dr B to be held solely accountable for the failings in the case of Master A. The DHB must also accept its share of responsibility. I conclude that the Bay of Plenty DHB is vicariously liable for Dr B's breach of the Code.

[38] The Health and Disability Commissioner Act 1994, s 72(5).
[39] See footnote 13, page 4.
[40] I note that under section 2(1) of the Health and Disability Commissioner Act 1994, "Action", in relation to a health care provider … includes failure to act; and also includes any policy or practice.

Actions taken

Dr B has apologised in writing to Master A's family. To his credit, he has acknowledged to Master A's parents that he did not recognise the severity of his asthma, and should have called for help sooner. He is "so sorry", and apologises for his "part in what happened". He says that "he will live with these events for the rest of his life". I commend Dr B on his prompt and unreserved admission of responsibility.

Both Dr B and the Bay of Plenty DHB have reflected extensively on the care provided to Master A since the events in question occurred. Dr Doran noted that Dr B has "worked very hard to improve his paediatric skills in general and his understanding of asthma assessment and management in particular". My expert also commented that Dr B has "responded with integrity and sincerity" and "has been proactive in ensuring that he is better equipped to manage similar situations in the future".

Bay of Plenty DHB has acknowledged the tragedy and met with Master A's family. The DHB has also arranged an independent review and initiated a Corrective Action Plan in response. It has responded comprehensively to this investigation and provided input to Starship Hospital on the revised asthma management guidelines. I commend the Bay of Plenty DHB on its commitment to a high quality of care in its paediatric service and its open and honest disclosure in response to this tragedy.

Non-referral to Director of Proceedings

In many cases, a health professional's significant departure from expected standards of care warrants a referral to the Director of Proceedings, for the purpose of deciding whether any disciplinary proceedings should be taken. However, in my view it would be harsh to take this step in relation to a junior doctor placed by his employer in a position out of his depth. I am satisfied that Dr B has learnt important lessons from this case and has striven to address the shortcomings in his care and upskill his clinical knowledge. Since these events, Dr B has returned to the United Kingdom. Taking these factors into account, I have decided not to refer Dr B to the Director of Proceedings.

Recommendations

- I recommend that the Auckland District Health Board provide HDC with a copy of the revised Starship Asthma Management Guidelines by **31 May 2009**.

- I recommend that the Bay of Plenty District Health Board update HDC on its implementation of the revised Starship Asthma Guidelines, including its education and training of junior medical and nursing staff. This information is to be forwarded to HDC by **31 August 2009**.

Follow-up actions

- A copy of this report will be sent to the Medical Council of New Zealand, the General Medical Council of the United Kingdom, and the Accident Compensation Corporation.

- A copy of this report, with details identifying the parties removed except the names of Tauranga Hospital, the Bay of Plenty District Health Board, Starship Hospital, and the experts who advised on this case, will be sent to the Director-General of Health, the Paediatric Society of New Zealand, the Royal Australasian College of Physicians, the Resident Doctors Association, the RMO Commission, the Medical Training Board, the New Zealand Medical Association, and the Association of Salaried Medical Specialists, and placed on the Health and Disability Commissioner website, www.hdc.org.nz, for educational purposes.

Names have been removed (except Tauranga Hospital, Bay of Plenty DHB, Starship Hospital) to protect privacy. Identifying letters are assigned in alphabetical order and bear no relationship to the person's actual name.

Appendix A

Independent advice to Commissioner — Paediatrician John Doran

Initial advice
"I have been asked to provide independent expert medical advice to the Health and Disability Commissioner regarding the complaint received from [Mr A] and [Ms A] about the care that Bay of Plenty DHB provided to their son [Master A] as outlined in their letter to the Commissioner. The issue being investigated is:

The appropriateness of the care provided by the Bay of Plenty District Health Board to [Master A] during his admission to Tauranga Hospital [in] 2007.

I have read and agreed to follow the Guidelines for Independent Advisors provided by the Office of the Health and Disability Commissioner.

I have no conflicts of interest in providing this advice.

I am a General Paediatrician currently working in the Department of Paediatrics at Taranaki Base Hospital in a half time position and as Chief Medical Advisor for Taranaki District Health Board in a half time position. I have experience in the assessment and management of acute paediatric presentations including asthma gained over the last fifteen years as a consultant paediatrician.

I qualified MB ChB in 1978, gained a Diploma in Child Health in 1983 and completed my specialist training in 1991 becoming a Fellow of the Royal Australasian College of Physicians.

I have been provided with information and specific referral instructions from the commissioner as outlined below. I will comment on the basis of this information only and have not seen any other correspondence related to this case.

I have been asked to comment only on the events occurring at Tauranga Hospital in the Emergency Department and in the Paediatric Ward. I have not commented on events in the Intensive Care Unit at Tauranga Hospital as these are outside my area of practice.

I did not have information regarding the level of experience of the junior medical staff nor of their orientation and education in acute paediatric medical care.

[At this point, Dr Doran lists the questions asked of him which he repeats in his advice. This has been omitted for the purpose of brevity.]

Supporting Information

- Information from [Master A's] parents including a report from paediatrician Dr F, marked 'A' (Pages 1–20).
- HDC letter of notification to Bay of Plenty DHB, marked 'B' (Pages 21–23).
- Information from Bay of Plenty DHB marked 'C'
    - — Section C1: Written accounts from clinical staff (Pages 25–59).
    - — Section C2: Confirmation of clinician who had primary responsibility (Page 60).
    - — Section C3: [Master A's] clinical records (Pages 61–119).
    - — Section C4: Information regarding BOP DHB's support structure for junior doctors (Pages 120–137).
    - — Section C5: Information regarding staffing levels in the paediatric ward [during Master A's admission] (Pages 138–139).
    - — Section C6: Information regarding any internal investigations conducted (Pages 140–14 1).
    - — Section C7: BOP DHB's clinical guidelines and policies for managing asthma (Pages 142–158A).
    - — Section C8: BOP DHB's response regarding [Dr F's] report (Pages 159–170).
- Written account from paediatric intensivists at Starship Hospital and discharge letter marked 'D' (Pages 171–173).

[Master A] was correctly identified on presentation to the Emergency Department at Tauranga Hospital on the afternoon of [his admission] as having an acute exacerbation of asthma. Appropriate treatment was initiated with a bronchodilator (Ventolin) which was delivered via a nebuliser along with oxygen.

As a result of this treatment his condition improved and the Paediatric RMO on duty made the decision to transfer [Master A] to the Paediatric ward for ongoing management.

This seems to have been an appropriate decision given the fact that his asthma seems to have been improving although clearly still of at least moderate severity as evidenced by the fact that he still required Ventolin on an hourly basis though changed to delivery via a spacer (refer Appendix I).

[Master A] continued to improve in the ward initially and he was able to stretch out his bronchodilator to an 85 minute gap from 2050hrs to 2330hrs. There also seemed to have been a trend towards improving pulse rate during this time supporting the clinical impression of improvement. However he still had a significant tachycardia at this time which reflects the severity of his asthma rather than effect of the Ventolin. At this time he was not receiving continuous oxygen as oxygen saturation levels were satisfactory but at 2230hrs he is recorded as having an oxygen saturation of 86% in room air which improved but not back up to normal values.

[Master A] appears to have gone back on to continuous oxygen [at 0030hrs], an indication of his deteriorating respiratory condition as was the upward trend in his pulse rate and the increasing frequency of bronchodilator use which did not lead to improvement of his vital signs (pulse and respiratory rate).

[Master A] was reviewed by the on duty Paediatric RMO, [Dr B], at 0115 hours following handover between shifts at 2300hrs. Over the next 2 hours [Master A] continued to receive bronchodilator initially by nebuliser and then via spacer and it is unclear why the decision to change delivery systems was made and was not consistent with the clinical situation of deteriorating asthma that [Master A] was displaying, which his mother recognised and nursing staff were concerned about.

[Dr C], the Paediatric consultant on call, was contacted at 0330hrs and advised 'back to back' nebulisers 20 minutes apart. There was a lack of understanding on behalf of [Dr B] as to the significance of amount of Ventolin [Master A] had required over the previous hours and what that implied about the severity of [Master A's] asthma. The distress that [Master A] was displaying was a key indicator of his unwellness as much as his tachycardia and need for oxygen.

There was also confusion over the indication for Ventolin via spacer rather than nebuliser. Generally a nebuliser is indicated in the management of severe asthma rather than a spacer so changing back from nebuliser to spacer would imply reduction in therapy rather than an intensification which was an inappropriate step given the increasing severity of [Master A's] asthma.

Following [Master A's] cardiorespiratory arrest resuscitation procedures were followed and, as is often the case, it was very difficult to ventilate him. He had further episodes of requiring full resuscitation before [Master A] was transferred by the Starship Paediatric intensive care team back to the intensive care unit in Auckland. I have not been asked to comment on the events following his transfer.

I was asked to respond to a number of specific questions.

1. Comment on the appropriateness of the clinical observations performed between [Master A's] admission to ED and his admission to the paediatric ward.

On initial presentation [Master A] was triaged quickly and given a triage code 3 (see within 30 minutes). I am uncertain as to the basis for this code 3 assignment and from the subsequent ED SHO note and the observations recorded wonder whether a code 2 (see within 10 minutes) assignment may have been more appropriate.

[Master A] was in ED from 12.15hrs to 16.45hrs and appears to have had regular vital signs recorded (9 sets of observations) and 7 doses of Ventolin delivered by nebuliser. There were regular nursing notes and he was seen by the ED SHO [senior house officer], ED SMO ([senior medical officer]) and the Paediatric SHO ([Dr E]) who inserted an Intravenous line during this time.

An arterial blood gas was also performed and this is not something I would normally carry out in this situation as the assessment of asthma severity is based on clinical judgment and monitoring response to therapy rather than a blood test.

The clinical observations performed were of the expected standard in quantity and quality.

2. Please comment on the appropriateness of the decision to transfer [Master A] to the paediatric ward rather than ICU on the afternoon of [his admission].

   This decision is based primarily on the clinical condition of the patient and the ability of the ward to care for him. From the information available this decision seems appropriate as [Master A] was improving clinically and there was an ability to deliver his treatment hourly on the ward and to observe him.

3. Please comment on the management decisions made following [Master A's] medical assessment at 1.l5am [the following day], including the decision to change [Master A's] therapy from nebulisers to spacers.

   There was recognition of worsening asthma by both the nursing staff on duty and [Dr B] (Paed SHO).[41] Appropriately treatment was restarted with nebuliser delivery with a dose of Ipatropium (Atrovent) in the first nebuliser and then a further nebuliser 30 minutes later as recorded in the drug chart.

   The change then to spacer delivery represents unclear thinking about acute asthma management and poor understanding of asthma protocol.

   The subsequent assessment puts too much weight on the auscultatory findings felt to suggest better air entry but in fact the comments 'small amount of wheeze' and 'otherwise silent chest' should have rung alarm bells that there was in fact very poor air entry and the Severe Life Threatening Asthma protocol required initiating. Especially in conjunction with [Master A's] agitation and worsening tachycardia

[41] Dr B has clarified that he was employed as a second year house officer, not a senior house officer.

and needs for oxygen, as well as his mother's obvious escalating concern. The clinical assessment and management decisions at this time were significantly below the expected standard.

4. Advise whether assistance was sought from senior medical staff in a timely manner.

   From reading the clinical notes I believe senior staff should have been contacted earlier. The time of deterioration at 1.00am would have been a much more appropriate time to discuss with the paediatrician on call.

5. Advise whether clinical staff responded in a timely manner to the deterioration in [Master A's] condition [in the morning].

   I assume that this relates to the cardiorespiratory arrest. There appears to have been activation of the cardiac arrest team in a timely way with rapid arrival of the on duty anaesthetic/ICU registrar, then the paediatrician and ICU specialist. It can be extremely difficult to ventilate the lungs in asthma.

6. Comment on the standard of communication between clinical staff.

   There does appear to have been regular communication between nursing staff and junior medical staff. [Dr C] in her commentary indicates that on each occasion she asked whether she should come in and review which is supportive to the junior staff.

   The paediatric nursing staff clearly indicated their concern to [Dr B] about the deterioration in [Master A's] condition but did not directly contact [Dr C], the on call paediatrician.

   Key information does not appear to have been transferred such as the fact that [Master A] had required increasing nebuliser treatment from 11.30pm and, as above, I believe earlier communication with [Dr C] should have been made about [Master A's] deterioration.

7. Was Bay of Plenty's documentation of an appropriate standard?

   The documentation seems to be appropriate. As mentioned the use of an Asthma Severity Score incorporated into the observation chart may have alerted staff earlier to the deteriorating situation or to the lack of improvement.

   I think confusion about the Ventolin prescribing is reflected in the written prescription in the medication chart. I am uncertain what the term 'back to back' means and from the charting I suspect there was also confusion on the part of the clinical teams.

Ventolin via nebuliser should be charted at specific intervals e.g. 4 hourly or 1 hourly. In the immediate acute situation Ventolin is often given in 3 doses over 1 hour i.e. 20 minutes apart. At the end of this time reassessment is indicated, if improvement is seen then timing between nebulisers is increased e.g. to hourly. If there is no or insignificant improvement then intensification of treatment is indicated e.g. to continuous Ventolin by nebuliser which implies exactly that: continuous medication delivery — without break for a period of time e.g. 30 minutes before reassessment. Although someone requiring continuous Ventolin also require continuous observation because it implies severe asthma.

For some the term 'back to back' means 3 doses in an hour, for others continuous treatment and therefore it is confusing and does not help in assessing severity. At no stage can I see from the medication notes that continuous Ventolin was given although it is mentioned on occasions in the clinical notes.

In addition the delivery of 3 Ventolin treatments in one hour should be via nebuliser if one is available rather than spacer as was done at 0220 to 0320, reflecting the severity of asthma if it requires this level of treatment but also allowing simultaneous oxygen delivery.

8. Advise whether Bay of Plenty District Health Board had appropriate clinical guidelines/policies in place for managing paediatric asthma at the time of events in question.

   The Starship Guidelines are very appropriate to manage asthma and they seem to have been readily accessible.

9. Are there any systemic issues of concern that contributed to the outcome of [Master A's] care?

   I am unaware of the level of paediatric experience that [Dr B] had and also his level of experience in managing acute asthma. Inexperience may have contributed to his failure to recognise the worsening asthma and respond appropriately. It is extremely important that the consultant on call is aware of the level of competence of the junior staff they are working with and factor that into their decision making.

   Children who require very regular Ventolin for asthma need close observation and if they are on continuous Ventolin they require continuous observation because of the risk these children are at of failure of response to treatment and therefore sudden change for the worse. The children's ward was obviously busy and ideally at the time of [Master A's] deterioration he required very close observation or 'specialing' which was difficult given the nursing workload.

   Experienced senior nurses who are concerned about a patient should feel able to discuss that patient's care directly with a consultant if they are uncomfortable with the appropriateness of junior doctor management. This is perhaps especially so in

a specialty such as paediatrics where the junior medical staff may have limited experience in child health.

I am not aware of the 'handover' practices in the paediatric department but believe that if there is a 'paper handover' only, it is very important for the doctor coming on duty to view and if necessary examine all the inpatients particularly any that have been highlighted at handover as requiring particular attention so that he has a clear picture of their status at the beginning of the shift. I note [Dr B] appears, from the notes, to have seen [Master A] for the first time at 0100hrs [in the early morning].

10. Comment of the changes that Bay of Plenty District Health Board has made since the events in question. In your view have the concerns about [Master A's] care been adequately addressed?

A number of changes have been instituted which should prevent a similar event occurring in the future. I believe the most important mitigating strategies are to do with communication and education.

The key communicator for the child [is] his parent(s) and it is very clear from the clinical notes that [Master A's] mother recognis[ed] at an early stage that her son was getting into trouble and attempted to convey that message on a number of occasions.[42] Her communication was misinterpreted and its importance not respected or understood. If greater due had been paid to what she was saying more intensive intervention would have appropriately been started sooner and the consultant on call contacted at an earlier stage. Parents usually know their children very well and are mostly very accurate in recognizing when things aren't right.

I have already mentioned the importance of communication within the clinical team across all levels without hierarchical structures getting in the way of the child's care. The changes indicate a clear communication structure. It is important to emphasise that the parent is a key part of the child's clinical care team.

Education is also enhanced in the programme tabled which is very appropriate with specific focus on acute situations and scenario training as a means to promote that learning.

I note there is still use of the descriptor 'back to back' nebulisers which I believe to be a term which can have a variety of meanings (see above) and leads to confused thinking and treatment.

11. Are there any aspects of the care provided by Bay of Plenty District Health Board that warrant additional comment?

[42] Dr B considers this statement "incorrect" and clarified that it is not documented anywhere before 4am that Ms A was concerned about her son's condition.

The response of the Child Health Team following [Master A's] death in meeting with the family and asking for an independent review, then re-meeting the family to allow opportunity for questions to be answered and general discussion is an acknowledgement of the tragedy that has occurred and displays their acceptance that this must not be allowed to occur again.

Summary

[Master A] died following a cardiorespiratory arrest that occurred while he was a hospital inpatient receiving treatment for an acute exacerbation of his asthma. After he initially appeared to improve on standard treatment his clinical deterioration was not correctly assessed or managed in a timely fashion. If the clinical assessment had been more accurate directing intensification of asthma treatment and if there had been earlier communication of the severity of his asthma with the paediatrician on call there could have been greater opportunity for a positive outcome."

Appendix I

Bronchodilator Therapy

/07		Ventolin 3 puffs via spacer
	1230 hrs	administered by mother
	1345	Ventolin 2.5mg } via nebuliser
		Atrovent 500mcg }
	1415	Ventolin 2.5mg (?dose) via nebuliser
Emergency	1427	" " " "
Department	1446	" 5mg " "
	1502	" 5mg " "
	1515	" 5mg " "
	1535	" 5mg " "
	1630	Ventolin 6 puffs via spacer
	1730	" " " "
	1830	" " " "
	1930	" " " "
	2050	" " " "
	2215	" " " "
	2330	" " " "
/07	0015	(by mother)
	0040	
	0100	Atrovent 250mcg } via nebuliser
		Ventolin 2.5mg }
	0130	Ventolin 5mg via nebuliser
	0210	Ventolin 6 puffs via spacer
	0240	Ventolin 10 puffs } via spacer
		Atrovent 4 puffs }
	0300	Ventolin 10 puffs via spacer
	0320	" " " "
	0330	Ventolin 5mg via nebuliser
	0350	Ventolin 2.5mg via nebuliser
	0400	" " 5mg " "
	0410	" " 5mg " "
	0430	cardiorespiratory arrest

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		Atrovent 4 puffs }
	0300	Ventolin 10 puffs via spacer
	0320	" " " "
	0330	Ventolin 5mg via nebuliser
	0350	Ventolin 2.5mg via nebuliser
	0400	" " 5mg " "
	0410	" " 5mg " "
	0430	cardiorespiratory arrest

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Appendix B

Independent advice to Commissioner — Paediatrician John Doran

Further advice
"Thank you for the opportunity to comment further on the responses provided by [Dr B] and the Bay of Plenty DHB.

My original report was based on information provided from a variety of sources, some documenting what was happening at the time (clinical notes) and other reports compiled at later dates in response to specific requests. The nature of my report is very much looking back at what happened and attempting to identify factors that may have led to the fatal outcome for [Master A], with the aim of trying to prevent such a tragedy occurring again.

In hospital, patient care is always a team process and the experience of clinical staff varies widely, and this includes junior doctors who as a group will include doctors with widely varying years of post graduate experience and also variation in clinical experiences. [Dr B] indicates his level of background experience and that must be taken into account as it is this clinical experience he brings to bear in his decision making in any given clinical situation.

Equally, asthma is a condition with a wide spectrum of clinical severity and in the acute situation the level of severity can, and does, change for the worse even when the patient is thought to be receiving optimal treatment so that close observation and repeated clinical assessment of the patient is necessary both of which occurred in [Master A's] inpatient stay as documented in the clinical notes.

In my original summary I attempted to indicate that earlier communication with the paediatric consultant would have given an opportunity for a different outcome because it would have led to earlier recognition of the asthma severity and intensification of treatment. But it is impossible to say that the outcome would have been different because severe life threatening asthma is just that and one of the goals of assessment and management is to prevent progression to that point.

[Dr B] acknowledges that with hindsight an earlier call to the consultant paediatrician would have been most appropriate and I agree entirely with that. It appears that his level of experience in this clinical situation meant that he made a different decision and there was a tragic outcome which instigated this investigation.

'If my senior colleague had been actually in the hospital they would have been more likely to come and review the patient' is almost certainly a correct statement but does not reflect the reality of practice for after hours on call specialist care as practised in New Zealand. The attendance of a consultant is initiated by the communication from the junior doctor and so what is conveyed in that communication is critical. It is

important that the consultant is very aware of the junior doctor's level of clinical knowledge and experience.

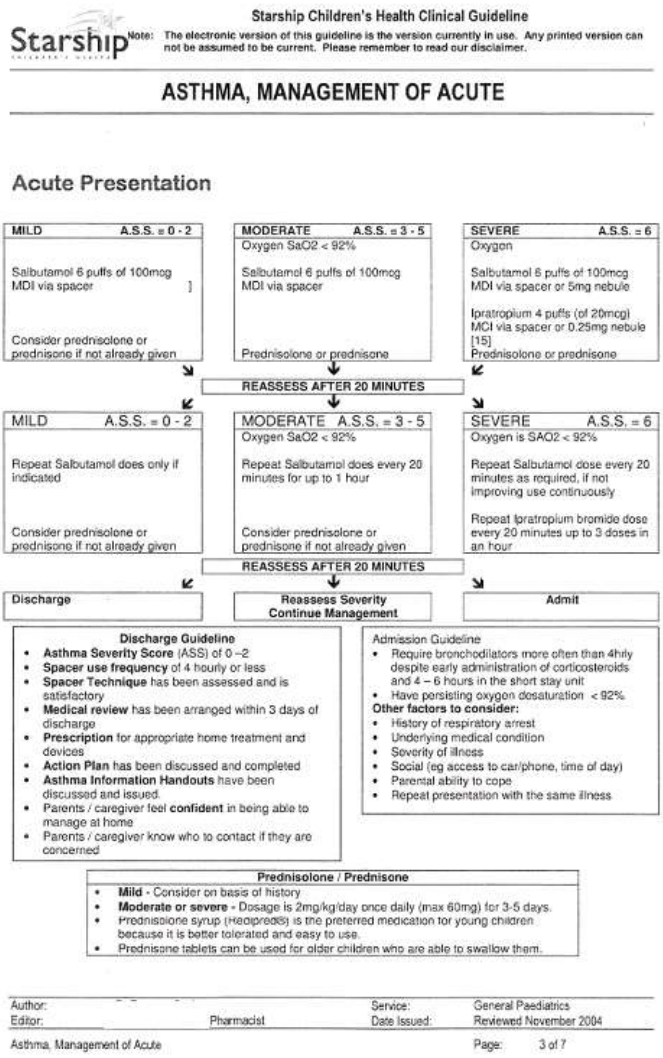
I have not intended to portray [Dr B] as arrogant or uncaring and I believe that he did his best to care for [Master A] and his family, including in the area of communication. In retrospect however, [Master A's] mother's recollection differs.

[Dr B] has worked very hard to improve his paediatric skills in general and his understanding of asthma assessment and management in particular, and has been able to use these skills in his ongoing practice. I feel that he has responded with integrity and sincerity in this respect and has been proactive in ensuring that he is better equipped to manage similar situations in the future.

Similarly I am satisfied with the responses of the Bay of Plenty DHB and the Corrective Action Plan that they have put in place to ensure that this will not occur again.

In summary, [Master A] died following a severe attack of asthma and if the severity of his situation had been recognised, more accurately directing intensification of his treatment including earlier communication with the consultant paediatrician, there might have been a different outcome."

Appendix C — Starship Guidelines



Starship Children's Health Clinical Guideline

Note: The electronic version of this guideline is the version currently in use. Any printed version can not be assumed to be current. Please remember to read our disclaimer.

ASTHMA, MANAGEMENT OF ACUTE

Acute Presentation

MILD A.S.S. = 0 - 2	MODERATE A.S.S. = 3 - 5	SEVERE A.S.S. = 6
Salbutamol 6 puffs of 100mcg MDI via spacer]	Oxygen SaO2 < 92% Salbutamol 6 puffs of 100mcg MDI via spacer	Oxygen Salbutamol 6 puffs of 100mcg MDI via spacer or 5mg nebule Ipratropium 4 puffs (of 20mcg) MDI via spacer or 0.25mg nebule [15]
Consider prednisolone or prednisone if not already given	Prednisolone or prednisone	Prednisolone or prednisone

REASSESS AFTER 20 MINUTES

MILD A.S.S. = 0 - 2	MODERATE A.S.S. = 3 - 5	SEVERE A.S.S. = 6
Repeat Salbutamol does only if indicated	Oxygen SaO2 < 92% Repeat Salbutamol does every 20 minutes for up to 1 hour	Oxygen is SAO2 < 92% Repeat Salbutamol dose every 20 minutes as required, if not improving use continuously Repeat Ipratropium bromide dose every 20 minutes up to 3 doses in an hour
Consider prednisolone or prednisone if not already given	Consider prednisolone or prednisone if not already given	

REASSESS AFTER 20 MINUTES

Discharge	Reassess Severity Continue Management	Admit

Discharge Guideline

- **Asthma Severity Score** (ASS) of 0 –2
- **Spacer use frequency** of 4 hourly or less
- **Spacer Technique** has been assessed and is satisfactory
- **Medical review** has been arranged within 3 days of discharge
- **Prescription** for appropriate home treatment and devices
- **Action Plan** has been discussed and completed
- **Asthma Information Handouts** have been discussed and issued.
- Parents / caregiver feel **confident** in being able to manage at home
- Parents / caregiver know who to contact if they are concerned

Admission Guideline

- Require bronchodilators more often than 4hrly despite early administration of corticosteroids and 4 – 6 hours in the short stay unit
- Have persisting oxygen desaturation < 92%

Other factors to consider:

- History of respiratory arrest
- Underlying medical condition
- Severity of illness
- Social (eg access to car/phone, time of day)
- Parental ability to cope
- Repeat presentation with the same illness

Prednisolone / Prednisone

- **Mild** - Consider on basis of history
- **Moderate or severe** - Dosage is 2mg/kg/day once daily (max 60mg) for 3-5 days.
- Prednisolone syrup (Hedipred®) is the preferred medication for young children because it is better tolerated and easy to use.
- Prednisone tablets can be used for older children who are able to swallow them.

Author:		Service:	General Paediatrics
Editor:	Pharmacist	Date Issued:	Reviewed November 2004

Asthma, Management of Acute Page: 3 of 7

Names have been removed (except Tauranga Hospital, Bay of Plenty DHB, Starship Hospital) to protect privacy. Identifying letters are assigned in alphabetical order and bear no relationship to the person's actual name.

Starship Children's Health Clinical Guideline

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ASTHMA, MANAGEMENT OF ACUTE

Inpatient Management

Reassess Severity on arrival to ward

MILD = 0-2	MODERATE = 3 - 5	SEVERE = 6
Salbutamol 6 puffs of 100mcg 4 hrly via MDI + spacer Consider Prednisolone or prednisone daily Review medications at least 8hrly	Salbutamol 6 puffs of 100mcg 2hrly via MDI + spacer. Prednisolone or prednisone daily. Review medications at least 8hrly	Oxygen is Sa02 < 92% Salbutamol 6 puffs of 100mcg hourly via MDI + spacer. Ipratropium bromide 4 puffs of 20mcg 4 hourly via MDI + spacer Prednisolone or prednisone daily. Review medications 2-4 hrly

Meets Discharge Guideline → DISCHARGE

Discharge Guidelines
- **Asthma Severity Score** (ASS) of 0 –2
- **Spacer use frequency** of 4 hourly or less
- **Spacer Technique** has been assessed and is satisfactory
- **Medical review** has been arranged within 3 days of discharge
- **Prescription** for appropriate home treatment and devices
- **Action Plan** has been discussed and completed
- **Asthma Information Handouts** have been discussed and issued.
- Parents / caregiver feel **confident** at being able to manage at home
- Parents / caregiver know who to contact if they are concerned

If patient's condition deteriorates, reassess, and manage as 'Life threatening asthma, and consider referral to PICU.

Discharge Planning

Discharge should include a letter to the family GP. Where possible, a phone call should also be made to the GP as this is shown to improve the communication between hospital and doctors in the community. This also provides an opportunity to provide more meaningful information about the patient to the GP.

Recommendations:
- Discharge should include a discharge letter and copy of the Asthma Action / Management Plan to the child's GP
- The discharge letter should clearly indicate that the patient needs to be followed up within a specified timeframe.
- All patients discharged from the ED or ward must have an individualised written Asthma Management Plan
- On discharge, parents should be advised to seek further medical attention (preferably from their GP), should the patient's condition deteriorate or if there is no significant improvement within 48 hours

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