Viral bronchiolitis management in hospitals in the UK

Abstract

Background Viral bronchiolitis is the leading cause of hospitalisation in infants less than a year old. The United Kingdom (UK) National Institute for Health and Care Excellence (NICE) published a guideline for the management of viral bronchiolitis in June 2015.

Objectives This study aimed to prospectively survey the management of viral bronchiolitis in hospital Trusts in the UK to provide a baseline of practice prior to the publication of the 2015 NICE bronchiolitis guideline against which future practice can be assessed.

Study design An electronic, structured questionnaire was sent to hospital paediatricians in the UK prior to the publication of the NICE bronchiolitis guideline via the Royal College of Paediatrics and Child Health e-portfolio system to assess the quality of Trust's viral bronchiolitis management guidelines.

Results Paediatricians from 111 (65% of all) UK Trusts completed an electronic questionnaire. 91% of Trusts had a bronchiolitis guideline. Overall only 18% of Trusts would be fully compliant with the NICE guideline. Between 43-100% of Trusts would be compliant with different sections of the guideline. There was variation in hospital admission criteria with respect to the need for supplemental oxygen (oxygen saturations <88% to <95%). 'Unnecessary' medications (especially bronchodilators, nebulised hypertonic saline and antibiotics) and investigations (chest x-ray and blood gas) were regularly advised. 72% of Trusts advised respiratory virus testing in all hospitalised infants and 64% created bronchiolitis bays to cohort infants.

Conclusions There was wide variation in the management of infants with bronchiolitis in Trusts. Most bronchiolitic infants are not managed optimally in hospitals. Future guidelines should include advice on virus testing and isolation/cohorting.

Keywords: NICE, bronchiolitis, hospital trusts, viral testing, cohorting

Viral bronchiolitis management in hospitals in the UK

Background

In developed countries, viral bronchiolitis, in particular that caused by respiratory syncytial virus (RSV), is the leading cause of hospitalisation in infants less than a year old [1]. More than 30,000 infants are hospitalised each year in England and Wales due to viral bronchiolitis with a wide variation in rates of hospitalisation in different geographical regions of the United Kingdom (UK) [2–4]. In one study hospitalisation rates varied between 351 and 5140 per 100 000 in English Primary Care Trusts [3]. No clear cause has been identified for the wide variation although differences in hospital management protocols and admission guidelines may have a role [3].

As currently there are no treatments for viral bronchiolitis the management is purely supportive (oxygen supplementation and feeding support). There is evidence that medications including bronchodilators, steroids, nebulised adrenaline, hypertonic saline, leukotriene receptor antagonists (e.g. montelukast) and antibiotics and physiotherapy have no role in the vast majority of hospitalised bronchiolitic infants [5–11] despite them often being used.

In Scotland, the Scottish Intercollegiate Guideline Network (SIGN) published a guideline for managing infants with viral bronchiolitis in 2006 (withdrawn December 2015) [12] but in England and Wales there was no national guideline for the management of viral bronchiolitis for hospital doctors until the National Institute for

Health and Care Excellence (NICE) published their guidance in June 2015 [13]. The guidance given by NICE and SIGN are almost identical in terms of hospital management. NICE recommendations [13] include:

- Give supplemental oxygen if saturations <92% in air (<94% in SIGN)
- Do not routinely prescribe bronchodilators, nebulised adrenaline, steroids, nebulised hypertonic saline, antibiotics, leukotriene receptor antagonists or ribavirin
- Do not routinely perform physiotherapy
- Do not routinely perform chest x-rays or blood gases
- Provide written information for parents

Individual hospitals and NHS Trusts have local guidelines often based on national (SIGN) or international (American Academy of Pediatrics [AAP]) guidelines but how variable these guidelines are in the UK National Health Service (NHS) is unknown.

Objectives

The primary aim of this study was to prospectively survey hospital Trusts in the UK (England, Scotland, Wales and Northern Ireland) to provide a baseline of practice prior to the publication of the 2015 NICE bronchiolitis guideline against which future practice can be assessed. Anecdotal reports suggest respiratory virus testing and isolation/cohorting of infants with viral bronchiolitis happens in many NHS Trusts but currently there is not clear UK guidance on when to test for respiratory viruses or isolate/cohort bronchiolitis infants. A secondary aim, therefore, was to assess the

use of respiratory virus testing and isolation/cohorting of infants with viral bronchiolitis in hospital Trusts.

Study design

In March 2015 an electronic, structured questionnaire (Appendix 1) was sent to paediatricians covering all healthcare Trusts in England, Wales, Scotland and Northern Ireland that provide paediatric care (n=170).Hereafter these will all be referred to as “Trusts”. The questionnaire was based on the NICE bronchiolitis draft guideline, and included questions on Trust guidelines for the management of viral bronchiolitis. Questions on cohorting of infants with viral bronchiolitis and viral testing were also included. Trust guidelines (which cover all hospitals within a Trust) are written and developed by clinicians (e.g. paediatricians) and usually reviewed and ratified by Trust guideline development committees which involve all appropriate stakeholders (e.g. clinicians, pharmacy, laboratory staff, etc). Questionnaires were sent to paediatric consultants and trainees via the Royal College of Paediatrics and Child Health (RCPCH) e-portfolio system (which includes all paediatric trainees and most paediatric consultants in the UK) and followed up with targeted emails in April and May 2015 with a link to the questionnaire sent to paediatricians (consultants and trainees) working in those Trusts that had not responded initially. The survey closed at the end of May 2015. We also asked paediatricians to send an electronic copy of their Trust’s bronchiolitis guideline if they had one. If we had more than one response from a Trust and there was variation in the questionnaire answers from the Trust, then we included the responses that suggested the broadest number of infants

were included for the question asked. If we also had an electronic copy of the guideline we completed the questionnaire using the information it contained.

Data were analysed for descriptive statistics using Microsoft Excel version 16 (2016). As per the UK National Health Service (NHS) Health Research Authority guidance, formal ethical approval was not required for this study.

Results

Questionnaires were sent to doctors covering all 170 Trusts routinely caring for children in England, Scotland, Wales and Northern Ireland (NI). We received responses from 111 (65%) Trusts; 104 (66% of English and Scottish Trusts) in England (n=96) and Scotland (n=8), five (71% of Welsh Trusts) in Wales and two (40% of NI Trusts) in NI. We received one response from 69 Trusts, two responses from 21 Trusts, three responses from 13 Trusts, four responses from five Trusts and from each of three Trusts we received five, six and eight responses respectively. Twenty-four (22%) respondents sent an electronic copy of their Trust's bronchiolitis guideline enabling corroboration of their responses with the guideline, seven (6%) of these were from Trusts where we received more than one response. For each of the other Trusts where there were multiple responses there were minor variations in the responses from each respondent.

Written guidelines

One hundred (91% of all) Trusts had a written guideline for the management of infants with viral bronchiolitis. Of those 100, ninety-one (91%) Trusts had a local guideline, eight (8%) used a national guideline (SIGN) and one (1%) used the American Academy of Pediatrics guideline.

Investigations and interventions

Blood gas

Of the 100 Trusts that had a guideline, 84 (84%) suggested only carrying out a blood gas in hospitalised infants with severe bronchiolitis (i.e. requiring high dependency or intensive care) (in line with SIGN/NICE guidance), four (4%) Trusts in all hospitalised infants with viral bronchiolitis, in four (4%) Trusts the guideline advised not to do a blood gas routinely (also in line with SIGN/NICE guidance) and in eight (8%) Trusts the guideline did not mention blood gas testing.

Chest x-ray

Sixty-five (65%) Trust guidelines suggested performing a chest x-ray in hospitalised infants with severe viral bronchiolitis (i.e. requiring high dependency or intensive care) (in line with SIGN/NICE guidance), 22 (22%) Trusts advised not to perform chest X-rays routinely (also in line with SIGN/NICE guidance), ten (10%) Trusts' guidelines did not mention chest x-rays and two (2%) Trusts advised chest x-rays for all hospitalised infants with viral bronchiolitis.

Oxygen saturations

The level of oxygen saturations suggested as an indication to administer supplemental oxygen varied between Trusts from <88% to <95%; one (1%) Trust

<88%, four (4%) <90%, 58 (58%) <92%, 16 (16%) <93%, 17 (17%) <94%, one (1%) <95% and three (3%) were outside this range.

Other Interventions

The frequency of use of interventions used to manage infants with viral bronchiolitis varied considerably (Table 1). Of note, 55% of Trusts advised using nebulised hypertonic saline in some settings (10% were for “other indications”) (45% compliance with the NICE guideline) and 47% advised using bronchodilators in some settings (20% were for “other indications”) (53% compliance with the NICE guideline). The majority of Trusts (83%) advised using nasogastric feeds in all hospitalised infants (admitted to a ward or high dependency / intensive care) and intravenous fluids were reserved for those most severely unwell (77% Trust advised using in severe bronchiolitis requiring high dependency / intensive care).

<u>Written advice</u>

Fifty-one (47%) Trusts provided written guidance about viral bronchiolitis to parents of infants discharged from the emergency department (ED) and the paediatric wards (in line with SIGN/NICE guidance), 27 (25%) if discharged from the ward (and not if discharged from the ED), 18 (17%) if discharged from ED (and not if discharged from the inpatient ward), one respondent did not know if written advice was given, and 12 (13%) Trusts did not provide written advice to any parents.

<u>Viral testing and cohorting</u>

Five (5%) Trusts advised nasopharyngeal aspirates (NPAs) or viral throat swabs to be taken and tested for respiratory viruses from all infants with bronchiolitis presenting to the emergency department even if they were discharged home, 80 (72%) in all hospitalised bronchiolitic infants, 17 (15%) in only a subset of hospitalised bronchiolitic infants (e.g. only those with risk factors for severe disease), two (2%) advised not taking respiratory samples on any infant and for seven (6%) there was no guidance on taking respiratory samples.

Thirty nine (36%) Trusts placed bronchiolitic infants requiring hospital admission into a cubicle/single room and did not create 'bronchiolitis bays' (inpatient areas or “bays” containing cots for more than one infant with a diagnosis of viral bronchiolitis), 25 (23%) Trusts cohorted infants with RSV infection separately from infants with bronchiolitis caused by other viruses, 18 (17%) Trusts create a 'bronchiolitis bay' for all infants with bronchiolitis irrespective of the virus(es) the infants had, 18 (17%) Trusts only cohorted infants with the same virus together (i.e. separate bays for infants testing positive for RSV, influenza, human metapnuemovirus, etc.), and ten (9%) Trusts had another, unspecified cohorting policy.

<u>Compliance with the NICE bronchiolitis guideline (2015)</u>

We calculated the percentage of Trusts that would already be compliant with the various elements of the NICE guideline as a baseline to compare future studies to (Table 2). In total, only 18 (18%) Trusts would be fully compliant with the NICE guideline.

For those Trusts from which we received a copy of the electronic guideline and the completed questionnaire there was almost 100% concordance between the two for the relevant questions (i.e. when comparing the results of the survey filled in by the doctor at the Trust with the written guideline that was sent to us, the survey matched what was written on the guideline).

Discussion

This study has demonstrated a wide variation in the guidelines and potential management of infants with viral bronchiolitis in hospitals in the UK. Similar to a recent study in 12 Welsh hospitals [14], our study has also shown wide variation in viral bronchiolitis guidelines used by Trusts in the hospital setting and 9% of Trusts in our study did not have a guideline. It is thus not surprising that management of these infants varied considerably across the UK. When comparing the guidelines with the SIGN and newly published NICE guidelines we demonstrated considerable variation from both guidelines by Trust guidelines. The level of oxygen saturations requiring supplemental oxygen varied between <88% to <95%. The NICE guideline suggests all infants with a diagnosis of viral bronchiolitis should have their oxygen saturations measured and those with oxygen saturations <92% require supplemental oxygen[13]. At the time this survey was undertaken there was guidance available from SIGN (provide supplemental oxygen if saturations are <94%), the draft NICE guideline (provide supplemental oxygen if saturations are <92%), the AAP (provide supplemental oxygen if saturations are <90%)[15] and data from the UK bronchiolitis of infants discharge study (BIDS) [16] (provide supplemental oxygen if saturations are <90%), which may account for some of the variation in practice.

Most Trusts (>85%) advised not to perform investigations (chest x-ray and blood gas) or only to do them in infants with severe bronchiolitis (as per SIGN/NICE). Guidance on the use of interventions (medications, chest physiotherapy, nasal suctioning and feeding support) also varied considerably among Trusts and from the SIGN and NICE guidelines. Numerous previous studies [14,17–25] have demonstrated the introduction of a clinical guideline for the management of viral bronchiolitis has led to a reduction in 'unnecessary' investigations and medication prescriptions although a considerable proportion of infants still receive these investigations and medications. After the 2006 AAP guideline was introduced many infants still received 'unnecessary' investigations and medications; 52% chest x-rays, 58% bronchodilators, 32% antibiotics and 16% steroids [24]. This suggests just developing and introducing a guideline is insufficient to ensure appropriate management of these infants and other strategies including guideline dissemination, education, audit and feedback, academic detailing [26] and multisite collaboratives[27] are also required.

Although the NICE guideline [13] does not comment on testing for RSV or other respiratory viruses or on isolating/cohorting infants with viral bronchiolitis in hospital wards, the SIGN guideline [12] recommended rapid testing for RSV infection and isolating or cohorting infants with viral bronchiolitis. In addition, the AAP guideline [15] recommends strict infection control practices and isolating/cohorting RSV-positive infants to reduce nosocomial infection. Recently, the recommendation on cohorting has been contested as 10-30% of infants will have multiple respiratory viruses detected at presentation [28]. We have shown both are frequent practices in UK hospitals. Seventy-five percent of Trusts advised testing all hospitalised infants for

respiratory viruses and 64% of Trusts created some form of ‘bronchiolitis bay’ for cohorting infants. Knowledge of the viruses affecting individuals is essential for epidemiological purposes and for individual patients it may be clinically relevant [29]. Nosocomial RSV infection is well described and is a risk factor for more severe disease [30] and thus testing and isolating/cohorting infants to reduce this risk would seem advantageous [31]. Including advice on viral testing and isolation/cohorting in the NICE bronchiolitis guideline would be useful for future updates.

This study has some strengths and a number of weaknesses. We have undertaken the largest survey of UK Trusts investigating the management of viral bronchiolitis and comprehensively investigated the management practice and procedure guidelines. We did not, however, look at individual patient notes and thus we cannot comment on how closely Trusts’ guidelines were followed and how this may have manifest in patient care. In addition, the person filling in the questionnaire may not have represented the actual guideline correctly but expressed their opinion/interpretation of it and indeed we had some variation in the responses from individuals from the same Trusts. To overcome this if we had more than one response from a Trust and there was variation in the questionnaire answers from the Trust then we included the responses that suggested the broadest number of infants were included for the question asked (e.g. if the question asked about use of bronchodilators and one person responded that all children seen in ED should receive them and another responded only those in PICU should then we coded that as all children seen should receive them). We also asked respondents to send an electronic copy of their Trust guideline for review, although only 22% did so. It is

277 possible, therefore, that we may have overestimated guidance suggesting the use of
278 medications and investigations.
279
280 In conclusion, we have shown wide variation in the guidelines and potential
281 management of infants with viral bronchiolitis in hospitals in the UK and provided a
282 baseline against which future studies can be assessed. Many Trusts were not fully
283 compliant with the NICE guideline prior to its publication meaning they need to
284 update their guidelines. Ensuring the NICE guideline is widely implemented and
285 complied with is imperative to improve the care of vulnerable infants with viral
286 bronchiolitis. We plan to carry out a repeat survey of Trusts to assess the impact of
287 the NICE guideline after implementation.
288
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