NICE National Institute for Health and Care Excellence

2019 surveillance of bronchiolitis in children: diagnosis and management (NICE guideline NG9)

Surveillance report

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Surveillance decision

We will update the guideline on bronchiolitis in children: diagnosis and management (NICE guideline NG9). The update will focus on safe and effective levels of oxygen saturation when discharging patients.

Reasons for the decision

Topic expert feedback, stakeholder feedback and several studies highlighted areas where there had been amendments to other national guidelines, alterations in clinical practice or new evidence that has an impact on recommendation 1.5.1.

Three topic experts and 1 stakeholder suggested that minimum oxygen saturation levels could be safely lowered from 92% to 90% in children with bronchiolitis. New evidence was found from 1 study that suggested oxygen saturation levels of 90% prior to discharge had no adverse effects. The American Paediatric Guidelines (2019) on bronchiolitis in children have amended their recommendation to state that oxygen levels can be lowered to 90% during treatment. The original surveillance proposal noted that, in the interests of patient safety, more evidence was needed in order to consider lowering the discharge threshold in the guideline. The population covered by the new evidence was only from 6 weeks to 12 months old, whereas the guideline covers patients from birth to 18 years old. However, having considered the consultation comments from stakeholders, reviewed the full text of the evidence, and reviewed the low-level evidence that the original recommendation was based on, it has been decided that there is a need to update the guideline in this area. The new evidence also included an economic evaluation, which suggested cost saving implications for the NHS and the wider healthcare setting.

No new evidence was identified through this surveillance review to suggest that a child could not be referred for emergency care and remain safe if their oxygen levels were lower than 92%, or that a child does not need oxygen supplementation if their levels are above 90%. Therefore, no impact on these recommendations within the guideline is expected.

Other areas that were raised by topic expert feedback but that will not be updated in the guideline included:

- the measurement of oxygen saturation using pulse oximetry
  - The American Paediatric Guidelines (2019) on bronchiolitis in children suggests that pulse oximetry is prone to errors of measurement. One topic expert also suggested that pulse oximetry should be reconsidered for use in primary care due to issues around affordability and lack of availability. No new evidence was found through surveillance that suggests that pulse oximetry is ineffective at measuring oxygen levels and should not be recommended for use in primary care. Therefore, no impact on the guideline is expected.
- the use of different methods of oxygen supplementation in the management of bronchiolitis
  - Two topic experts and 1 stakeholder suggested that high-flow oxygen therapy (HFOT) and nasal continuous positive airway pressure (CPAP) are being used more frequently in the UK. Evidence identified showed few significant differences between these methods of oxygen supplementation compared to standard care. Therefore, no impact on the guideline is expected.
- risk factors for severe bronchiolitis including the possibility of failure to thrive
  - Two topic experts suggested that low birth weight and failure to thrive can be risk factors for more severe bronchiolitis. One topic expert contacted NICE in March 2019 to state that the wording in recommendations 1.2.3 and 1.3.3 may have been misinterpreted as being an exhaustive list of risk factors by clinicians potentially resulting in unsafe and unacceptable practice. Three studies suggested low birth weight as a risk factor, however it was unclear as to whether this was a specific risk factor for more severe bronchiolitis. Failure to thrive was not noted as a risk factor in the studies identified through surveillance. Due to the feedback received however, it is proposed that the wording of the current recommendations be amended to ensure it is not considered exhaustive. It is suggested that recommendations 1.2.3 and 1.3.3 should be amended to state clinicians 'take account of any known risk factors for more severe bronchiolitis, such as: chronic lung disease; hemodynamically significant congenital heart disease; age in young infants; premature birth; neuromuscular disorders; immunodeficiency'. This should help to confirm that the list of risk factors is not exclusive and may improve the safety of patients and their care.

- the use of hypertonic saline for the management of bronchiolitis
  - Seven studies were identified that stated that hypertonic saline was safe and effective to use and showed positive results for improving clinical severity scores, reducing length of stay in hospital and reducing the risk of hospitalisation. The American Paediatric Guidelines (2019) recommends that hypertonic saline is safe and effective to use. However, 2 studies were found which suggested that hypertonic saline worsened episodes of cough and 6 studies indicated hypertonic saline did not make a difference to primary outcomes when the heterogeneity of the evidence was fully considered. It is proposed that there is not enough consistent high-quality evidence to suggest that nebulised hypertonic saline should be used in the management of bronchiolitis in infants and therefore no impact on the recommendation is expected.
- diagnosing bronchiolitis
  - One topic expert and 1 stakeholder suggested there are 3 types of bronchiolitis that can be diagnosed at presentation and more effort should be made to appropriately diagnose the causing virus in order to treat this appropriately. No evidence was found regarding the diagnosis of bronchiolitis and therefore no impact on the guideline is expected.
- considering sepsis at diagnosis
  - The Surveillance Team felt that clinicians should consider the possibility of sepsis when carrying out their assessments. It is proposed that NG9 cross-refers to sepsis: recognition, diagnosis and early management (NICE guideline NG51) to ensure that clinicians consider the possibility of sepsis as well as pneumonia when carrying out their assessments.
- admittance avoidance and early support discharge
  - A placeholder statement in the bronchiolitis in children (NICE quality standard 122) was identified. No evidence was found regarding admittance avoidance or early support discharge and therefore no impact on the guideline is expected.

Overall, although an impact was found in 1 area, the majority of evidence identified through the surveillance was insufficient to impact on the recommendations within this guideline and needs to be substantiated by further longer-term studies.

For further details and a summary of all evidence identified in surveillance, see appendix

A.

Rationale of 2019 surveillance methods

NICE's Surveillance Team checked whether recommendations in bronchiolitis in children: diagnosis and management (NICE guideline NG9) remain up to date.

The surveillance process consisted of:

- Feedback from topic experts via a questionnaire.
- A search for new or updated Cochrane reviews.
- Examining related NICE guidance and quality standards and NIHR signals.
- A search for ongoing research.
- Examining the NICE event tracker for relevant ongoing and published events.
- Literature searches to identify relevant evidence.
- Assessing the new evidence against current recommendations to determine whether or not to update sections of the guideline, or the whole guideline.
- Consulting on the proposal with stakeholders.
- Considering comments received during consultation and making any necessary changes to the proposal.

For further details about the process and the possible update decisions that are available, see ensuring that published guidelines are current and accurate in developing NICE guidelines: the manual.

Evidence considered in surveillance

Search and selection strategy

We searched for new evidence related to the whole guideline.

We found 34 studies in a search for randomised controlled trials (RCTs) and systematic reviews published between 1 August 2014 and 1 April 2019.

Based on topic expert feedback we also conducted a focused search on failure to thrive and other risk factors for more severe bronchiolitis.

We found 3 studies in a search for studies published between 1 August 2014 and 8 April 2019.

From all sources, we considered 37 studies to be relevant to the guideline.

See appendix A for details of all evidence considered, and references.

Selecting relevant studies

Studies were eligible if they involved children with bronchiolitis and included any of the following areas:

- Diagnosis and monitoring.
- Investigations including indications for oxygen saturation measurement using pulse oximetry, indications for chest radiography and indications for capillary blood gas testing.
- Treatments including chest physiotherapy; antibiotic treatment; inhaled therapies; systematic corticosteroids; nebulised hypertonic saline; heliox; combined bronchodilator and corticosteroid therapy and montelukast .
- Supportive measures to maintain SpO_2 or ventilation including oxygen supplementation; humidified high-flow oxygen and CPAP.
- Indication for fluids and nutrition support.
- Use of nasal suction.
- Criteria for discharge from hospital.

Studies were excluded if they involved children with other respiratory conditions, such as recurrent viral induced wheeze or asthma. Studies were also excluded if they involved any of the following areas:

- Screening for respiratory syncytial virus (RSV) in primary care.
- Viral testing in hospital to prevent transmission.

- Complementary and alternative treatments.
- Ribavirin.
- Surfactant.
- Normal saline.
- Prevention of bronchiolitis by the use of palivizumab for immunoprophylaxis of RSV.

Regarding oxygen monitoring; any studies involving invasive ventilation were excluded and any pan bronchiolitis and bronchiolitis obliterans were excluded.

Regarding oxygen supplementation; studies were excluded if they involved children in neonatal units or intensive care units.

The inclusion/exclusion criteria were chosen in line with that used for the previous searches for NICE guideline NG9.

In order to manage the number of potentially eligible studies pragmatic limits were placed on inclusion:

- Studies that were not RCTs, systematic reviews or meta-analyses were not included.
- Studies were required to have a minimum sample size of 40 for inclusion.
- Studies were required to be conducted in OECD (Organisation for Economic Co-operation and Development) countries for inclusion.

Studies in the focused search were selected if they were relevant to risk factors associated with bronchiolitis in children.

Ongoing research

We checked for relevant ongoing research; of the ongoing studies identified, 5 studies were assessed as having the potential to impact on existing recommendations. Therefore, we plan to check the publication status regularly and evaluate the impact of the results on current recommendations as quickly as possible. These studies are:

- Nebulised N-acetyl cysteine for bronchiolitis in inpatient hospital use: a randomized controlled trial
- Magnesium sulphate for acute bronchiolitis in children under two years of age
- Suctioning of NOse Therapy Versus Usual Home Care in Bronchiolitis (SNOT)
- Azithromycin to Prevent Wheezing Following Severe RSV Bronchiolitis-II (APW-RSV-II)

Intelligence gathered during surveillance

Views of topic experts

We considered the views of topic experts who were recruited to the NICE Centre for Guidelines Expert Advisers Panel to represent their specialty. For this surveillance review, topic experts completed a questionnaire about developments in evidence, policy and services related to the guideline.

We sent questionnaires to 8 topic experts and received 5 responses from a consultant and honorary reader in paediatric respiratory medicine; 2 general practitioners, an advanced clinical nurse specialist; and the head of paediatric respiratory department.

Topic expert feedback queried the safe and effective levels of oxygen saturation when referring, admitting or discharging patients with bronchiolitis. There was insufficient evidence regarding referring or admitting patients, however directly relevant evidence was found regarding discharging patients and therefore this recommendation will be updated.

Other areas raised in topic expert feedback included:

- The measurement of oxygen saturation using pulse oximetry.
- The use of different methods of oxygen supplementation in the management of bronchiolitis.
- Risk factors for severe bronchiolitis including the possibility of failure to thrive.
- That the research recommendation for the use of paediatric early warning score as an assessment tool in bronchiolitis should be reviewed.
- That antiviral therapies should be considered.

There was either no evidence or not enough evidence found regarding the areas raised in topic expert feedback to impact on guideline recommendations. Further confirmatory RCTs are needed in these areas for NICE to consider amending the guideline.

Implementation of the guideline

NICE uptake data were found measuring the use of this guideline in practice. It was noted that only 25% of the GPs within the study were compliant with referring children to hospital if oxygen saturation levels were less than or equal to 92% (those that referred once saturations were less than or equal to 90% were excluded). It was noted that 56% of GPs within the study were compliant with referring children to hospital if feeding was less than or equal to 50% of usual volume. Finally, 53% of GPs within the study referred children with bronchiolitis to paediatric intensive care units where a nebuliser was used. It is not clear why uptake of these recommendations is low.

Other sources of information

We considered all other correspondence received since the guideline was published. A placeholder statement was made in bronchiolitis in children (NICE quality standard 122) around admission avoidance and early supported discharge. A placeholder statement is an area of care that has been prioritised by the Quality Standards Advisory committee but for which no source guidance is currently available. A placeholder statement indicates the need for evidence-based guidance to be developed in this area. Unfortunately, we did not find any evidence in these areas and therefore the guideline will not be updated.

Views of stakeholders

Stakeholders are consulted on all surveillance reviews except if the whole guideline will be updated and replaced. As this surveillance report originally proposed to not update the guideline, we consulted with stakeholders.

Overall, 5 stakeholders commented. Responding stakeholders included professional bodies and royal colleges. Three agreed with the original proposal not to update the guideline and 2 disagreed. Out of the 2 responders who disagreed, 1 felt that NICE should include recommendations around testing for respiratory virus infection. NICE searched for evidence regarding the identification of different viruses that are associated with bronchiolitis however no studies were found. Therefore, NICE will not update the guideline at this time.

The other responder asked NICE to consider including guidance from the Joint Committee on Vaccination and Immunisation (JCVI) in regard to RSV immunisations for infants hospitalised with bronchiolitis during the winter season. NICE noted that the guideline is around the diagnosis and management of bronchiolitis and therefore antivirals, vaccines and vaccination procedures are outside of the remit of the guideline. Therefore, NICE will not update the guideline at this time.

Issues raised during the consultation included:

- A query regarding evidence on the safety of >90% oxygen saturation levels. A multicentre, parallel-group, double-blind, RCT from the UK was identified in the surveillance review that considered children with bronchiolitis being discharged with a target of 90% for oxygen saturation both safely and effectively. NICE has reconsidered its original proposal not to update this recommendation. On reflection it is felt that this study was directly relevant and from a UK setting. The original recommendation was not based on high-quality evidence that directly addressed the issue of what levels of oxygen are safe and effective for discharge.
- Obtaining of nasopharyngeal aspirate to identify causal organism. We searched for evidence regarding the identification of different viruses that are associated with bronchiolitis however no studies were found.
- The use of high-flow versus low flow respiratory support and nasal CPAP. We found 3 RCTs that compared high flow oxygen therapy (HFOT) with either standard care or hypertonic saline. It was not clear from the abstracts if standard care involved low flow respiratory support. There was little evidence that suggested using HFOT caused significant differences in outcome in standard practice. Due to the lack of evidence on safety and efficacy, we will not update the guideline to include HFOT. CPAP is already recommended in NG9 in recommendation 1.4.5: 'Consider continuous positive airway pressure (CPAP) in children with bronchiolitis who have impending respiratory failure'.

- Failure to thrive being a risk factor for more severe bronchiolitis. A focused search on failure to thrive as a risk factor for severe bronchiolitis was conducted for the surveillance review. No evidence was found that associated failure to thrive with bronchiolitis in terms of increasing the risk of diagnosis or increasing the risk of illness post diagnosis. However, an editorial amendment will be made to recommendations 1.2.3 and 1.3.3 to amend the list of risk factors to state: 'When deciding whether to admit a child with bronchiolitis, take account of any known risk factors for more severe bronchiolitis such as…'. It is hoped that this will encourage clinicians to consider all possible risk factors for severe illness, not just those listed in the recommendation that were included due to the evidence found during the original search.

NICE also requested feedback during consultation on applying the recommended respiratory rates in NG9 in clinical practice and whether clinicians had encountered any issues around applying the recommended respiratory rates to the different range of ages this guideline covers. We received 1 response to this request, which stated the respiratory rates are useful and practitioners should be encouraged to discuss their concerns with a tertiary care centre if they are worried or want further clarification/support on this. NICE will not be updating the guideline regarding respiratory rates at this time.

See appendix B for full details of stakeholders' comments and our responses.

See ensuring that published guidelines are current and accurate in developing NICE guidelines: the manual for more details on our consultation processes.

Equalities

No equalities issues were identified during the surveillance process.

Editorial amendments

During surveillance of the guideline we identified the following points in the guideline that should be amended.

- Recommendation 1.1.6: It is suggested that a line is added at the end of this recommendation to ensure that clinicians consider sepsis as an alternative diagnosis. The proposed amendment would be as follows:

'Consider a diagnosis of pneumonia if the child has:

- high fever (over 39°C) and/or
- persistently focal crackles.

See also the NICE guideline NG51 on sepsis and risk stratification tools for sepsis in under 5s.'

- Recommendation 1.2.3: It is suggested that this wording is amended to ensure that the list of risk factors is not considered exhaustive. The amended areas have been highlighted in bold font:

'When deciding whether to refer a child with bronchiolitis to secondary care, take account of **any known** risk factors for more severe bronchiolitis **such as**:

- chronic lung disease (including bronchopulmonary dysplasia)
- haemodynamically significant congenital heart disease
- age in young infants (under 3 months)
- premature birth, particularly under 32 weeks
- neuromuscular disorders
- immunodeficiency.'

- Recommendation 1.3.3: It is suggested that this wording is amended to ensure that the list of risk factors is not considered exhaustive. The amended areas have been highlighted in bold font:

'When deciding whether to admit a child with bronchiolitis, take account of **any known** risk factors for more severe bronchiolitis **such as**:

- chronic lung disease (including bronchopulmonary dysplasia)
- haemodynamically significant congenital heart disease
- age in young infants (under 3 months)
- premature birth, particularly under 32 weeks
- neuromuscular disorders

- immunodeficiency.'

Overall decision

After considering all evidence and other intelligence and the impact on current recommendations, we propose that an update is necessary.

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