NICE National Institute for Health and Care Excellence

2022 exceptional surveillance of sepsis: recognition, diagnosis and early management (NICE guideline NG51)

Surveillance report
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Surveillance decision

We will update the NICE guideline on sepsis.

The update will focus on the risk stratification of adults to identify adults at risk of severe illness or death from sepsis, and the appropriate timing for antibiotic delivery for different risk categories.

Reason for the exceptional review

To examine the impact of the report from the Academy of Medical Royal Colleges (AoMRC) on the risk stratification and initial antimicrobial management of patients with suspected sepsis, along the entire patient pathway.

Methods

The exceptional surveillance process consisted of:

- Considering the new information that triggered the exceptional review.
- Considering the evidence used to develop the guideline in 2016.
- Examining related NICE guidance and quality standards.
- Assessing the new information against current recommendations to determine whether or not to update sections of the guideline.

We decided that full updated literature searches were not needed because the trigger for the review was specifically the AoMRC report.

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.

Information considered in this exceptional surveillance review

A report from the AoMRC on the initial risk stratification and antimicrobial management of patients with sepsis has been reviewed by NICE. This report was produced by the AoMRC in collaboration with the UK Faculty of Intensive Care Medicine, using a multi-professional working group, comprised of 28 individuals, including patient representatives. The membership is provided in the appendix of the report. This report was convened to balance the need to minimise mortality associated with sepsis, and the necessity to conduct appropriate antimicrobial stewardship to minimise the development of drug resistant strains. The report cites a recent narrative review conducted by infectious disease and intensive care specialists assessing the impact of time to antibiotic therapy on clinical outcomes in emergency department patients with suspected bacterial infections. That review concluded that withholding antibiotics until diagnostic results are available (for example, by 4 to 8 hours) appears acceptable in most cases unless the patient is critically ill, for example, with suspected septic shock or bacterial meningitis.

To help stratify risk of deterioration in adults with suspected sepsis the report recommended the use of the UK's National Early Warning System 2 (NEWS2) scale. NEWS2 is a track and trigger early warning score system that is used to identify and respond to patients at risk of acute deterioration. NHS England and NHS Improvement endorse the use of NEWS2, and it is now widely used in acute and ambulance settings. It uses 6 commonly monitored physiological parameters:

- respiratory rate
- oxygen saturation
- temperature
- systolic blood pressure
- pulse rate
- level of consciousness.

A score is allocated to each parameter, with a higher value indicating greater deviation from the norm. Within the report, an individuals' NEWS2 score, alongside clinical assessment, is suggested as the metric by which clinicians stratify patients. A clinical decision support framework was then devised to direct appropriate clinical action.

For individuals with a NEWS2 score of 0, the report recommends:

- If infection is considered possible, review position at least daily.
- If infection is considered probable or definite, commence diagnostic tests within 6 hours.

For individuals with a NEWS2 score of 1 to 4, the report recommends:

- If infection is considered unlikely, review every 24 hours for risk of infection.
- If infection is considered possible, probable or definite, conduct the following within 6 hours:
  - microbiology tests
  - antimicrobials – administer or revise
  - source identification and control plan.

For individuals with a NEWS2 score of 5 to 6, the report recommends:

- If infection is considered unlikely, review every 24 hours for risk of infection.
- If infection is considered possible, probable or definite, conduct:
  - the following within 3 hours:
    - microbiology tests
    - antimicrobials – administer or revise
    - source identification and control plan **and**
  - the following within 48 to 72 hours:
    - review antimicrobials.

For individuals with a NEWS2 score of 7 or more, the report recommends:

- If infection is considered unlikely, review every 24 hours for risk of infection.
- If infection is considered possible, probable or definite, conduct:

- the following within 1 hour:
  - microbiology tests
  - antimicrobials – administer or revise
- the following within 3 hours:
  - source identification and control plan **and**
- the following within 48 to 72 hours:
  - review antimicrobials.

The advice within the report stratifies adults with suspected sepsis into 4 brackets based on their NEWS score; low=0, mild=1 to 4, moderate=5 to 6, high=7 or more; with extra considerations for different infection likelihoods. Relative to the current NICE guideline, this framework would reduce the proportion of people with suspected sepsis for whom parenteral antibiotics are recommended within 1 hour of assessment. The AoMRC report argues that this will allow clinicians time to consider possible non-infective diagnoses and then target antibiotics at those who will benefit from them, thereby improving antimicrobial stewardship.

Summary of clinical decision framework: adapted from the AoMRC report

-	NEWS2 score	NEWS2 score	NEWS2 score	NEWS2 score
Infection unlikely	Standard care	Review 24 hourly for risk of infection tests	Review 24 hourly for risk of infection tests	Review 24 hourly for risk of infection tests

-	NEWS2 score	NEWS2 score	NEWS2 score	NEWS2 score
Infection possible	Review at least daily	Within 6 hours • Source identification and control plan	Within 3 hours • Microbiology tests • Antimicrobials: administer or revise • Source identification and control plan Within 48 to 72 hours • Review antimicrobials	Within 1 hour • Microbiology tests • Antimicrobials: administer or revise Within 3 hours • Source identification and control plan Within 48 to 72 hours • Review antimicrobials

-	NEWS2 score	NEWS2 score	NEWS2 score	NEWS2 score
Infection probable or definite	Within 6 hours • Diagnostic tests and prescription plan	Within 6 hours • Microbiology tests • Antimicrobials: administer or revise • Source identification and control plan	Within 3 hours • Microbiology tests • Antimicrobials: administer or revise • Source identification and control plan Within 48 to 72 hours • Review antimicrobials	Within 1 hour • Microbiology tests • Antimicrobials: administer or revise Within 3 hours • Source identification and control plan Within 48 to 72 hours • Review antimicrobials

The AoMRC report covers children and young people as well as adults, and recommends using the Paediatric Early Warning Score (PEWS) to assess children and young people under 16. However, the authors of the report have advised that PEWS is not accepted across the NHS to the same extent as NEWS2 for adults. For that reason, the scope of this surveillance review is limited to adults.

Information considered when developing the guideline

Current recommendations in the NICE guideline categorise risk of severe illness or death from sepsis in adults into 3 categories of risk criteria (high, moderate to high, and low), based largely on the same physiological parameters that are included in NEWS2 criteria that overlap (recommendations 1.4.2 to 1.4.4). Timing of antibiotic administration is then linked to the number and severity of risk criteria (recommendations 1.6.1, 1.6.10 and 1.6.14).

The NICE guideline does not recommend the use of a specific risk tool as there was

insufficient evidence to say any 1 tool was superior to any other.

The evidence underlying the signs and symptoms in the risk stratification tool was very low quality and was not appropriate for meta-analysis. As such the guideline development group could not rely on an evidence review to make recommendations, but used the evidence as supporting information to help the guideline committee to develop consensus risk criteria. It was recognised during development that the decision rules for using signs and symptoms as predictive of sepsis is crucial as this will determine the number of people who, for example, are referred from primary care to hospital or who may be given antibiotics. If the categories recommended for very urgent intervention are too broad, then there may be false positives and individuals may be over medicated, and antimicrobials over used. If these categories are too narrow then there may be false negatives and there may be increased mortality of individuals with sepsis.

At the time of guideline development (2016) very low-quality evidence from observational trials in adults showed a reduction in all-cause mortality when antibiotics were administered within up to 3 hours. The evidence available did not show any reduction in mortality for antibiotics within 1 hour versus 3 hours, though the populations in the timing groups were different. Therefore, the guideline development group recommended that a 1-hour time window for those at highest risk would ensure that those people with highest risk would benefit, but that a 3-hour window was sufficient for those at moderate to high risk without organ dysfunction.

Since the guideline published, NHS England has promoted use of NEWS2, and in acute settings, all except for a small minority have embedded NEWS2 in practice.

Other relevant NICE guidance

The NICE guideline on acutely ill adults in hospital contains recommendations on the use of track and trigger systems to identify at risk patients, including stating what physiological parameters these systems should measure.

The 2020 surveillance review of the NICE guideline on acutely ill adults in hospital looked at the question of which track and trigger/early warning systems were best. It was also raised by stakeholders that the guideline should be updated to indicate support for the NEWS2 tool. The evidence review did not find sufficient evidence to suggest that NEWS2 has superior performance compared with other available tools, and as such, the current wording of recommendation 1.4, stating that NEWS2 has been endorsed by NHS England

is sufficient to provide a consistent message for professionals.

If evidence being assessed is found to favour NEWS2 over other track and trigger systems then the NICE guideline on acutely ill adults in hospital should also be updated.

Statement 2 in NICE's quality standard on sepsis says that people with suspected sepsis in acute hospital settings and at least 1 of the criteria indicating high risk of severe illness or death have an immediate review by a senior clinical decision maker and antibiotics given within 1 hour if indicated.

If any changes are made to the timings of when to administer antibiotics to individuals at high risk, then the NICE quality standard will need to be updated.

Equalities

No equalities issues were identified during the surveillance process.

Overall decision

Following the report of the AoMRC on initial antimicrobial management of patients with sepsis, we will update the NICE guideline on sepsis.

During guideline development there was only low-quality evidence available on the criteria which should be included when looking for signs and symptoms of sepsis. As a result, the current NICE guidance has broad categories, to ensure that false negatives are minimised and that individuals with sepsis receive appropriate timely care. There is a risk with broad categories, that there are too many false positives, and that as a result people receive medication they did not need. Additionally, broad risk categories may mean broad spectrum antibiotics are given early and subsequently changed as more details on the infection emerge. As a key treatment for sepsis is antibiotics, it is important that the guideline recommendations promote good antimicrobial stewardship.

The report from the AoMRC suggests using the NEWS2 system to categorise people into risk brackets for sepsis. The physiological parameters used in NEWS2 are already recommended by NICE as part of an initial assessment when people present with suspected sepsis (recommendation 1.1.8). The report suggests 4 risk brackets, with different timings for antimicrobial prescribing and review for each.

During guideline development, there was inconclusive evidence about whether or not fast (within 1 hour versus within 3 hours) administration of antibiotics is beneficial, however, in light of the risk of mortality from sepsis, this was recommended for all individuals who met any of the high-risk criteria. If longer times between risk stratification and antibiotic administration were found to be safe, antibiotics could be targeted according to the results of microbiological testing, which would support good antimicrobial stewardship.

The evidence surrounding risk stratification brackets, and timing of antimicrobial delivery should be assessed to ensure that NICE recommendations are up to date.

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