

Evaluation of updated NG51 guidelines on early recognition and sepsis outcomes in elderly patients

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Abstract

On 31 January 2024, NICE updated NG51, following recommendations from the Academy of Medical Royal Colleges in 2022. After years of stalling progress for sepsis outcomes, particularly in the elderly population, this guideline update seeks to address sepsis mortality rates by introducing new recommendations surrounding early administration of antibiotics, and, most significantly, encouraging universal use of NEWS2 to identify deterioration, aiding identification of patients with early sepsis. This review critically examines the evidence and arguments regarding the impacts of the updated NG51 guidelines on future sepsis identification, diagnosis and outcomes. Drawing on personal observations of sepsis management in the emergency department, this review also includes original recommendations for potential future updates to the NG51 guidelines.

Abbreviations

ADL – Activities of Daily Living Score
 AoMRC – Academy of Medical Royal Colleges
 BP – blood pressure
 CFS – Clinical Frailty Score
 COPD – chronic obstructive pulmonary disease
 CRP – C-reactive protein
 DNR – do not resuscitate
 HR – heart rate
 NEWS2 – National Early Warning Score²
 NG51 – NICE Guideline 51

NICE – National Institute for Health and Care Excellence

ReSPECT – Recommended Summary Plan for Emergency Care and Treatment

RR – respiratory rate

SaO₂ – peripheral capillary oxygen saturation

SIRS – systemic inflammatory response syndrome

Introduction

Sepsis is defined as life-threatening organ dysfunction due to an unregulated host response to infection. The Lancet Journal of Respiratory Medicine reported 245,000 sepsis cases annually in England, with a 20.3% mortality rate, responsible for more deaths than leukaemia, breast, bowel and prostate cancer combined.^{1,2} In 2016, the National Institute for Health and Care Excellence published NICE Guidelines 51 (NG51), a protocol for recognition, early diagnosis and management of sepsis. On 31 January 2024, NICE updated NG51, following recommendations from the Academy of Medical Royal Colleges in 2022. Specifically, the elderly population typically suffer the least favourable sepsis outcomes, with mortality in 75- to 79-year-olds in England increasing by 351 annual deaths from 2015 to 2022.^{3,4} Therefore, this update aims to address the challenges surrounding diagnosis and sepsis treatment, given early intervention has proven to significantly mitigate mortality.

This academic review aims to critically evaluate the updated NG51 guidelines on early recognition and sepsis outcomes in elderly patients, analysing the impact in this vulnerable patient demographic. The 2024 NG51 update holds positive implications

for sepsis outcomes, however, some limitations remain unresolved since its original publication in 2016. Given limited progress to improve outcomes in recent years, this review will propose original recommendations for research and updates for future guideline amendments.

Methodology

The purpose of this methodology section is to detail the approach used to ensure the reliability and validity of the findings regarding the NG51 guidelines presented in this review. The research was conducted across several databases, including PubMed, Google Scholar and articles published by the UK Sepsis Trust, Academy of Medical Royal Colleges and NHS England. To ensure research bias was minimised, relevant keywords were developed related to the themes of this review and were consistently used, including ‘elderly sepsis’, ‘NICE guidelines’, ‘detecting sepsis’ and ‘sepsis outcomes’. Titles and abstracts were screened first, prior to review of the full text. Moreover, a combination of research articles, reports, news articles and quotes were used to provide further context on current perspectives and challenges in sepsis management from leading experts.

Studies that did not directly address the research question regarding sepsis detection and outcomes in the elderly patient demographic (adults aged 65 years or older) were excluded from this review. Furthermore, whilst international studies were included in this review, providing particularly valuable insights for future iterations to NICE guidelines, UK-based studies on sepsis management and outcomes were prioritised due to the intention to focus specifically on the implementation and impact of NICE guidelines within the UK healthcare context.

Limitations of this review include the limitations of the included studies and the potential for publication bias, as studies with inconclusive results may be underrepresented in the literature included.

Positive implications of NG51 updates

The 2024 NG51 update amends important considerations involving recognising sepsis early. Firstly, whilst sepsis is typically suspected in individuals recording a temperature >39°C or <36°C, some people with sepsis will record normal body temperature, previously including patients who are elderly, infants, have cancer and severe sepsis. The 2024 update includes patients with spinal cord injuries, thus increasing vigilance for potential hidden cases of sepsis.

NG51 includes further details informing early antibiotic treatment. Evidence highlights prescribing antibiotics within the first hour of suspecting sepsis is crucial for successful recovery. From 2024, ambulance staff should administer antibiotics if the hospital transfer time exceeds one hour and if the patient meets any high-risk criteria, minimising delayed treatment. Outlined are the high-risk criteria for patients aged >12 years: new altered mental state, respiratory rate >25bpm, requiring >40% oxygen delivery to maintain SaO₂>92% (SaO₂>88% in COPD), systolic BP <90mmHg (alternatively >40mmHg below their normal systolic pressure), heart rate >130bpm, no urine output in previous 18 hours, cyanosis, mottled/ashen skin.

Prior to the 2024 update, research at James Paget University Hospital discovered the significance of early antibiotic administration. The trust increased the number of patients receiving antibiotics within one hour of suspecting sepsis from 63% to 87%. Subsequently, sepsis mortality decreased by 2.4% and admission length decreased by 3.3 days.⁵ Thus, promoting early antibiotic treatment in the updated NG51 guidelines aims to reduce mortality rates and hospitalisation, enhancing patient reintegration into society and improving outcomes.

The most significant update is introducing the National Early Warning Score (NEWS2) for use in hospital, mental health and ambulance

settings. Early warning scores assess patient deterioration, monitoring: temperature, heart rate, respiratory rate, oxygen saturation, blood pressure and consciousness level.⁶

A normal parameter scores 0, whilst the maximum score of 3 for a single parameter indicates increased risk of organ dysfunction.⁷ NEWS2 facilitates regular vital sign monitoring, providing a visible trajectory of deterioration. Following recommendations by the Academy of Medical Royal Colleges in 2022, proposing “NEWS2 should be used to supplement clinical judgement to identify adult patients with suspected sepsis”, using NEWS2 allows stratification of patients into risk categories, shown in **Table 1**.

Table 1. Data adapted from the Academy of Medical Royal Colleges (AoMRC) ‘Statement on the initial antimicrobial treatment of sepsis: synthesis and recommendations’.⁸

Risk Category	Time of Sepsis Six Treatment Activation
High	Within one hour of suspecting sepsis
Moderate	Deferred for up to 3 hours to gather more specific diagnosis
Low	Deferred for up to 6 hours to gather more specific diagnosis

This intervention supports clinical decision-making by providing additional time for information gathering for a more precise diagnosis. This simultaneously benefits clinicians with clear frameworks to plan the most appropriate treatment pathway, and enhances patient outcomes by promoting antimicrobial stewardship, limiting excessive antibiotics, thus reducing antibiotic resistance.

Currently, 100% of ambulance trusts use NEWS2 for initial assessment, contrasting 76% of acute trusts using NEWS2 in England, with remaining trusts opting for alternative early warning scores.⁹ Mandating NEWS2 use in NG51 targets universal application, aiming to reduce current confusion caused by nationwide variations in early warning scores, thus minimising compromising patient safety. NHS England argue national standardisation of NEWS2 in acute hospitals could prevent 1800 deaths annually, further stressing the significance of standardising NEWS2, proposed in NG51.¹⁰

Limitations of updates

Despite NG51 addressing some concerns, sepsis remains challenging to detect and treat accordingly, with new guidance still leaving ambiguity for healthcare professionals. NG51 urges clinicians to consider every sepsis diagnosis unique and to recognise nuances in history-taking, negatively encouraging hyper-vigilance. Nuances in history-taking are seen as common early sepsis markers, including heart rate, blood pressure, oxygen saturation, altered mental state and body temperature, could all remain normal despite underlying sepsis present, causing potential for more confusion than coherence for clinicians. Therefore, the headline “UK Sepsis Trust welcomes NICE sepsis guideline updates which herald end of confusing period for health professionals” arguably inflates the impact of NG51.¹¹

Furthermore, a lack of guidance for sepsis over-diagnosis limits the value of NG51. Dr Paul Morgan, Sepsis Lead at Cardiff and Vale University Health Board, proposed, “Could this pressure to improve sepsis management be counterproductive and lead to over-diagnosis of sepsis?”, suggesting hyper-vigilance, fuelled by new guidance, can generate over-diagnosis in non-septic patients.¹² The published NG51 ‘Recommendations for research’ suggests: “The consequences of getting the decision-making wrong can be catastrophic and therefore many patients are potentially over-investigated and admitted inappropriately,” further implying the consequence of over-diagnosis from NG51.²⁶

A further limitation arises from the subjectivity in interpreting clinical guidelines, especially regarding antibiotic prescription. Given concerns regarding antibiotic resistance, this can create challenges in sepsis management. Specifically, the need for careful evaluation before initiating antibiotics introduces the potential for discrepancies amongst clinicians in determining appropriate treatment regimens based off differing interpretations of clinical guidelines and patient markers.¹³ These disagreements can lead to delayed antibiotic administration, a critical factor in sepsis survival, and, subsequently, may contribute to workplace conflict.

Whilst over-diagnosis is favoured over risking consequences of misdiagnosis, treating patients without sepsis with Sepsis Six results in unnecessary invasive procedures and antibiotic misuse, contributing towards antibiotic resistance. Given antibiotics are the most effective sepsis treatment, inappropriate use risks affecting effectiveness of future treatments, worsening sepsis mortality.¹⁴

Regarding NG51 recommendations, a recent Netherlands-based trial suggested limited evidence behind the effectiveness of pre-hospital antibiotics. Despite administering antibiotic treatment (median 26 minutes) prior to hospital arrival, the study found no signs of prognosis improvement, questioning NG51 recommendations.¹⁵

Challenges in elderly patients

Recognising and managing sepsis is challenging for clinicians; this task becomes increasingly complicated involving elderly patients, dominating sepsis prevalence, given the mean sepsis patient age in 2021–22 being 71 years old. Additionally, elderly patient outcomes are significantly worse, with 77% of sepsis-related deaths in England in people aged 75 years or older, therefore NG51 should aim to improve these outcomes given years of stalling progress.¹⁶

Complex histories often seen in elderly patients complicates early sepsis detection. Upon initial assessment, elderly patients with sepsis often present with non-specific symptoms, including confusion, immobility and incontinence, easily discouraging clinicians from diagnosing sepsis. Alternatively, many elderly patients suffer comorbidities and exacerbation can cause organ dysfunction, mirroring sepsis, misleading clinicians into a false sepsis diagnosis; this bears potentially fatal consequences. Moreover, some comorbidities can cause an individual's blood variables to deviate outside the 'normal range,' potentially leading clinicians to over-diagnose sepsis due to misinterpreting these variables, which may be normal for the patient's comorbidity. Thus, NG51 should further emphasise the importance of considering the individual's medical history to reduce over-diagnosis.¹⁷ Subsequently, patients receive inappropriate or delayed treatments for sepsis, elevating mortality rates.

Furthermore, ethical considerations should be appropriately discussed when treating elderly patients with sepsis. Treatments must respect patient autonomy and dignity, and clinicians must consider legal and ethical frameworks to guide treatment accordingly. Many elderly patients clarify their 'ceilings of treatment,' commonly including DNR and ReSPECT; these can impose significant limitations on sepsis treatment, which involves invasive interventions, notably lumbar punctures and administering intravenous antibiotics and fluids. These treatments must be evaluated alongside the individual's best interests, given many older patients argue quality of life supersedes intensive treatments that potentially lengthen life.¹⁸

Moreover, whilst evidence regarding over-treating sepsis is limited, a 2020 study assessing elderly cancer patients highlighted "vulnerable older patients treated with intensive therapy may actually have higher all-cause mortality as a result of treatment toxicity", indicating the complications treating sepsis in elderly patients, as urgent clinical decisions require an understanding of complex physiology, twinned with patient beliefs and ethical considerations.¹⁹

Considerations for future updates

Whilst NEWS2 should be encouraged to aid identifying suspected sepsis, the increasing emphasis fuelled by NG51 poses a serious risk of NEWS2 over-reliance, highlighted by the Health and Safety Investigation Branch: "NEWS2 is not intended to be a stand-alone tool."²⁰

Patient age is a common leading determinant for treatment, however, future NG51 amendments should encourage using patient scoring systems, promoting holistic decision-making. The Clinical Frailty Score (CFS) could partner alongside NEWS2; a 2022 study discovered those classified as 'frail' (CFS 5-9) had a 10% increased sepsis mortality risk than 'non-frail' patients (CFS 1-4).²¹ During the COVID-19 pandemic, CFS was endorsed by NICE to identify at-risk patients, discovering for every one-point score increase, mortality rose by 12%.^{22,23} CFS has only been validated in patients over the age of 65 years, but the Clinical Frailty Score offers a practical advantage in emergency settings: its rapid assessment by healthcare staff, combined with evidence from a 2023 study suggesting it is both relevant and easy to use, provides clinicians with additional support for informed clinical decision-making in sepsis.²⁴

Furthermore, the Katz Index of Independence in Activities of Daily Living can be utilised to aid sepsis prognosis and outcomes in hospitalised patients. The score assesses six Activities of Daily Living (ADL): bathing, dressing, toilet use, transferring, continence and eating. A 2023 study found approximately 79% of elderly patients with sepsis developed brain volume reduction, with a strong positive correlation to poor ADL function. Reduced ADL function significantly increases the risk of post-intensive care syndrome, decreasing the likelihood of successful reintegration into society for elderly patients.²⁵ Implementing the Katz Index to assess an individual's functional ability will assist clinicians in planning appropriate re-integrative care for elderly patients with sepsis. This highlights the importance of encouraging the use of alternative scoring systems in future NG51 updates, supporting sepsis diagnosis and improving post-sepsis outcomes.

The original 2016 NG51 guidelines recommended research into developing "a set of clinical decision rules or a predictive tool to rule out sepsis". Using NEWS2 initially, followed by a blood test confirming systemic infection, is essential for clarifying a sepsis diagnosis.²⁶ However, since obtaining blood test results typically takes hours, individuals are prescribed antibiotics prior to receiving a confirmed diagnosis. Elevated biomarkers, including white blood cell count (indicating active immune response), C-reactive protein (suggesting inflammation), and lactate (produced in hypoxic conditions, such as infection) are key indicators of sepsis in a blood test.²⁷ Bedside biomarker tests could therefore enhance early sepsis detection and limit over-diagnosis. Currently, tests are available, such as Actim CRP, a skin-prick blood test which records CRP levels within 5 minutes, contrasting hours awaiting blood test results.²⁸ Experts from a 2024 study analysing various biomarkers for sepsis diagnosis recommended "The combination of biomarkers allows for a more holistic assessment of the pathophysiology of sepsis, leading to a more accurate diagnosis and monitoring of the disease", thus enabling clinicians to "customise treatment plans based on the individual patient's response to therapy and disease progression".²⁹ Future research should therefore investigate the association between bedside biomarker monitoring in suspected sepsis cases and the risk of severe illness or death.

Current NICE guidance states NEWS2 use is not mandatory in primary care. In secondary care settings, NEWS2 has a clear 'tracking' value, as patients are monitored at regular time intervals. This poses a significant challenge in primary care due to impracticalities surrounding regular patient monitoring. Despite this, there is an argument to encourage NEWS2 use in primary care, supported by recent recommendations by the Royal College of General Practitioners "for GPs to use NEWS2 scores as part of their clinical

assessment of acutely deteriorating patients”.³⁰ A 2021 study found in a sample of 206 GPs, overwhelmingly 98.1% concluded ‘gut feeling’ was their most used diagnostic method for suspecting sepsis. Only 1.5% of participants used the UK Sepsis Trust criteria as their main method for identifying sepsis.³¹

Given a considerable proportion of primary care consultations involve elderly patients who may present with infection, using NEWS2 and other scoring systems for clinical decision-making, rather than reliance on ‘gut feeling’, could prompt earlier identification of sepsis in community settings, thus improving outcomes. Dr Ron Daniels, CEO of UK Sepsis Trust, argued involving GPs in sepsis detection “is increasingly relevant as transit times increases and could be potentially transformational in terms of patient outcomes”.³² Thus, investigating a correlation between NEWS2 use in primary care for infectious patients and sepsis incidence in the community is important for future research in identifying sepsis, particularly involving hidden cases amongst elderly patients.

Detecting early signs of sepsis in care homes could be enhanced by proposing NEWS2 use to track deterioration. Andy Platt, Project Manager at Kent Community Health NHS Foundation Trust, argued care home residents “aren’t monitored very closely and usually only receive care once the care home staff notice that the patient’s health has visibly deteriorated”, yet introduction of the NEWS2 scoring system could aid premature detection and treatment for resident deterioration, preventing severe complications of sepsis.³³ Implementing NEWS2 use in care homes has proven popular, supporting care staff to make decisions regarding escalating health concerns in addition to improving clearer communication between care and healthcare staff.³⁴ Therefore, updating NG51 to encourage GP and care staff to use NEWS2 for elderly patients presenting with infection could minimise current misdiagnosis, thus being hugely impactful.

Conclusion and reflections

In conclusion, the 2024 NG51 update aims to advance sepsis outcomes in England by addressing key improvements in identifying and treating suspected sepsis cases. Recognising sepsis is a subjective challenge for clinicians daily, and by standardising NEWS2 use to detect patient deterioration and early sepsis, healthcare staff will be capable of administering antibiotic treatment promptly. Moreover, NG51 is coherent and thorough, with important clinical decision-making supported by the outlined NEWS2 risk categories.

Upon reflection, diagnosing sepsis in elderly patients will remain challenging for the foreseeable future, and whilst NG51 will continue supporting clinicians with new tools, such as NEWS2, this alone is unlikely to transform sepsis management. Ultimately, whilst future iterations of NG51 have potential to enhance primary care guidance by targeting the clinical characteristics of the elderly patient cohort specifically with additional diagnostic support, its application in emergency settings reinforces the synergy between clear guidelines and informed clinical decision-making to improve sepsis outcomes in elderly patients.

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