The role of sepsis screening, SIRS and qSOFA in head and neck infections: An audit of 104 patients

Zain Sheikh1,2 | E Tian Tan1 | Sunday Ifedayo3 | Muhammed Shahed Quraishi1

1Department of Otolaryngology, Head and Neck Surgery, Doncaster Royal Infirmary, Doncaster, UK
2University of Sheffield, Sheffield, UK
3Primary Care, West End Lane Clinic, Doncaster Royal Infirmary, Doncaster, UK

Correspondence
Zain Sheikh, Department of Otolaryngology, Head and Neck Surgery, Doncaster Royal Infirmary, Thorne Rd, Doncaster DN2 5LT, UK.
Email: zain.sheikh@nhs.net

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1 | BACKGROUND

Head and neck infections (HNIs) contribute significantly to inpatient admissions for both Ear, Nose and Throat (ENT) and Oral and Maxillofacial Surgery (OMFS) specialities. These infections can be broadly categorised into the following:

- Oral Cavity including salivary and Odontogenic
- Oropharyngeal
- Deep neck space
- Skin and Soft tissue
- Sinogenic
- Otological
- Iatrogenic/traumatic
- Other

The rate of admissions with infections of the head and neck is rising.1 Whilst the nature of complications can vary hugely depending on the primary source of infection, they all carry significant morbidity and mortality if not treated early.2

One such complication is sepsis, defined as ‘a life-threatening organ dysfunction caused by a dysregulated host response to infection’.3 It is associated with mortality rates up to 8.6%.4 In 2016, a task force re-examined the definitions and criteria of sepsis and the result was the Third International Consensus Definition5 where it was proposed that sepsis is a result of dysregulation to normal physiology rather than an inflammatory condition. As a result, instead of using Systemic Inflammatory Response Syndrome (SIRS) Criteria3 to diagnose sepsis, the Sequential Organ Dysfunction Score (SOFA) was proposed as the most suitable modality in diagnosing sepsis (Table 1).

However, for frontline clinicians, the SOFA score was not useful as a quick bedside screening tool to identify sepsis due to the inclusion of laboratory markers which may take time. Thus, the taskforce proposed quick SOFA (qSOFA) that only includes 3 easily obtainable bedside parameters (Figure 1) for quick identification of sepsis.5

In the context of ENT/OMFS, the available literature was generally limited to reporting sepsis as one of many life-threatening sequelae,6 but exact figures on incidence, prevalence, mortality and disease burden remain undetermined. Thus, we set out to conduct an audit to investigate sepsis among HNIs in an acute otolaryngology setting with the following aims:

- To determine the compliance with sepsis screening among inpatient admissions with head and neck infections in a district general hospital
- To assess the demographics of inpatient admissions and nature of infections
- To compare differences in rate of diagnosing sepsis when using SIRS criteria versus qSOFA criteria
2 | METHODS

2.1 | Ethical considerations

The study was undertaken as an audit with approval from the Doncaster Royal Infirmary Department of Audit and Clinical Governance. The original standard used was: World Health Organisation document A70/13, ‘Improving the Prevention, Diagnosis and Clinical Management of ‘Sepsis’.

An additional standard was also included: NICE guidance NG51 1.1.1. Think ‘could this be sepsis?’ if a patient presents with signs or symptoms that indicate a possible infection. It follows the SQUIRE guidelines.

An audit was undertaken on all adult patients admitted to the ENT ward in a district general hospital with a HNI over two time periods, August 2018 and April 2019. Data were collected by retrospective analysis of inpatient notes, specifically the clerking documentation of the admitting doctor. In the first cycle, data on the following parameters were assessed:

- Diagnosis
- Length of stay (using date of admission and discharge recorded electronically)
- Documentation on whether sepsis screening was performed regardless of criteria (specifically a documentation of ‘septic’ or ‘not septic’ anywhere on the clerking notes)
- If patient met sepsis criteria using qSOFA assessment (using observations recorded at time of admission to the ENT ward)

Following completion of the first cycle, interventions in the form of staff education and posters were implemented. The second cycle was conducted one month following implementation of the interventions and in addition to the parameters from the first cycle, we assessed if patients met sepsis criteria according to SIRS.

3 | RESULTS

A total of 104 patients were admitted with HNI over the 2 audit cycles.

In the first cycle, there were 44 admissions and the mean length of stay were 2.7 days (range 1 – 9 days). The most common diagnosis was tonsillitis (n = 18, 40.9%) followed by peritonsillar cellulitis (n = 7, 15.9%). Rarer diagnosis included digastric abscess (n = 1). None of the patients underwent sepsis screening; however, no patients met the qSOFA criteria for sepsis either when screened retrospectively.

In the second cycle, there were 60 admissions with HNIs with a mean length of stay of 2 days (range 0–13 days). The most common diagnosis was again tonsillitis (n = 18, 30%) followed by peritonsillar abscess/quinsy (n = 13, 21.6%). Following the interventions, sepsis screening rate improved to 46% (n = 28). One patient met the qSOFA criteria for sepsis and this was picked up on screening; however, 29 patients (48.3%) were septic according to the SIRS criteria. The patient who had met the criteria for sepsis had a diagnosis of supraglottitis with neck cellulitis. Whist the patient was treated with intravenous fluids and antibiotics, there was no evidence of the ‘sepsis six’ being undertaken. Post-tonsillectomy bleeds were included as HNIs, as these patients presented more than 24 hours post-op with raised inflammatory markers and other features suggesting bleeds secondary to infection (Table 2, Figure 2).

| SIRS Criteria (2 required of the following) | SOFA Criteria (each parameter given a score of 0–5) |
|--------------------------------------------|-----------------------------------------------|
| Temperature >38 or <36 degrees Celsius     | PaO2 (including requiring respiratory support) |
| Heart Rate >90 beats per minute           | Platelets                                     |
| Respiratory Rate or PaCO2 >20 breaths per minute or <32 mmHg/4.3 KPa | Mean Arterial Pressure (including vasopressor/inotropic support) |
| White Blood Cell Count >12 /cm³ or <4/cm³ | Bilirubin                                     |
|                                             | GCS                                           |
|                                             | Creatinine or urine output                     |

Key points
- Sepsis is associated with high morbidity and mortality and is a known complication of infections of the head and neck. Screening for sepsis should be conducted on admission in order to identify patients at risk and provide early intervention.
- Compliance with sepsis screening was poor on an ENT ward in a district general hospital; however, this can be improved further by education and visual reminders such as poster or a clerking proforma.
- The most common head and neck infections admitted to a district general hospital were tonsillitis, peritonsillar cellulitis and peritonsillar abscesses.
- The incidence of sepsis as a complication of head and neck infections is very rare if using the qSOFA criteria.
- Using SIRS criteria may result in over-identification of sepsis and may lead to excessive and inappropriate clinical management in patients who could otherwise be managed less aggressively.
4 | DISCUSSION

4.1 | Synopsis of key/new findings

HNIs result in a variety of complications contingent on the source resulting in significant morbidity and mortality if not managed adequately. Sepsis can confound this effect. The first step in this process is by recognising sepsis through screening. We found that screening was generally poorly undertaken; however, this could be improved with appropriate education and visual reminders.

We also found that tonsillitis, peritonsillar cellulitis and peritonsillar abscesses form a significant proportion of inpatient admissions (60% or more); however, the rate of sepsis is quite low. In fact, only 1 out of 104 patients was septic if using the qSOFA criteria.

Clinically, qSOFA criteria are more appropriate in diagnosing sepsis in lieu of SIRS among HNIs. Almost half (48.3%) of patients in the second cycle fit the SIRS criteria compared to 1.7% (n = 1) when using the qSOFA criteria. This could result in unnecessary and over-aggressive measures to manage these patients.

4.2 | Strengths of the study

There is currently limited literature on the outcomes, morbidity and mortality specific to head and infections. To our knowledge, our study is the first one comparing the clinical applicability of qSOFA versus SIRS in HNIs. We have also shown that though serious and a definite complication to look out for, sepsis is a rare occurrence among this cohort of patients. Tonsillitis and peritonsillar abscesses still represent a significant proportion of admissions among district general hospital and these are usually younger patients with less co-morbidities.

We also highlighted that despite ‘sepsis’ being a topic of significant national interest and the emphasis on trusts to recognise and treat it early, it is still poorly documented in a clinical setting. Although inadequate knowledge/awareness about sepsis is a possible reason, the more likely explanation would be suboptimal documentation on the clinician’s part. Education and visual awareness such as posters do improve compliance; however, regular audits are needed to monitor this for continuous improvement and maintenance of the standard.

4.3 | Comparison with other studies

There has been widespread debate about the sensitivity and specificity of SIRS and qSOFA in recognising sepsis since the new criteria have been introduced. qSOFA was thought to be more specific while SIRS was more sensitive. It has also been reported that SIRS was more accurate in predicting an established infection. Comparison with National Early Warning Score (NEWS/NEWS2) has also been reported with the study demonstrating that NEWS was equally good in predicting unwell patients compared to either SIRS or qSOFA and may be more relevant as it is already widely adopted among UK hospitals. These studies were often conducted in an emergency department or acute medical setting; however, there is no literature currently specific to HNIs.

4.4 | Clinical applicability of the study

The standard response to sepsis would be implementation of Sepsis 6, a time-critical intervention consisting of:

- The administration of oxygen
- Intravenous fluid
- Antibiotics
- Obtaining blood cultures

T A B L E  2  Results of Admissions to Otolaryngology assessing admissions, diagnosis, length of stay and sepsis screening

|                        | First cycle (August) | Re-audit (April) |
|------------------------|----------------------|------------------|
| Admissions             | 44                   | 60               |
| Most common diagnosis  | Tonsillitis (18)     | Tonsillitis (18) |
|                        | Peritonsillar cellulitis/quinsy (18) |
| Length of admission    | 2.7 (1-9)            | 2 (0-13)         |
| Sepsis screening       | 0 (0%)               | 28 (46%)         |
FIGURE 2   Frequency of Diagnoses of Cycle 1 and 2

Cycle 1
- Acute otitis Media
- Epiglottitis & Supraglottitis
- Peritonsillar cellulitis
- Neck Lump
- Pinna Cellulitis & Perichondritis
- Post parotidectomy infection
- TB lymphadenitis
- Digastric Abscess
- Otitis Externa
- Quinsy
- Orbital abscess
- Post mastoidectomy infection
- Post tonsillectomy bleed
- Tonsillitis

Cycle 2
- Acute otitis media
- Dental Abscess
- Tonsillitis
- Parotitis
- Quinsy
- Pharyngitis
- Submandibular Sialadenitis & abscess
- Angio oedema
- Epiglottitis & Supraglottitis
- Otitis externa including necrotic
- Peritonsillar Cellulitis
- Viral ulcer
- Post tonsillectomy bleed
- Lactate measurement
- Accurate measurements of urine output

As shown in our audit, using SIRS as screening criteria would result in almost half of our patients needing these potentially invasive and unnecessary interventions in a cohort who tends to be younger, less frail with fewer co-morbidities and a greater physiological reserve. Thus, qSOFA is clinically more relevant as a screening tool for HNIs and can reduce overly aggressive management in these patients. We recognise that lactate can be obtained as a venous sample and urine output can be measured without catheterisation; however, this would still incur additional costs and time and may not affect patients’ outcomes.

5 | CONCLUSION

Head and neck infections are common and form a significant proportion of inpatients in ENT wards. Although sepsis as a complication is relatively rare, sepsis screening is a first step in recognizing vulnerable patients and this should be clearly documented. Compliance with sepsis screening can be improved with education and visual reminders such as posters or clerking proformas. qSOFA is more clinically appropriate as a screening tool in this population, as SIRS can result in falsely high rates of sepsis and hence potentially unnecessary treatments for patients.

CONFLICT OF INTEREST

None held.

DATA AVAILABILITY STATEMENT

Data available on request.

ORCID

Zain Sheikh https://orcid.org/0000-0002-4877-6284
E Tian Tan https://orcid.org/0000-0003-4129-8598

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