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.
- Our audit on an ENT ward in a district general hospital found that sepsis screening is poor, 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 diagnosed according to the updated qSOFA criteria.
- Using SIRS criteria may result in falsely high rates of diagnosis of sepsis and may lead to excessive and inappropriate clinical management in patients who could otherwise be managed less aggressively.

Background

Head and neck infections contribute significantly to inpatient admissions for both Ear, Nose and Throat (ENT) and Oral and Maxillofacial Surgery (OMFS) specialties. 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[2,3].
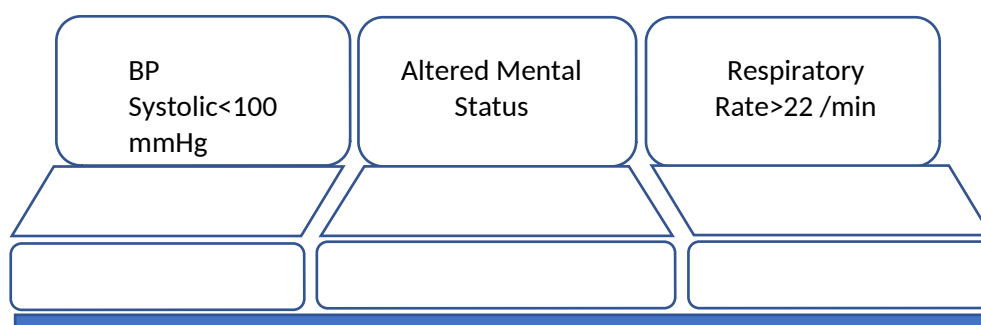
One such complication is sepsis, defined as 'a life-threatening organ dysfunction caused by a dysregulated host response to infection'[4] . It is associated with mortality rates up to 8.6%[5]. In 2016, a task force re-examined the definitions and criteria of sepsis and the result was the *Third International Consensus Definition[4]* 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) Criteria[4]* to diagnose sepsis, the *Sequential Organ Dysfunction Score (SOFA)* was proposed as the most suitable modality in diagnosing sepsis (Table 1).

Table 1: Comparison of Systemic Inflammatory Response Syndrome (SIRS) and Sequential Organ Dysfunction Score (SOFA)

SIRS	SOFA
Criteria (2 required of the following)	*Criteria (each parameter given a score of 0 – 5)*
Temperature >38 or <36 degrees Celcius	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/ionotropic support)
White Blood Cell Count >12 /cm^3 or <4/cm^3	Bilirubin
	GCS
	Creatinine or urine output

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, *quick* SOFA (qSOFA) was proposed that only includes 3 easily obtainable bedside parameters (figure 1) for quick identification of unwell patients.

Figure 1: qSOFA Criteria

In the context of ENT/OMFS, the available literature was generally limited to reporting sepsis as one of many life-threatening sequalae[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 head and neck infections in an acute otolaryngology setting with the following aims:

- To determine the rate of 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

Methods

Ethical considerations

The study was undertaken as an audit with approval from the *Doncaster Royal Infirmary Department of Audit and Clinical Governance.*

The standard used was from the World Health Organisation document A70/13, 'Improving the Prevention, Diagnosis and Clinical Management of Sepsis'[7]:

'23(d) To prioritize actions that increase awareness of the clinical manifestations of sepsis among

the public and community health care practitioners, to facilitate efforts related to the quality of care

aimed at improving early diagnosis and appropriate clinical management'.

It follows the SQUIRE guidelines for reporting quality improvement studies.

A retrospective audit was carried out on all adult patients admitted to the ENT ward in a district general hospital with a head and neck infection over two distinct time periods, August 2018 and April 2019. Data was collected by retrospective analysis of inpatient notes, specifically the clerking documentation of the admitting ENT 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 sepsis screening
- If patient met sepsis criteria using qSOFA assessment (using observations recorded at time of admission)

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 also assessed if patients met sepsis criteria according to SIRS.

Descriptive statistics were undertaken however inferential statistics were not.

Results

There was a total of 104 patients admitted with head and neck infections over the 2 audit cycles.
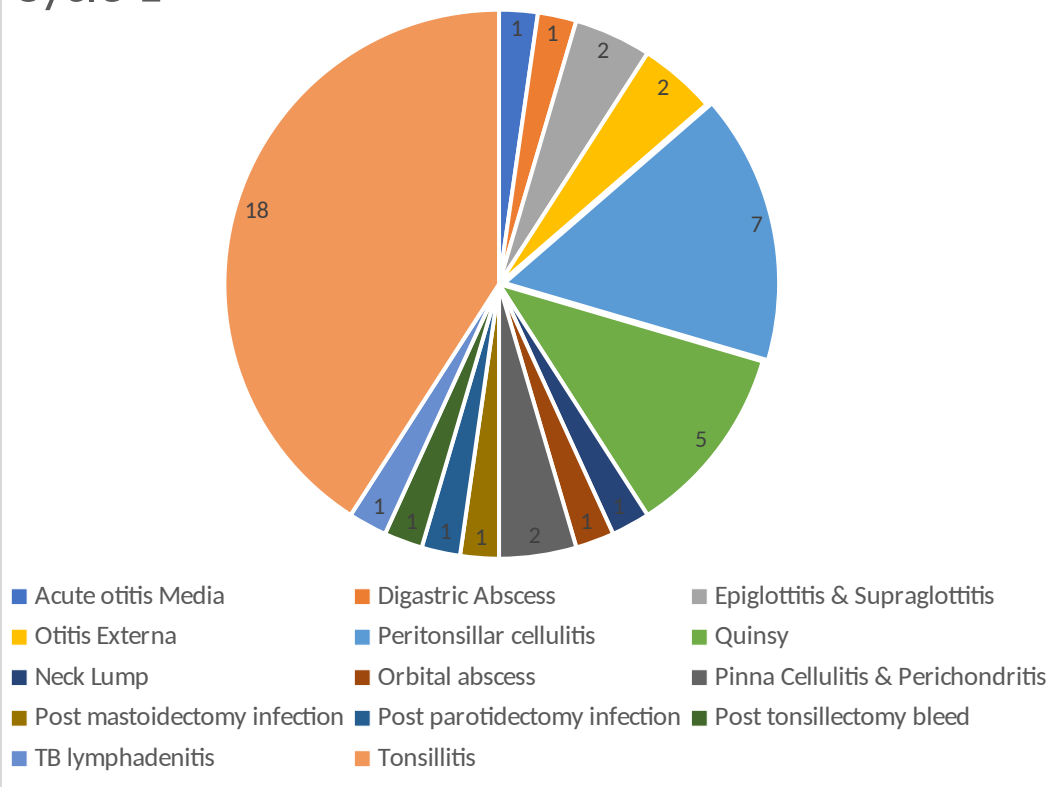
In the first cycle, there were 44 admissions and the mean length of stay were 2.7 days (range from 1 – 9 days). The most common diagnosis was tonsillitis (n = 18, 40.9%) followed by peritonsillar cellulitis (n = 7, 15.9%). Rarer diagnosis included digastric abscess (n = 1). None of the patients underwent sepsis screening, however no patients met the qSOFA criteria for sepsis either when screened retrospectively.

In the second cycle, there was a total of 60 admissions with head and neck infections 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). 1 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.

Table 1: 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 (mean, range)	2.7 (1 – 9)	2 (0 – 13)
Sepsis screening	0 (0%)	28 (46%)

Cycle 1

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

Cycle 2

Legend:
- Acute otitis media
- Angio oedema
- Dental Abscess
- Epiglottitis & Supraglottitis
- Tonsillitis
- Otitis externa including necrotic
- Parotitis
- Peritonsillar Cellulitis
- Quinsy
- Viral ulcer
- Pharyngitis
- Post tonsillectomy bleed
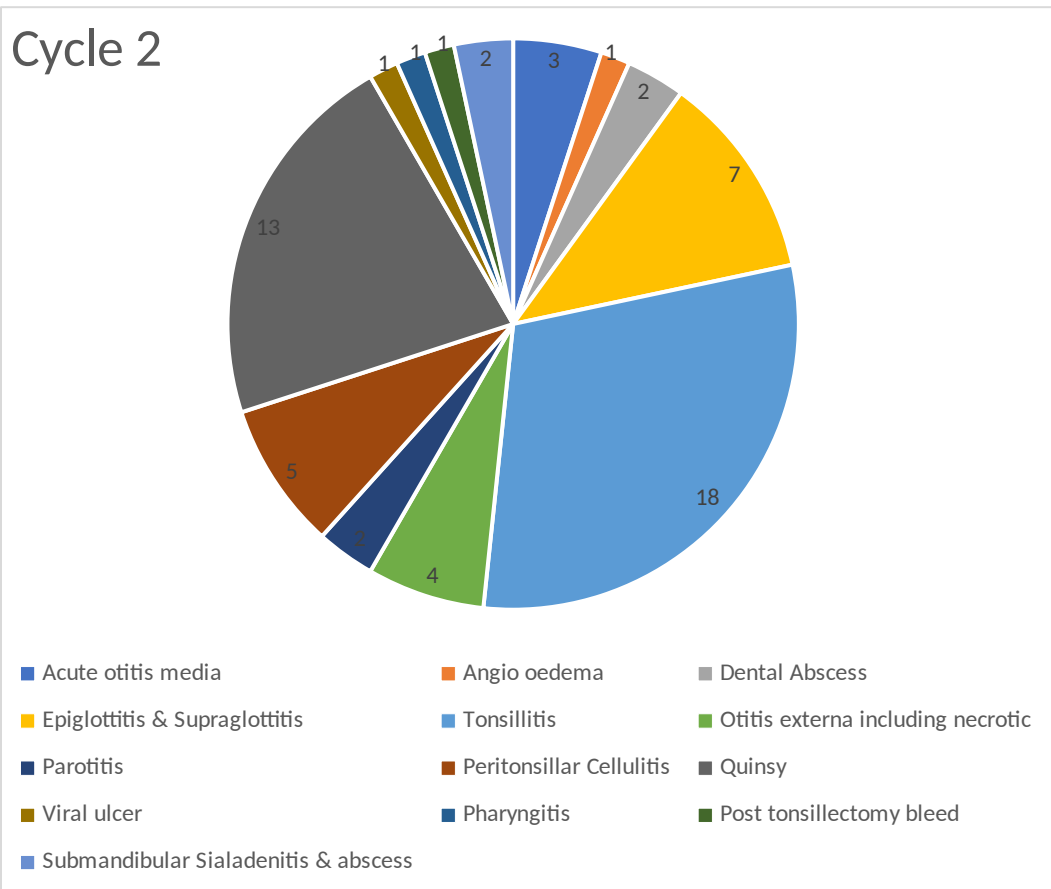- Submandibular Sialadenitis & abscess

Figure 1: Frequency of Diagnoses of Cycle 1 and 2

Discussion

Synopsis of key/new findings

Sepsis as a complication of head and neck infections is associated with high morbidity and mortality. 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 were septic if using the qSOFA criteria.

Clinically, qSOFA criteria may be more appropriate as a guide in highlighting deteriorating unwell patients compared to SIRS. 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.

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 predicting unwell patients in this context. 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. Tonsillits and peritonsillar abscesses still represents a significant proportion of admissions among district general hospital.

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 does improve compliance however regular audits are needed to monitor this for continuous improvement of maintenance of standard.

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 has been introduced. qSOFA was thought to be more specific while SIRS was more sensitive[8]. It has also been reported that SIRS was more accurate in predicting an established infection[9]. Comparison with National Early Warning Score (NEWS) has also been reported with the study demonstrating NEWS was equally good in predicting unwell patients compared to either SIRS or qSOFA and may be more relevant since it is already widely adopted among UK hospitals[10]. These studies were often conducted in an emergency department or acute medical setting, however there is no literature currently specific to head and neck infections.

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
- lactate measurement.
- accurate measurements of urine output

As shown in our audit, using SIRS as screening criteria would result in over half of our patients needing these invasive and unnecessary treatments 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 head and neck infections and can reduce overly aggressive management in these patients.

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 is done poorly. However, this can be improved with education and visual reminders such as posters or clerking documents. qSOFA is more clinically appropriate as a screening tool as SIRS result in falsely high rates of sepsis and hence potentially unnecessary treatments for patients.

References

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