

Main Article

Dr M J Edwards takes responsibility for the integrity of the content of the paper

Cite this article: Edwards MJ, James TW, Dalton CL. ENT UK coronavirus disease 2019 adult tonsillitis and quinsy guidelines: translating guidance into practice. *J Laryngol Otol* 2021;**135**:579–583. <https://doi.org/10.1017/S0022215121000682>

Accepted: 20 January 2021
First published online: 3 March 2021

Keywords:

COVID-19; Tonsillitis; Peritonsillar Abscess; Guideline Adherence; Povidone-Iodine

Author for correspondence:

Dr Michael J Edwards, Department of Otolaryngology, Queen Elizabeth Hospital, University Hospitals Birmingham NHS Foundation Trust, Birmingham, UK
E-mail: michael.edwards19@nhs.net

Abstract

Objectives. This study examined the uptake of ENT UK coronavirus disease 2019 adult tonsillitis and quinsy guidelines at our tertiary centre, and assessed perceived barriers to uptake.

Methods. A retrospective case series of tonsillitis and quinsy patients was analysed in two arms: before and after the introduction of new ENT UK management guidelines. A survey assessed perceptions and practice differences between ENT and emergency department doctors.

Results. Each study arm examined 82 patients. Following the introduction of new ENT UK guidelines, ENT clinicians demonstrated significant changes in practice, unlike their emergency department counterparts. Survey results from emergency department doctors highlighted a lack of appreciation of guideline change and identified barriers to guideline uptake.

Conclusion. The introduction of new management guidelines for tonsillitis and quinsy patients during the pandemic resulted in disparate uptake within ENT and emergency department departments at the tertiary centre. Clearer dissemination to all affected clinicians is paramount for future rapidly introduced changes to practice, to ensure clinician safety.

Introduction

Tonsillitis is one of the most common acute conditions referred to an ENT department, and has an incidence of 100 per 1000 population in the UK.¹ Peritonsillar abscess (quinsy) represents the most common complication of tonsillitis.² The decision to admit a case of tonsillitis or quinsy to hospital is based on severity of illness, with an inability to eat or drink being the classic deciding factor.³ In view of its relatively high impact on the emergency workload of ENT departments, there are surprisingly few publications outlining management algorithms aiming to optimise and shorten the hospital treatment of tonsillitis and quinsy patients. One of the few examples published demonstrated an effective reduction in hospital admissions in a single centre.⁴

In early 2020, the first wave of the severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) pandemic (coronavirus disease 2019 (Covid-19)) saw a dramatic shift in clinical practices across all hospital specialties.⁵ With a preponderance for aerosol-generating procedures (AGPs) and upper aerodigestive tract examinations, ENT practitioners were considered especially at risk of exposure to and transmission of Covid-19.⁶

In order to mitigate this risk in the UK, the professional representative body for ENT (ENT UK) issued a number of early guidelines on 23 March outlining changes to AGPs.⁷ Less than a week later, on 27 March, they published specific national guidelines for the management of tonsillitis and quinsy in adults during the Covid-19 pandemic.⁸ These detail significant changes to many established practices regarding the assessment and management of patients with tonsillitis or quinsy. For instance, where possible treatment should be based on history alone, oral examinations should be avoided and restricted to severe cases only; povidone-iodine should be used prior to oral examination; and medical therapy should be optimised to achieve same-day discharge. Additionally, there is a shift in the guidance regarding admitting patients with tonsillitis or quinsy. Specifically, patients who are unable to swallow should be managed with optimal medical therapy and undergo an initial period of observation, with same-day discharge once swallowing of fluids and medication has been achieved.

The new Covid-19-related tonsillitis and quinsy guidelines were introduced rapidly during a turbulent time within healthcare at the start of the first Covid-19 surge in the UK. They required a significant shift in commonly accepted practice regarding the management of tonsillitis and quinsy cases. The primary aim of the current study was to assess the uptake of ENT UK Covid-19 adult tonsillitis and quinsy guidelines at our tertiary centre within the ENT and emergency departments. The secondary aim was to gain insight into possible barriers hindering local uptake of this particular guideline.

Table 1. Questionnaire distributed to emergency department and ENT physicians*

1	Prior to this questionnaire, you were aware that changes have been made to the national guidelines on tonsillitis & quinsy
2	Prior to this questionnaire, you were aware of the specific changes to practice that ENT UK Covid-19 adult tonsillitis & quinsy guidelines entail
3	You have been formally signposted to the ENT UK Covid-19 adult tonsillitis & quinsy guidelines by your department or colleagues prior to this questionnaire
4	You have changed your practice with regard to tonsillitis & quinsy as a result of the ENT UK Covid-19 adult tonsillitis & quinsy guidelines
5	You have treated suspected tonsillitis based on history rather than oral examination as a result of the ENT UK Covid-19 adult tonsillitis & quinsy guidelines
6	When you do examine the oral cavity, you use full PPE including FFP3 (or equivalent)
7	You reserve oral examination only for suspected severe tonsillitis or quinsy as a result of the ENT UK Covid-19 adult tonsillitis & quinsy guidelines
8	When you do perform oral examinations, you give the patient povidone-iodine mouthwash
9	When discharging tonsillitis patients who can eat & drink, you consider prescribing oral steroids & proton pump inhibitor
10	You feel that more needs to be done to disseminate new guidelines to practitioners

*Distributed on 4 and 5 October 2020. Responders were able to choose from the following options: 'strongly disagree', 'disagree', 'neutral', 'agree' and 'strongly agree'. Covid-19 = coronavirus disease 2019; PPE = personal protective equipment; FFP3 = filtering facepiece code 3

Materials and methods

Study design and setting

This study was undertaken at the Queen Elizabeth Hospital, Birmingham, and encompassed three elements: two retrospective case series of tonsillitis and quinsy patients, and a survey of emergency department and ENT medical staff. Electronic patient records were analysed to assess the local practice of managing tonsillitis and quinsy patients in comparison with ENT UK Covid-19 adult tonsillitis and quinsy guidelines,⁸ both before and after the introduction of these guidelines (pre-pandemic arm reflected data for 13 January – 29 February 2020, and the Covid-19 arm covered 1 April – 31 July 2020).

Data collection

A healthcare informatics search request of hospital admission statistics was used to identify both cohorts of patients to be studied, with confirmation by subsequent review of electronic patient records. Patients were included if they had a clinical diagnosis of either tonsillitis or quinsy, and if they had been seen by the emergency department clinicians alone, ENT clinicians alone, or both the emergency department and ENT clinicians.

In both cohorts of patients, data were collected regarding: patient age; gender; documented number of oral examinations performed by the emergency department and ENT doctors; use of povidone-iodine prior to oral examination; prescription of intravenous antibiotics, steroids and analgesics; admission rates; re-attendance rates; and quinsy drainage rates.

In order to assess physicians' awareness and use of ENT UK Covid-19 adult tonsillitis and quinsy guidelines,⁸ a survey of emergency department and ENT physicians was undertaken using opportunistic sampling of the emergency department and ENT teams present during a 48-hour window (4 and 5 October 2020). Questionnaires were designed using Google Forms (Alphabet, Mountain View, California, USA), and distributed in person via a personal electronic device. Responses were anonymous. The survey contained 1 qualitative and 10 quantitative questions (Table 1). Five response options were given for the quantitative questions: 'strongly agree', 'agree', 'neutral', 'disagree' and 'strongly disagree'. The qualitative question asked for 'any other comments', with a free text option for responses.

Table 2. Demographics of patients in pre-pandemic and Covid-19 study arms

Characteristic	Pre-pandemic arm*	Covid-19 arm [†]	P-value
Age (median (IQR); years)	24 (20–35)	26 (22–33)	0.61
Gender (n (%))			
– Male	36 (43.9)	36 (44)	1.00
– Female	46 (56.1)	46 (56.1)	1.00
Diagnosis (n (%))			
– Tonsillitis	70 (85.4)	69 (84.1)	0.969
– Quinsy	12 (14.6)	13 (15.9)	0.828

*n = 82; [†]n = 82. Covid-19 = coronavirus disease 2019; IQR = interquartile range

Data analysis

Data were analysed using SPSS® statistical software (IBM®, Build 1.0.0.1508). Data are summarised as medians and interquartile ranges for continuous, non-parametric data, with categorical data presented as numbers and percentages. Continuous data were compared using the Mann–Whitney U test, and categorical data were compared using chi-square analysis. Significance was set at $p < 0.05$.

Results

Patient demographics

Hospital admission statistics coding identified 88 and 91 patients for the pre-pandemic and Covid-19 arms, respectively. A review of patient records clarified that six patients in the pre-pandemic arm and nine patients in the Covid-19 arm did not meet the inclusion criteria because of an incorrect diagnosis. The patient demographics of both study arms are summarised in Table 2.

Patient management

In the pre-pandemic arm, 62.2 per cent of patients (51 out of 82) presenting to the emergency department were referred to ENT. Of these, 62.7 per cent (32 out of 51) were admitted to the hospital. Following discharge from either the emergency

Table 3. Management of tonsillitis and quinsy patients in pre-pandemic and Covid-19 study arms*

Management step performed	Pre-pandemic arm [†]	Covid-19 arm [‡]	P-value
PVP-I mouthwash prior to oral examination (n (%))	0 (0)	0 (0)	1.00
IV antibiotics (n (%))	49 (59.8)	38 (46.3)	0.085
IV analgesics (n (%))	36 (43.9)	25 (30.5)	0.076
Dexamethasone (n (%))	40 (48.8)	32 (39)	0.208
Quinsy aspiration (n (%))	8/12 (66.7)	3/13 (23.1)	0.028**
Oral examinations			
– Patients examined (n (%))	82 (100)	81 (98.8)	0.316
– Total number of examinations	170	123	0.002**
– Median number of examinations per patient	2	1	0.005**
– Interquartile range per patient	1–3	1–2	
– Examinations performed by ED (n (%))	69 (40.6)	73 (59.3)	0.477
– Examinations performed by ENT clinicians (n (%))	101 (59.4)	50 (40.7)	0.012**
– Patients not examined by ED (n (%))	14 (17.1)	10 (12.3)	0.781
– Patients not examined by ENT clinicians (n (%))	33 (40.2)	50 (61.0)	0.008**

*Indicating degree of adherence to the ENT UK Covid-19 adult tonsillitis and quinsy guidelines.⁸ [†]n = 82; [‡]n = 82. **Indicates statistical significance ($p < 0.05$). Covid-19 = coronavirus disease 2019; PVP-I = povidone-iodine; IV = intravenous; ED = emergency department

department or ENT department, 9.8 per cent (8 out of 82) re-attended with the same condition.

In the Covid-19 arm, Covid-19 tests were performed on 29.3 per cent of patients (24 out of 82), all of which were negative for Covid-19. Referral to ENT took place in 52.4 per cent of patients (43 out of 82).

The reduction in referrals to ENT compared to the pre-pandemic arm was not statistically significant ($p = 0.207$). Of the patients referred to ENT in the Covid-19 arm, 37.2 per cent (16 out of 43) were admitted to the hospital, representing a statistically significant reduction in hospital admission rate compared to the pre-pandemic arm ($p = 0.014$). Following discharge from either the emergency department or ENT department, 11 per cent of cases in the Covid-19 arm (9 out of 82) re-attended with the same condition.

Adherence to the management recommendations outlined in the ENT UK Covid-19 tonsillitis and quinsy guidelines⁸ in the pre-pandemic and Covid-19 arms are outlined in Table 3.

Survey of clinicians

Thirty-one emergency department and ENT clinicians completed the survey. Physician grades are summarised in Table 4. In comparing emergency department and ENT physicians, respectively, 90 per cent (18 out of 20) versus 18.2 per cent (2 out of 11) disagreed or strongly disagreed with the statement that they were aware of specific changes to guidelines; 10 per cent (2 out of 20) versus 63.3 per cent (7 out of 11) agreed or strongly agreed with the statement that they were aware of new guidelines as a result of colleague or departmental signposting; 5 per cent (1 out of 20) versus 18.2 per cent (2 out of 11) agreed that they use povidone-iodine mouthwash prior to oral examination; 45 per cent (9 out of 20) versus 54.5 per cent (6 out of 11) disagreed or strongly disagreed with the statement that they use appropriate personal protective equipment (PPE) for oral examinations. All responders 'strongly agreed' that more should be done to disseminate the guidelines to frontline practitioners.

Table 4. Summary of survey responders' grades according to department

Grade	Emergency department (n (%))*	ENT surgery (n (%)) [†]
Consultant	3 (15)	0 (0)
Registrar	8 (40)	5 (45.5)
Core trainee	3 (15)	3 (27.3)
Junior specialist	7 (35)	0 (0)
Foundation trainee	2 (10)	3 (27.2)

*n = 20; [†]n = 11

Four emergency department doctors made use of the 'Any additional comments' section: only two respondents explained awareness of PPE requirements and new recommendations regarding the restricted performance of oral examinations; one admitted awareness of the publication of new guidelines without having read them yet; and one doctor suggested displaying a poster of the guidelines within the department. The ENT responders did not use the 'Any additional comments' section.

Discussion

In March 2020, towards the beginning of the UK pandemic, the national mean daily attendance of emergency departments fell by 29 per cent, with a further drop by 57 per cent observed in April compared to the same month in 2019.⁹ During June 2020, the incidence of tonsillitis was less than half of the reported five-year average.¹⁰

Our findings mirror these reports. The distribution of tonsillitis and quinsy diagnoses, patient ages and gender remained equivalent in our pre-pandemic and Covid-19 arms. However, the pre-pandemic cohort presented during a six-week window, whilst the Covid-19 cohort presented over a 16-week period following the implementation of a nationwide lockdown.

Early studies have indicated a significant reduction in Covid-19 prevalence as a direct result of lockdown measures.¹¹

With successively introduced restrictions, including self-isolation, social distancing, school closures and the banning of public events, ultimately leading to a national lockdown, there has, additionally, been an observed reduction in the transmission of other airborne infectious diseases.^{12,13} This is the most likely explanation for our observed difference in tonsillitis and quinsy presentations, though data to further support this hypothesis are required.

On 23 March 2020, in response to the Covid-19 pandemic, ENT UK released guidance that identified all aerodigestive tract examinations as high risk for staff exposure to Covid-19, and advised avoidance of all unnecessary examinations and procedures.⁷ On 27 March 2020, ENT UK released the Covid-19 adult tonsillitis and quinsy guidelines aimed at reducing patient admissions and staff exposure to the virus, whilst maintaining high standards of care.⁸ The guidelines recommend restricting the number of oral examinations and advise the mandate prophylactic use of povidone-iodine mouthwash for cases where oral examination is unavoidable.

In some respects, the ENT UK guidelines are not dissimilar to the Portsmouth tonsillitis protocol.⁴ Both ENT UK and Portsmouth tonsillitis protocol algorithms aim to reduce hospital admissions by advising an observation period following initial medical treatment, with subsequent reassessment of the patient and potential early discharge if the patient is able to swallow oral medication.^{4,8}

However, differences between the two guidelines also exist. Contrasting the non-interventional approach of the ENT UK guidelines, the Portsmouth tonsillitis protocol recommends: flexible laryngoscopy for all patients with a diagnosis of tonsillitis who cannot swallow, hospital admission in all immunocompromised patients or those with diabetes, and 8-hourly benzylpenicillin rather than once-daily ceftriaxone as the advised intravenous antibiotic. The ENT UK guidelines, on the other hand, recommend that: treatment is based on history where possible, oral examination is performed by ENT clinicians, and povidone-iodine gargling is employed prior to oral examination. Differing from the Portsmouth tonsillitis protocol, the ENT UK guidelines also cover the management of quinsy, restricting abscess drainage to severe cases or to patients who show no improvement after initial medical management and subsequent observation. For milder cases of quinsy, the ENT UK protocol suggests discharge on medical therapy if patients are able to swallow.

The primary aim of the current study was to determine the impact of the ENT UK Covid-19 adult tonsillitis and quinsy guidelines⁸ on practice within our hospital. We observed some disparity in the management of tonsillitis and quinsy patients between our emergency department and ENT department. Interestingly, whilst a similar proportion of patients were referred to ENT in both pre-pandemic and Covid-19 study arms, there was a significant reduction in the number of patients admitted by ENT in the Covid-19 versus pre-pandemic cohort (37.2 per cent vs 62.7 per cent, respectively; $p = 0.014$). Moreover, whilst there was little change in the practices of emergency department colleagues with regard to the performance of oral examinations between both study arms, ENT physicians performed statistically significantly fewer oral examinations ($p = 0.012$) following the introduction of the guidelines. Additionally, despite similar rates of quinsy presentations within both study arms, all of whom were referred to ENT, we found a statistically significant reduction in the number aspirated following the guideline introduction ($p = 0.028$).

Our findings indicate an awareness of the new guidelines within our ENT department, with swift adoption of some parts thereof into local practice. In contrast, our results highlight a lack of guideline adoption into practice within our emergency department. The most likely reason for the observed disparity between ENT and emergency department practices is a lack of familiarity with the new guidelines within our emergency department. This hypothesis was confirmed by our survey, which documented a particular lack of awareness of the new guidelines amongst emergency department responders.

Arguably, a further potential barrier to guideline uptake might be that oral examinations are such a well-established, routine step in the assessment of tonsillitis and quinsy patients, and integral to multiple tonsillitis management protocols. For instance, the National Institute for Health and Care Excellence (NICE) antimicrobial prescribing guidelines assume oral examination in all cases of sore throat,¹⁴ the Portsmouth tonsillitis protocol mandates oral examination for all patients,⁴ tonsil assessment has been a crucial factor in the well-established Centor criteria for many decades,¹⁵ and, more recently, such assessment has become integral to 'FeverPAIN' tonsillitis criteria.¹⁶ Such well-established, expected clinical practice arguably requires a more significant culture shift in order for a less intuitive guideline recommending the avoidance of oral examinations to become fully adopted locally within a relatively short timeframe.

Povidone-iodine has long been known to act as a broad-spectrum microbicide.¹⁷ There is now a growing body of evidence indicating that povidone-iodine works rapidly to inactivate Covid-19 *in vitro*, though to date this is yet to be demonstrated *in vivo*.¹⁸ Povidone-iodine is thought to reduce viral loads within upper aerodigestive tract mucosa, which could reduce the risk of Covid-19 transmission to healthcare workers.¹⁹

In our study, no doctor documented the use of prophylactic povidone-iodine mouthwash prior to oral examination in the Covid-19 cohort. Whilst this may represent an underreporting bias, the more likely explanation is a combination of lack of availability of povidone-iodine mouthwash in patient assessment areas, and an absence of povidone-iodine mouthwash from the hospital's electronic prescribing system.

It is important to note that ENT UK guidelines do not specify the exact method of use for povidone-iodine when examining the oropharynx. In view of the fact that this management step will be new to the vast majority of emergency department and ENT practitioners, we would argue that some guidance is warranted. This might include the volume of povidone-iodine to be used, the length of time the oropharynx needs to be exposed to povidone-iodine, which formulation to use (gargle vs rinse), and an indication of the length of time povidone-iodine is thought to inactivate Covid-19 for.

Our survey results substantiate the disparity observed between emergency department and ENT doctors' application of the changes described within the new ENT UK tonsillitis and quinsy management guidelines in the Covid-19 study arm. The most likely explanation is that the guidelines originated from the professional representative body for ENT (ENT UK). As such they would have been directly disseminated to any member of this professional body. Most senior ENT trainees and consultants are members of this body, whereas it is unlikely that emergency department trainees or consultants would be.

Our findings suggest that up-to-date clinical practice guidance from ENT UK effectively reached ENT practitioners within our hospital at the start of the first UK Covid-19 surge. Our survey indicated that such information was passed

on to team members within our ENT department. However, more work is required both at national and local levels to reach related specialties, such as emergency medicine, who may be dealing with similar patient cohorts.

Runnacles *et al.* identified guideline dissemination and education to be the main barriers to uptake of novel guidelines.²⁰ When the health and safety of patients and staff depend on the swift and efficient application of new guidelines, such as during a global pandemic, it is paramount that we have clear and effective means of guideline dissemination and education to achieve this. More work in this area is required to ascertain how these goals can be achieved.

Limitations

The emergency department questionnaire data were gathered using opportunistic sampling, and only represents the staff working during a short period of time. However, given the asymmetric individual shift patterns, our sample not only represents a single emergency department team, but is, in fact, a reasonable snapshot of the department as a whole.

- ENT UK released new coronavirus disease 2019 adult tonsillitis and quinsy guidelines in March 2020
- ENT doctors rapidly updated several aspects of practice accordingly
- Emergency department doctors were less aware of the new guidelines and demonstrated fewer changes in practice
- Dissemination of new specialty guidelines to associated specialties dealing with similar patients is paramount

Conclusion

We have demonstrated varying degrees of adherence to new pandemic-specific tonsillitis and quinsy management guidelines amongst ENT and emergency department doctors at our centre. Several factors are likely to have influenced this process. These include poor dissemination of guidelines to emergency department physicians, the lack of interdepartmental education, difficulty changing long-established practices, and institutional and physician naivety regarding the importance of each element of the new guidelines. In the context of an established additional Covid-19 surge, there are many lessons to be learnt. Significantly, dissemination of and education surrounding new guidelines are paramount to ensure efficient uptake thereof into clinical practice. Ultimately, this will lead to enhanced safety for patients and staff, whilst limiting the Covid-19 burden on health services.

Competing interests. None declared

References

- 1 Georgalas CC, Tolley NS, Narula PA. Tonsillitis. *BMJ Clin Evid* 2014;**2014**:0503

- 2 Powell EL, Powell J, Samuel JR, Wilson JA. A review of the pathogenesis of adult peritonsillar abscess: time for a re-evaluation. *J Antimicrob Chemother* 2013;**68**:1941–50
- 3 Scottish Intercollegiate Guidelines Network. *Management of Sore Throat and Indications for Tonsillectomy: A National Clinical Guideline*. Edinburgh: Scottish Intercollegiate Guidelines Network, 2010
- 4 Bird JH, Biggs TC, Schulz C, Lower N, Faris C, Repanos C. Implementation of an evidence-based acute tonsillitis protocol: our experience in one hundred and twenty-six patients. *Clin Otolaryngol* 2013;**38**:410–15
- 5 Al-Jabir A, Kerwan A, Nicola M, Alsafi Z, Khan M, Sohrabi C *et al.* Impact of the coronavirus (COVID-19) pandemic on surgical practice - Part 1. *Int J Surg* 2020;**79**:168–79
- 6 Givi B, Schiff BA, Chinn SB, Clayburgh D, Iyer NG, Jalisi S *et al.* Safety recommendations for evaluation and surgery of the head and neck during the COVID-19 pandemic. *JAMA Otolaryngol Head Neck Surg* 2020;**146**:579–84
- 7 Aerosol-generating procedures in ENT. In: <https://www.entuk.org/aerosol-generating-procedures-ent> [12 December 2020]
- 8 ENT UK COVID-19 Adult Tonsillitis & Quinsy Guidelines. In: <https://www.entuk.org/sites/default/files/ENT%20UK%20COVID-19%20Tonsillitis%20%26%20Quinsy%20Guidelines%20FINAL.pdf> [12 December 2020]
- 9 A&E Attendances and Emergency Admissions March 2020 Statistical Commentary. In: <https://www.england.nhs.uk/statistics/wp-content/uploads/sites/2/2020/04/Statistical-commentary-March-2020-jf8hj.pdf> [12 December 2020]
- 10 Royal College of General Practitioners. RSC Communicable and Respiratory Disease Report for England: week number/year 29/2020. In: https://www.rcgp.org.uk/-/media/Files/CIRC/WeeklyReport_Summer_wk29_2020 [12 December 2020]
- 11 Islam N, Sharp SJ, Chowell G, Shabnam S, Kawachi I, Lacey B *et al.* Physical distancing interventions and incidence of coronavirus disease 2019: natural experiment in 149 countries. *BMJ* 2020;**370**:m2743
- 12 Miles DK, Stedman M, Heald AH. “Stay at home, protect the national health service, save lives”: a cost benefit analysis of the lockdown in the United Kingdom. *Int J Clin Pract* 2021;**75**:e13674
- 13 Angoulvant F, Ouldali N, Yang DD, Filser M, Gajdos V, Rybak A *et al.* Coronavirus disease 2019 pandemic: impact caused by school closure and national lockdown on pediatric visits and admissions for viral and nonviral infections—a time series analysis. *Clin Infect Dis* 2021;**72**:319–22
- 14 National Institute for Health and Care Excellence. Sore throat – acute. Scenario: Management. In: <https://cks.nice.org.uk/topics/sore-throat-acute/management/management/> [12 December 2020]
- 15 Centor RM, Witherspoon JM, Dalton HP, Brody CE, Link K. The diagnosis of strep throat in adults in the emergency room. *Med Decis Making* 1981;**1**:239–46
- 16 Little P, Stuart B, Hobbs FDR, Butler CC, Hay AD, Campbell J *et al.* Predictors of suppurative complications for acute sore throat in primary care: prospective clinical cohort study. *BMJ* 2013;**347**:f6867
- 17 Reimer K, Wichelhaus TA, Schäfer V, Rudolph P, Kramer A, Wutzler P *et al.* Antimicrobial effectiveness of povidone-iodine and consequences for new application areas. *Dermatology* 2002;**204**(suppl 1):114–20
- 18 Anderson DE, Sivalingam V, Kang AEZ, Ananthanarayanan A, Arumugam H, Jenkins TM *et al.* Povidone-iodine demonstrates rapid in vitro virucidal activity against SARS-CoV-2, the virus causing COVID-19 disease. *Infect Dis Ther* 2020;**9**:669–75
- 19 Kirk-Bayley J, Challacombe S, Sunkaraneni V, Combes J. The use of povidone iodine nasal spray and mouthwash during the current COVID-19 pandemic may protect healthcare workers and reduce cross infection. *SSRN Electronic Journal* 2020 doi:10.2139/ssrn.3563092
- 20 Runnacles J, Roueché A, Lachman P. The right care, every time: improving adherence to evidence-based guidelines. *Arch Dis Child Educ Pract Ed* 2018;**103**:27–33