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# A prospective audit of acute ENT activity in a university teaching hospital

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**Key-words**. ENT; emergency; training; medical education; healthcare cost

**Abstract**. *Introduction and aim*: Acute ENT coverage is available out-of-hours in most hospitals. However, increasing pressure to reduce healthcare cost threatens this 24-hour availability. Our goal was to audit the emergency ENT activity in our institution.
*Methods*: A prospective audit of all ENT emergency referrals was carried out over a one-month period in an academic hospital. Descriptive statistics were produced for age, sex, origin, admission time, diagnosis, management, and patient outcome.
*Results*: A total of 190 patients (109 men and 81 women) were referred to the ENT emergency service over the study period (mean, 6.1 cases/day). Mean age was 47.9 (SD ±23.6) years. Most admissions (76.4%) occurred during normal working hours, and 62.0% of patients were self-referred. The mean complaint duration before admission was 7.6 (±13.7) days. One third (33.2% patients) required ambulatory treatment, a quarter (24.7% patients) had a minor ENT procedure, 18 (9.5%) required admission to the ward, and 8 (4.2%) required surgical treatment. Severity of diagnosis or management between patients did not differ with referral by a physician (GP or specialist) and self-referral. At 30 days, 3 (1.6%) patients died, 106 (55.8%) benefitted from an ENT follow-up, 65 (34.2%) were referred to another physician (GP or specialist), and 16 (8.4%) were lost to follow-up.
*Conclusions*: The results of this workload audit suggest that emergency ENT activity is justified in our hospital. Restricting emergency ENT cover to patients referred by a GP or another physician would not improve patient selection.

## Introduction

A major health policy goal is to ensure that adequate health care and emergency services are equitably offered to the entire population.[1] This availability includes access to both emergency medical services and specialised treatment services. Some departments, such as ENT, have their own emergency room fully equipped with adequate diagnostic and treatment facilities.[2-5] In those units, an ENT registrar most often sees the patients.[6] The goal of these dedicated areas are multiple: providing a safe treatment space for patients in a fully equipped ENT room, the ability to call a senior physician if needed, and reducing overcrowding of the emergency department. However, in the era of spending constraints, excessive use of acute specialised care is thought to be a source of wasteful spending.[7] Thus, departments offering 24-hour acute ENT coverage have to justify the cost effectiveness to their hospital management. Yet they also must avoid wasting public resources by attracting patients who could have been treated in primary care. The purpose of this study was to audit the emergency ENT activity in our institution over one month with the aim of informing future policy changes in this area.

## Materials and methods

A prospective audit of all ENT referrals from the emergency department was carried out from May 1 to May 31, 2017, in the University Hospital of Liege (1038 inpatient beds). Our ENT department includes 31 ENT surgeons and 8 ENT surgeons in training and covers all aspects of the specialty.

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Data regarding age, sex, origin, time of arrival, diagnosis, management, and patient outcome were prospectively collected. Origin of the patient included the distance between the patient address and hospital, the transport they used to reach the hospital, and the referring physician, if applicable. Admission time was divided into weekday and weekend and into normal working hours (8:00-18:00) and "out of hours" (18:00-8:00). Data regarding the diagnosis included the complaint duration, location, ENT history in the previous 30 days, and ENT cancer history. Paraclinic investigations were recorded (e.g., nasendoscopy, audiometry, swab, biopsy, blood test, medical imaging). Management decisions were divided into five categories: discharge without ENT treatment, medical ambulatory treatment, medical inpatient treatment, minor ENT procedure (ENT procedure directly performed in the emergency room), and surgical treatment in the operating theatre. Minor procedures were tracheotomy care, ear aspiration, foreign body removal, nasogastric tube insertion, nose packing, or cauterisation. Calls for a senior ENT surgeon or referral to another physician were recorded. Patient outcomes were registered as discharge, regular follow-up ENT appointment, referral to GP or another specialist, or admission to the ward. Emergency re-admissions and deaths within the following 30 days were recorded.

As a secondary endpoint, we performed a basic cost analysis using the healthcare payer perspective. Our calculation included governmental funding and costs incurred by patients, according to the Belgian guidelines for economic evaluations and budget impact.[8] Amounts of medical fees, diagnostic testing, surgery, and hospitalisation fees were based on official rates derived from agreements between the medical profession and Belgian health insurance funds.

The results were collated in a secure protected database (Microsoft Excel, Seattle, WA, USA). Quantitative variables were summarised using mean, standard deviation (SD), and interquartile range (P25-P75), while qualitative variables were described using frequency and percentage. Data distribution was evaluated using the D'Agostino-Pearson omnibus normality test. Odds ratios (ORs) and 95% confidence intervals [in brackets] were calculated to evaluate risk for a specific outcome. Statistical analysis was carried out using the free software *R* (https://www.r-project.org) with RCmdr. Graphical presentations were developed using GraphPad Prism 5.0a (GraphPad Software, San Diego, CA, USA).

## Results

### *Demographic data*

A total of 190 patients (109 men and 81 women) were referred to the ENT emergency service over the study period (mean, 6.1 cases/day). Mean age was 47.9 (SD ±23.6) years (range, 1-95). Most patients were ambulatory (75.8%; n=144), while 21.6% (n=41) were hospitalised in our hospital, 2.1% (n=4) were inpatients from another hospital, and 1 (0.5%) was referred from a nursing home. Most patients came from the neighbourhood. The mean distance they travelled to the hospital was 23.8 (±26.0) km (range, 1.8-172.0 km). Among ambulatory patients, 84.7% (n=161) came by private vehicle, 1.6% (n=3) by public transportation, and 13.6% (n=26) by ambulance (Table 1).

### *Admission and referral*

Most admissions occurred during normal working hours (76.3%; n=145). A total of 20 (10.5%) admissions occurred during daytime on the weekend, 19 (10.0%) patients were admitted during the night on a weekday, and 6 (3.2%) patients presented during the night on a weekend. In total, 23.7% patients presented outside business hours (n=45). Mondays and Tuesdays were the busiest days of the week for admissions. A total of 118 (62.1%) patients came without a referral. Referrals were mostly made by specialists from our hospital (21.1%; n=40) and ENT surgeons from our hospital (4.2%; n=8). Seventeen (8.9%) referrals were made by GPs. Five (2.6%) patients were sent by a specialist from another hospital, and two (1.1%) patients were sent by an ENT surgeon from another hospital (Table 1). Self-referred patients were not significantly more likely to present themselves at night or on a weekend (OR=1.64 [0.79–3.40], p=0.1841).

Most patients had no recent ENT history (68.9%; n=131). The 21 (11.1%) patients with a diagnosis of head and neck cancer prior to admission were significantly more likely to require admission to the ward or an ENT procedure (OR=0.32 [0.12-0.83], p=0.0196). Patients with recent ENT history had a nonsignificant tendency to require admission

*Table 1*
Demographics and outcomes

| | |
|---|---|
| **Demographics** | |
| **Total, n** | **190** |
| Sex, n (%): Female | 81 (42.6%) |
| Male | 109 (57.3%) |
| Age, mean (±SD), years | 47.9 (±23.6) |
| Outpatients (ambulatory) | 144 (75.8%) |
| Distance to hospital, mean (±SD), km | 23.8 (±26.0) |
| By private vehicle | 161 (84.7%) |
| By public transport | 3 (1.6%) |
| By ambulance | 26 (13.6%) |
| Inpatients | 41 (21.6%) |
| Inpatients from another hospital | 4 (2.1%) |
| Inpatients from nursing home | 1 (0.5%) |
| **Admissions and Referrals** | |
| Normal working hours | 145 (76.3%) |
| Outside business hours | 45 (23.7%) |
| Nighttime on weekdays | 19 (42.2%) |
| Daytime on weekend | 20 (44.4%) |
| Nighttime on weekend | 6 (13.3%) |
| Patients without referral | 118 (62.1%) |
| Referred patients | 72 (37.9%) |
| By specialists from our hospital | 40 (55.6%) |
| By general practitioners | 17 (23.6%) |
| By ENT surgeons from our hospital | 8 (11.1%) |
| By specialist from another hospital | 5 (6.9%) |
| By ENT surgeons from another hospital | 2 (2.8%) |
| Laryngeal or head and neck complaint | 81 (42.6%) |
| Otological or neurovestibular complaint | 70 (36.8%) |
| Nose or sinus complaint | 39 (20.5%) |
| Mean complaint duration prior admission | 7.6 (±13.7) days |
| **Management** | |
| No specific ENT treatment | 54 (28.4%) |
| Ambulatory treatment | 63 (33.2%) |
| Minor ENT procedure | 47 (24.7%) |
| Inpatient treatment | 18 (9.5%) |
| Surgical management | 8 (4.2%) |
| **30-day Outcome** | |
| ENT outpatient follow-up | 106 (55.8%) |
| Referral to another physician | 65 (34.2%) |
| Lost to follow-up/discharge | 16 (8.4%) |
| Dead | 3 (1.6%) |

to the ward or ENT procedure (OR=0.59 [0.34-1.03], p=0.0627). Mean complaint duration before admission was 7.6 (±13.7) days (range, 0-92 days). Of the total group, 39 (20.5%) patients presented with nose or sinus complaint, 70 (36.8%) with an otological or neurovestibular primary complaint, and 81 (42.6%) with a laryngeal or neck complaint. The reason for admission (nose, throat, or ear complaint) was not significantly associated with admission at night or during the weekend (OR=0.74 [0.36-1.52], p=0.4136).

*Management*

More than a quarter of admissions (28.4%; n=54 patients) resulted in no specific ENT treatment. One third (33.2%; n=63) of patients required ambulatory treatment, and a quarter (24.7%; n=47 patients) underwent a minor ENT procedure within the treatment room. Minor procedures were tracheotomy (n=3) or vocal prosthesis (n=5) care, ear aspiration (n=7), foreign body removal (n=2), nasogastric tube insertion (n=8), epistaxis control (n=17), abscess puncture (n=2), cleaning of post-operative clot in the tonsillar fossa (n=2), and the Semont manoeuvre for vertigo (n=1). Of the emergency patients, 18 (9.5%) required admission to the ward (mostly for intravenous antibiotic, n=15; for post-bleeding follow-up, n=2; or for sudden deafness, n=1). Eight patients (4.2%) required surgical treatment (4 mobilisation of nose fracture, 1 neck abscess drainage, 1 tracheotomy, 1 oesophageal foreign body removal, 1 sphenoid drainage) (Figure 1). Management did not differ between patients referred by a physician (GP or specialist) or self-referred (OR=0.97 [0.53-1.77], p=0.9175).

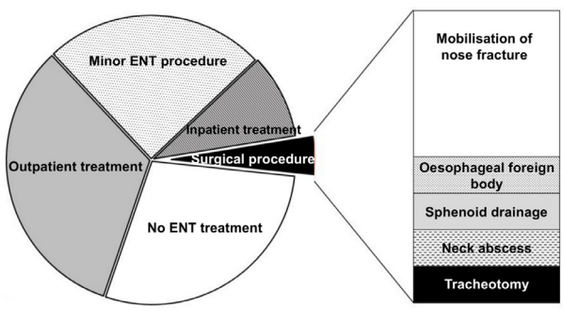


*Figure 1*
Emergency patient management. 33.2% of patients (n=63) required ambulatory treatment, 28.4% (n=54) did not need any specific ENT treatment, and 24.7% (n=47) underwent a minor ENT procedure. Minor procedures were tracheostomy (n=3) or vocal prosthesis (n=5) care, ear aspiration (n=7), foreign body removal (n=2), nasogastric tube insertion (n=8), epistaxis control (n=17), abscess puncture (n=2), tonsillar lodges decay (n=2), and the Semont manoeuvre for vertigo (n=1). 9.5% of patients (n=18) were admitted to the ward (intravenous antibiotic, n=15; post-bleeding follow-up, n=2; or sudden deafness, n=1). 4.2% of patients (n=8) required surgical treatment (4 mobilisations of nose fracture, 1 oesophageal foreign body removal, 1 sphenoid drainage, 1 neck abscess drainage, 1 tracheotomy).

Nose complaints were more likely to require technical or surgical management than ear or throat complaints (OR=0.34 [0.17-0.71], p=0.0038). Patients with nose complaints required a minor technical procedure within the treatment room in 43.6% (n=17) of cases (35.6% of the total minor procedures performed in this study) and required a surgical procedure in 12.8% (n=5) of cases. Among the total ENT emergency surgical procedures, 62.5% were rhinologic, involving the nose (50%) or the sinus (12.5%). Ear or throat initial complaints were more likely to require no treatment or ambulatory management. Patients were more likely to require specific ENT treatment at night and on the weekend (OR=0.40 [0.20-0.78], p=0.0078). The likelihood of requiring a specific ENT treatment is summarised in Figure 2.

*Outcome*

Within 30 days after emergency admission, 106 (55.8%) patients benefitted from a follow-up in our ENT outpatient consultation, 65 (34.2%) were referred to another physician (GP or specialist), 16 were lost to follow-up (8.4%), and 3 (1.6%) died. Patients discharged without ENT treatment were given a follow-up ENT appointment in one third (31.4%) of cases and were sent to their GP or their referring physician (paediatrician, geriatrician, dentist, or other) in most cases (61.1%). Patients requiring any sort of treatment were more likely to be given an ENT follow-up appointment (OR=0.24 [0.12–0.48], p<0.0001). In the month of the study, no death had an ENT cause. The three reported deaths were from geriatric causes (2 cases) and failed cardiopulmonary resuscitation (one case). Outcomes are summarised in Table 1.

*Basic cost analysis*

Among 54 patients without ENT treatment, 17 (31.4%) were given an ENT follow-up appointment to ensure their spontaneous evolution and 1 (1.9%) died (the ENT surgeon was called to check tracheotomy tube insertion in the intensive care unit, and the patient died 2 weeks later from primary lung disease). A total of 3 patients (5.6%) were simply reassured and discharged without treatment, and 33 (61.1%) were referred to another specialist or GP. In total, 36 patients could have been handled in primary care, with a cost of € 2325,60 for the healthcare payers. However, among these patients, OR calculation showed no difference between those referred by a GP or a specialist and self-referred. On the other hand, providing 24-hour access to care allowed discharge of patients outside normal service hours and reduced hospital stay by offering immediate management instead of hospitalisation

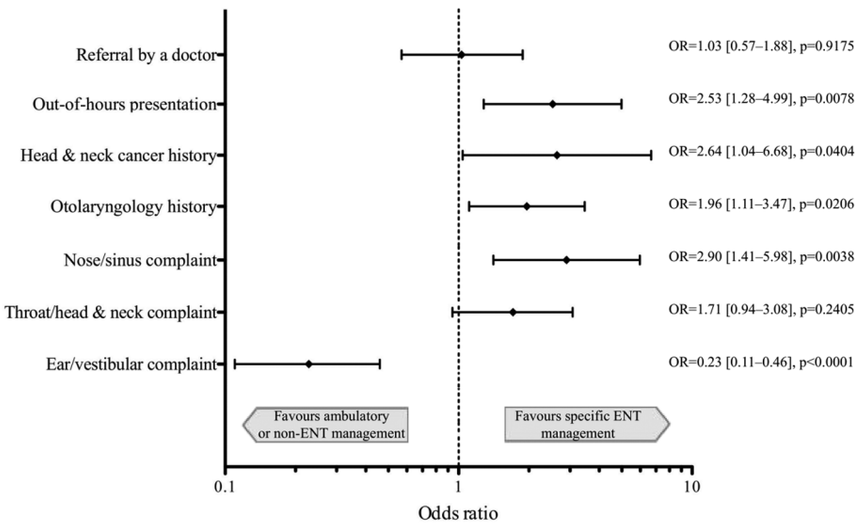


*Figure 2*

Odds ratios (ORs) for having specific ENT management. ORs and 95% confidence intervals [in brackets] were calculated to evaluate the risk of having a specific outcome. Patients were categorised according to the following outcomes: 1. No ENT treatment or ambulatory treatment; or 2. specific ENT management (minor procedure, inpatient treatment, surgical procedure).

until the next rotation. In our study, 45 patients were immediately treated outside business hours, resulting in an estimated cost saving of € 7300,27 from the perspective of the healthcare payers.

## Discussion

The results of this audit show that offering emergency ENT coverage is justified in our hospital. It provided adequate patient care in a fully equipped ENT room, including diagnostic tools, availability of on-call senior ENT supervision, and easy access to minor procedures. The main functions were to alleviate overcrowding in the accident and emergency department, provide ENT handling for hospitalised patients from other departments, and ensure a backup line for GPs and other physicians requesting quick ENT management for ambulatory patients. The emergency room also provided a safe framework for junior ENTs in training. Close availability of a senior ENT surgeon when needed has been stressed in earlier literature.[6]

Our study findings are in line with previous audits showing a similar workload in ENT emergencies across Europe.[5,9,10] Epistaxis management has been described as the most frequent emergency referral in ENT.[10] In our study, rhinologic complaints represented only one of five ENT emergency admissions, but they were more likely to require technical or surgical management than an ear or throat complaint. The fact that epistaxis was the most frequent rhinology complaint could explain this finding.

Costs assessments were undertaken from the taxpayer perspective. Emergency departments are seen as overly expensive, where "inappropriate" visits represent the largest room for improvement.[11] There is a potential savings from preventing avoidable visits, along with their associated downstream costs. However, strategies to prevent inappropriate emergency referral are disputable.[12,13] In our study, restricting emergency ENT access to patients referred by a GP or another physician would not have led to better patient selection. We found no difference in terms of inappropriate visits between patients referred by a physician (GP or specialist) and those who self-referred. Our findings illustrate the previously stated need for clear guidelines on critical ENT skills in primary care.[14-16] Patients were more likely to require specific ENT treatment during nights and on the weekends. Restricting ENT referral to normal working hours would not allow for better patient selection and would impair management of ENT patients. However, predicting the need for specific ENT handling is possible using ORs to identify high-risk patients. Our study also highlighted potential cost saving through shortened hospital stay and the availability of immediate ENT management. From a healthcare payer perspective, ENT emergency care in Belgium is efficient.

## Conclusion

In a climate of increased expectations and finite resources, providing 24-hour access with a fully equipped ENT room is justified. Although patient selection needs improvement, we did not identify reliable ways to ameliorate it through limiting referrals to clinicians. The current system allowed for safe management of emergency patients and patients from other departments and from primary care.

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