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**After-hours paediatric telephone triage and advice :  
the Neuchâtel experience**

THESE

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## Résumé

Introduction : Plusieurs études américaines et australiennes ont décrit des systèmes de tri téléphonique des urgences pédiatriques. En Europe, les services publics d'urgences pédiatriques ont peu de données épidémiologiques sur lesquelles s'appuyer pour répondre à la demande de soins. Depuis 1996, le département de pédiatrie de l'hôpital Pourtalès, à Neuchâtel, offre, en dehors des heures ouvrables, un tri téléphonique infirmier gratuit. Le présent travail analyse : 1) la situation suisse de l'offre en tri téléphonique infirmier pour les urgences pédiatriques ; 2) une partie des données épidémiologiques de l'expérience neuchâteloise.

Méthode : 1) Un questionnaire a été envoyé aux 35 services d'urgences pédiatriques publics de Suisse pour savoir si un tel tri était utilisé ; 2) une analyse rétrospective de tous les appels reçus, consignés sur fiches standardisées, en 1997 et 2000 a été menée.

Résultats : 1) La majorité des services (27/35) ont effectivement un système de tri infirmier. Peu offrent une formation spécifique pour ce travail (14/27) ; 2) Au total, 7870 appels ont été analysés (3242 en 1997 ; 4628 en 2000, + 43%). En semaine, la majorité ont été reçus entre 18h et 23h et le week-end en milieu de matinée. Septante-cinq % des appels ont concerné des enfants de 5 ans ou moins. La fièvre, les otalgies et la toux ont représenté 42% des plaintes. Vingt-sept % des appels ont été pris en charge uniquement par les conseils infirmiers, 15 % ont été transmis à l'interne de garde et 50% ont conduit à un rendez-vous dans le service le jour même.

Conclusion : Nos données peuvent aider d'autres services d'urgences pédiatriques à planifier au mieux la mise en place d'un tel système de tri téléphonique.

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## After-hours paediatric telephone triage and advice: the Neuchâtel experience

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**Abstract** Delivery of paediatric primary care by call centres has emerged as a satisfactory system. It has been reported in the literature in the United States and Australia. European public-funded paediatric emergency departments (ED) have little epidemiological data to rely on to match the demand in care. Since 1996, we have run a free nurse-led after-hours paediatric telephone triage and advice (TTA) system. To determine whether other Swiss public paediatric departments practiced formal TTA, we conducted a nation-wide postal survey. To delineate who used our call centre and for what reasons, we embarked on a retrospective study of all the 1997/2000 calls. Most of the units run a TTA (27/35) but few specifically train their staff (14/27). A 43% increase in call numbers was seen between 1997 (3242) and 2000 (4628). During week-days, most of the calls were between 6 and 11 pm and at weekends, a mid morning activity peak was seen. Some 75% of calls were for children aged 5 years or less. Fever, earache and cough accounted for 42% of the main complaints. Of all calls, 27% were dealt by nurses' advice only. About 15% of the calls were transferred to the on-call resident. About 50% led to a same day ED appointment. *Conclusion:* Nurse-led paediatric telephone triage and advice is common in Switzerland where training seems to be irregular. Our data can help units to better plan an eventual paediatric telephone triage and advice service.

**Keywords** After-hours · Paediatric · Telephone advice · Telephone triage

**Abbreviations** ED: emergency department · TTA: telephone triage and advice

### Introduction

In industrialised countries, demand of after-hours care has dramatically increased during the last two decades in adult and paediatric medicine and placed health care systems under considerable strain [2, 3,12]. Delivery of paediatric primary care by call centres has emerged as a satisfactory triage and advice scheme, reported mainly in the United States [9, 11,13] and Australia [4]. In Europe, where the British National Health Service has developed a state-funded nation-wide call centre and private insurance companies have also launched their own triage centres, no data have been published yet on the epidemiology of after hours call of a paediatric population. European public-funded paediatric emergency departments (ED) have therefore little epidemiological data to rely on to match the increasing demand in care.

Since 1996, we have run a free nurse-led after-hours paediatric telephone triage and advice (TTA) scheme. To determine whether other Swiss public paediatric hospital departments practiced formal TTA, we conducted a nation-wide postal survey in all state-funded paediatric units. To characterise the users of our call centre, we embarked on a retrospective study of all 1997/2000 paediatric calls to our department.

### Subjects and methods

Our level I/II paediatric department is part of a district general hospital serving a population of about 110,000 inhabitants. All benefit from health insurance coverage which is compulsory and run by private companies. Paediatric ambulatory care is provided mainly by private paediatricians or general practitioners except in the after-hours period when most children are referred to our department.

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## Postal survey of other Swiss public paediatric hospital departments

A five-question enquiry on TTA was sent to all 38 Swiss public paediatric hospital units.

### Descriptive analysis of phone calls to our telephone triage and advice system

All incoming paediatric phone calls to our ED are transcribed on standardised forms using a list of complaints and possible actions to be undertaken. With authorisation of the Swiss Federal Commission of Experts for Professional Secrecy in Medical Research, all 1997 and 2000 forms were retrospectively and anonymously analysed. Forms with missing dates of calls or poorly completed (12%) were excluded. The year 1997, the 1st year after implementation of the triage, was chosen to gather basic data for eventual further comparisons. The year 2000 was chosen as the triage demand had dramatically increased making a reassessment of the system necessary. As 1997 could have been part of a "learning period", data of both years were compared and analysed together only if non statistically different. Data quality was assessed by recurrent screening of all variables to detect aberrant or missing values.

### Statistical analysis

The SPSS software (SPSS Inc. Chicago, USA) was used for descriptive statistics as well as non parametric testing (Pearson  $\chi^2$  and Wilcoxon). Results are given for both years together unless stated otherwise.  $P < 0.01$  was considered as significant.

## Results

Out of 38 contacted units, 35 (92%) replied. Table 1 shows the main results.

### Phone call analysis

Out of a total of 7870 forms, 6 (0.08%) were without a main complaint, 46 (0.5%) without the age of the patient, 60 (0.8%) without the time of call, 64 (0.8%) without a management option, 155 (1.9%) without the identity of caller, and 175 (2.2%) without the gender of the patient.

In the years 1997 and 2000, 3242 and 4628 calls respectively were answered, a 43% increase between the two periods. Monthly distributions between 1997 and 2000 were significantly different. As 1997 could have been a "learning period", only the year 2000 was analysed in detail: 42% of all calls were distributed between December and March; during weekdays most of the calls

**Table 1** Main results of postal survey on telephone triage of 38 public-funded Swiss paediatric units

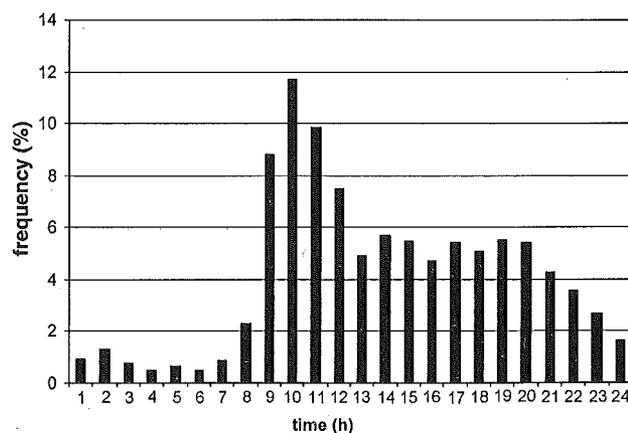
Responding	35/38
TTA system	27/35
Nurse-led telephone triage	23/27
Resident-led telephone triage	2/27
Specific training of triage staff	14/27
Computerised aid to triage	0/27
Written aid to triage	1/27
Transcription of triage process/results	9/27
Plans to adapt/improve triage	12/35

(61%) were between 6 and 11 pm; at weekends or public holidays, calls were evenly distributed during the day after a peak during the mid-morning and with only about 10% between midnight and 7 am (Fig. 1).

Calls were mainly made by mothers (78%), followed by fathers (19%). Fig. 2 shows the age distribution of patients. Median age was 30 months (range 0.5 to 192 months). Some 75% of calls were for children age 5 or less. Only 5% were for children above 10 years of age. Of all calls, 47% were for girls.

The main complaints are shown in Table 2. Earache was the most frequent isolated complaint (16%). Both fever and cough, associated or not, were evaluated in 2029 calls (26%). Ten other specific complaints were discussed in 98 to 655 calls each (1% to 8%). A total of 51 miscellaneous complaints such as headache, seizures, chronic disease, crying, nosebleed or simple questions regarding drug prescription or baby feeding were discussed in 1152 calls (14%).

Management options included telephone advice, referral to the patient's own paediatrician on the following days, telephone transfer to the on-call paediatric resident for further discussion, and appointment with the in house ED within a few hours. The four options were not mutually exclusive. Each call could thus be handled by more than one management option. Only the most informative data are given: in 1997 and 2000, 48%



**Fig. 1** Percentage of calls according to time of day during weekends and public holidays (year 2000 only)

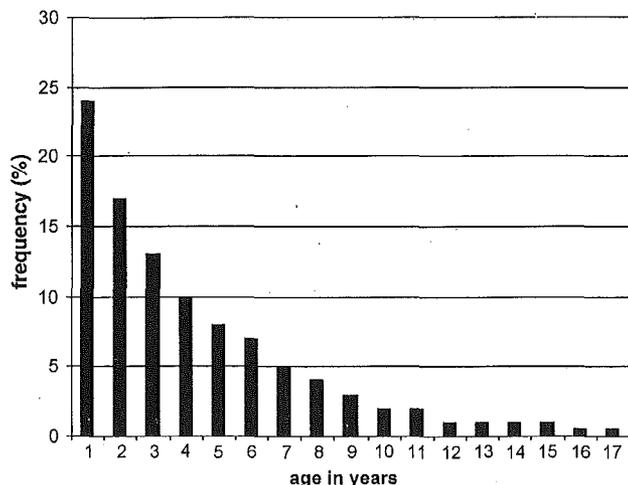


Fig. 2 Age distribution of patients discussed in calls

Table 2 Main symptoms or problems discussed in calls

Complaint	N	%
Earache	1263	16
Fever	1210	15
Rash	655	8
Vomiting	479	6
Cough with fever	460	6
Stomach ache	420	5
Abnormal breathing	369	5
Sore throat	361	5
Cough	359	5
Vomiting with diarrhoea	356	5
Trauma	301	4
Diarrhoea	202	3
Eye abnormality	179	2
Urinary problem	98	1
No reason found	6	<0.1
Miscellaneous	1152	14
Total	7870	100

and 70% respectively (+46%) of calls led to nurses' advice whereas 17% and 14% (-18%) of calls were transferred to the on-call resident and 9% and 4% (-56%) respectively of callers were advised to see their own paediatrician within the next few days. No significant differences were found between both years for the percentage of calls handled by nurse advice only (27%) or leading to a same day ED appointment (56%) and for the proportion of conditions lasting since 24 h or less (72%).

## Discussion

Switzerland, a country with a very small population of about 7,000,000 (or 200,000/state-funded paediatric unit) has a medical system characterised by a compulsory health insurance allowing patients or parents of

paediatric patients to seek medical help from any physician working in a private practice or any ED of state-funded hospitals. During after hours periods 20 years ago, parents could generally reach their child's paediatrician. However, a gradual trend in transferring after-hours care to children from private practices to public ED has emerged, forcing state-funded paediatric units to cope with an increasing demand in unplanned care. A few TTA systems are now run by health insurance companies but their impact on paediatric care has not been published. Furthermore, they have no direct links to paediatric EDs and thus cannot offer continuous care.

Of all public-funded Swiss paediatric units, 92% replied to our survey indicating an interest in TTA. Most run a nurse-led TTA system. Surprisingly, only 50% of the units gave a specific training to their triage staff, only one offered a written aid and none a computerised aid to the triage. Apparently, TTA schemes with specific training and written/computerised aids to clinical decision such as those described in Australia and in the United States [4, 11, 14] or set up by the National Health Service (UK) are uncommon in state-supported Swiss paediatric units. The literature is, however, void of data indicating whether this apparent lack of training and aid to decision-making in the TTA is specific to Switzerland or whether numerous European or even North American units do not invest in such free services which are known to be costly [8]. Furthermore, we are not aware of any randomised trial comparing both methods of TTA, namely with or without any aid, for similar operating staff. The use of TTA protocols does not necessarily mean better standardisation of care, as suggested by Watcher et al. [14] in a study analysing paediatric ED nurses' answers to standardised respiratory cases.

Although retrospective, we believe our study provides useful data on paediatric TTA. First, to ensure clinical quality and reproducibility, the staff was specifically trained in telephone communication, in common paediatric complaints and their treatment as well as in the use of a standardised form. Second, only few (6.4%) forms were incomplete, with a single item missing in 0.08% to 2.2% of all calls, suggesting very thorough data acquisition and thus little bias.

The dramatic increase in the volume of calls between 1997 and 2000 was no surprise since demand in care is constantly increasing [2, 3, 12]. TTA systems have seen similar increases in call numbers, either because more physicians referred their patients to the new system or due to growing population awareness of and satisfaction with the new offer [1, 4, 11]. In 2003, the total number of calls to our triage system reached 6635 (+43% since 2000), indicating, 6 years after the implementation of the new system, a still increasing demand for after-hours advice, even though the population has remained quite stable.

Because of current funding constraints, time distribution analysis of call frequency is crucial to better allocate staff when it is most needed. Similar to the

findings of Poole et al. [11] in Denver, our data stress the winter (42% of annual calls between December and March) and weekdays early evening (61% of calls between 6 and 11 pm) high volume in telephone calls. In addition and not shown in other studies, our findings reveal a weekend and public holiday midmorning surge in telephone calls, with 38% of the daily weekend and public holiday calls distributed between 8 and 12 am.

Our data confirm the findings of Hanson et al. [4] and Philipp et al. [10] that most of the callers are mothers although the latter found slight differences in caller's identity in urban and suburban populations (68% vs. 86% mothers). Our analysis reveals that the vast majority of calls (75%) are for children aged 5 years or less, which was also shown in Australia by Hanson et al. [4] (84%) and in the United States by Poole et al. [11] (about 65%, as inferred from their Figure 4). Those findings stress the need to specifically train all staff members that take part in paediatric triage and to ensure that they all have knowledge as well as practical experience with (small) children and parents. Melzer [7] even suggests that parental satisfaction could be directly linked to the level of paediatric experience of the TTA staff. This majority of calls for young children is a crucial element to promote triage quality since, as revealed by our national questionnaire, paediatric TTA is generally performed by nurses. As many European nursing schools no longer specifically train nurses in paediatrics, nursing experience with (small) children can only be acquired by working in paediatric units, and not during theoretical training sessions to operate as TTA staff.

The main problems or symptoms discussed in calls were similar to those found by Villareal et al. [13] and by Poole et al. [11] apart from ear trouble which was the chief complaint in 16% of our calls versus only 8.5% and 6.2% of their after-hours calls. The most common conditions reported by Hanson et al. [4] were rather dissimilar to those we encountered since 33% of their calls were related to gastrointestinal problems, another 33% to fever and only 3% to ENT conditions (versus 19%, 15% and 21% in our study).

We found that 56% of calls led to a same day ED appointment. Data from other studies are unfortunately not directly comparable since their referral practices and definitions differ from each other and from ours [4, 10, 11]. It seems, however, that the majority of callers (48% in [11] and 72.3% in [4]) are advised to have their child reviewed within 24 h. The volume of calls to our after-hours TTA programme dramatically increased between 1997 and 2000. As the same day appointment rate remained constant between the two periods, the volume of outpatient visits to our ED also increased, putting the whole unit under pressure and implying eventually a staff increase to meet parental demand. Whatever the size of a paediatric ED, the implementation of a TTA system can put the unit under stress because of the sheer workload of phone calls. There are, however, major advantages in any after-hours TTA scheme that has direct links to a paediatric ED: first, it

improves access to paediatric medical care to children whose parents cannot easily leave their workplace during office hours; second, as more patients will call the TTA first instead of simply walking into the ED, it allows better planning of outpatient visits to the ED and thus improves patient flow and quality of care in usually crowded units. We therefore refused to deter parents from calling our ED by implementing a fee-for-service TTA. We tried to improve patients' assessment efficacy by recruiting local paediatricians from private practices to work in our ED during weekends and bank holidays, thus centralising most of out-of-hours paediatric care of the area in our unit.

We also found a statistically significant increase in telephone advice given to callers by nurses between 1997 and 2000 (48% and 70%). This could be part of the operating staff's learning curve, with a positive gradual improvement in skills and confidence to address and support parental worries. This is supported in part by the decrease in call transfer to the on-call resident (-18%) and/or in the recommendation to seek help from the family paediatrician within the next days (-56%). On the other hand, if TTA only aimed at reducing ED visits, the efficiency of our operating staff could be questioned as the increase of nurse advice to callers was not associated with a decrease in referral rate to a same day ED appointment. Another (crude) way of measuring operating staff efficiency could have been to measure the duration of telephone calls, which we unfortunately did not do for the considered periods. In 2001, however, calls to our triage nurses lasted a mean time of 7 min (R. Dassylva, head ED nurse, personal communication), shorter than the 9.5 to 10.4 min reported by Hanson et al. [4] but longer than the 4 to 5 min quoted by Poole et al. [11] and probably longer than that of Philipp et al. [10] where about 85% of all calls lasted less than 5 min. However, the efficiency analysis of any TTA system is bound to be difficult as no severity score assessing a caller's condition has yet been developed.

Finally, most calls (72%) to our TTA system were about conditions having lasted no more than 24 h. We found no data on this topic in the literature. The apparent parental urge to seek professional advice early on their child's new condition probably relates more to social trends and worries than real risks. In 1997 and 2000, 4.2% and 3.4% of non-trauma paediatric patients were transferred from our ED to the paediatric ward [6]. This suggests an overall low risk for all children seen in our ED which indirectly supports that the degree of appropriateness in seeking health care should not neglect the psychosocial context of illness [5]. This very issue is probably crucial to understand why paediatric TTA is used increasingly and so early in a child's condition.

We present data on an after-hours paediatric TTA system in central Europe. Most of the literature on this topic relates North American or Australian experience with some organisational as well as epidemiological differences. Our data should help other units who wish

to set up such a system to better meet population demand with regard to staff training and probable increase in workload.

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