Nurse telephone triage: good quality associated with appropriate decisions

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Background. Triage at out-of-hours GP cooperatives (GPCs) is aimed at determining medical urgency and guiding decisions. Both medical knowledge and communication skills are required for this complex task.

Objective. To explore the impact of quality of consultation and estimated urgency on the appropriateness of decisions.

Methods. We performed a secondary analysis of telephone triage consultations by nurses at 29 Dutch GPCs. Consultations were taped and assessed by trained observers, using a validated instrument. Measures concerned quality of consultation, nurse-estimated urgency (four levels) and appropriateness of decisions (urgency, follow-up advice and timing). Bivariate analyses and logistic multilevel regression analyses were used to explore the impact of quality of consultation (controlling for urgency) on appropriateness of decisions.

Results. The sample included 6739 telephone contacts, most of which (90%) were non-urgent. The majority of decisions were appropriate (91% for urgency, 96% for follow-up advice and 95% for timing). In bivariate analyses, appropriateness of decisions was positively related to higher quality of consultation. Estimated urgency was negatively associated with quality of consultation. Logistic multilevel analysis showed that higher quality of consultation was related to a more appropriate estimation of urgency [odds ratio (OR) = 1.82; 95% confidence interval (CI): 1.69–1.95], follow-up advice (OR = 2.69; 95% CI: 2.41–3.01) and timing of decisions (OR = 2.41; 95% CI: 2.20–2.63).

Conclusions. High quality of consultation has a positive, but small, impact on the appropriateness of decisions. Quality of consultation needs to be targeted in training and support of triage nurses, especially when it concerns highly urgent contacts.

Keywords. After-hours, nursing, primary health care, telephone, triage.

Introduction

An increasing number of western countries provide out-of-hours primary care in large-scale organizations, such as GP cooperatives (GPCs). In these organizations, telephone triage has an important role to guarantee accessible, efficient and safe care. Triage is the process of determining the medical urgency and appropriate type of health care required for patient telephone contacts. In the Netherlands, as in other countries such as the UK, Sweden and Norway, the initial telephone contact typically is with a nurse. Triage nurses are instructed to apply national guidelines and are supervised by a GP. After triage, patients receive self-care advice, a centre consultation or a home visit. Adequate telephone triage is crucial to patient safety and efficiency of health care delivery at out-of-hours primary care.

Telephone triage is a complex task that carries some inherent risks compared to in-person consultation because of the absence of visual contact and non-verbal components of communication. Nurses must rely on auditory rather than visual cues, but patients vary in their ability to communicate about their symptoms. Therefore, communication skills are very important, although an additional range of skills is also required, such as appreciation of verbal cues, focussed history taking and awareness of adequate documentation. Other characteristics of out-of-hours care might also entail a risk: a high patient throughput, diversity of clinical conditions presented, higher probability of urgent conditions, unknown patients, limited knowledge of patients' medical history and a risk of discontinuity in information transfer.

As telephone triage may compromise patient safety, concerns have arisen. These concerns led to
measures being taken to improve the quality of telephone triage, such as a compulsory triage nurse education and development of quality measurement instruments with regular audits of triage contacts.\textsuperscript{2,11} Moreover, as health care resources are limited and telephone triage helps to manage flows and reduce costs,\textsuperscript{14} the importance of good quality of triage is further highlighted. Training focuses on medical knowledge and communication skills, which are important aspects of the triage process.\textsuperscript{7,15,16} However, we are unaware of evidence on the relation between appropriate urgency estimation and the quality of consultation (including medical knowledge and communication). Therefore, our aim was to assess the associations between the estimated urgency, the quality of consultation and the appropriateness of decisions in telephone triage contacts at out-of-hours GPCs. We expected a better quality of consultation to result in more appropriate decisions. On the other hand, we expected a high urgency level to be associated with suboptimal quality of consultation, as triage nurses may take a shortcut to a decision\textsuperscript{11} and want to act quickly. Also, if nurses suspect a potentially highly urgent contact, they might not want to take risks and make a safe decision; this might result in overestimated urgency.

**Methods**

**Study design**

A secondary analysis was performed in a large convenience sample of recorded telephone contacts of Dutch GPCs, which were assessed by trained observers using a validated quality measurement instrument.

**Population and procedure: telephone contacts and assessment**

In the Netherlands, all telephone contacts with GPCs are recorded. Triage nurse education consists of three parts. Regular assessment of a selection of nurse telephone contacts with a quality measurement instrument is an obligatory part. Two Dutch instruments are frequently used,\textsuperscript{15,17} and for this study, we had access to all assessments with the HAAKplus instrument.\textsuperscript{17}

Observers received a specific training to apply the HAAKplus, with a guideline which described the assessment of all items. The training included a yearly update, in order to assess contacts. Following selection of telephone contacts by GPCs, observers assessed nurse telephone contacts of their own GPC as well. They listened to a recorded contact and simultaneously filled out the measurement instrument in a digital environment.

The initial sample included nurse telephone contacts from 29 different GPCs, from April 2008 until the end of January 2010. However, we excluded all contacts of four GPCs; at three GPCs, nurses themselves selected the contacts for assessment and at one GPC, the quality of assessments was questionable. Furthermore, test contacts, training contacts and contacts for personal feedback were not used. The resulting number of included contacts per triage nurse and GPC differed due to a variation in the frequency of assessments.

**Instrument and measures**

The HAAKplus is a validated instrument: it had face and content validity, intrarater agreement varied between 78.4\% and 91.2\% and intrarater agreement varied from 91.6\% to 97.7\%.\textsuperscript{17} The instrument measures the quality of consultation, using items with a dichotomous scale (‘yes’ or ‘no’). The 38 items refer to the six guidelines (Box 1). These guidelines specify four urgency levels, from level 1 (highly urgent) to level 4 (not urgent).

<table>
<thead>
<tr>
<th>Urgency</th>
<th>Definition</th>
<th>Action</th>
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<tbody>
<tr>
<td>1</td>
<td>Life-threatening</td>
<td>\textsuperscript{a}Immediate</td>
</tr>
<tr>
<td>2</td>
<td>Acute</td>
<td>\textsuperscript{a}As soon as possible, within an hour at most</td>
</tr>
<tr>
<td>3</td>
<td>Urgent</td>
<td>Within a couple of hours</td>
</tr>
<tr>
<td>4</td>
<td>Non-urgent</td>
<td>\textsuperscript{a}No time pressure</td>
</tr>
</tbody>
</table>

\textsuperscript{a}Significant differences between urgency levels (chi-square; \textit{p}<0.001).
Analysis
Firstly, we explored the bivariate associations between the measures, using chi-square and t-tests. Nextly, we performed a logistic multilevel analysis to study the effect of quality of consultation on the appropriateness of decisions, thereby controlling for clustering effects. The dependent variables were appropriateness of urgency estimation, follow-up advice and timing. The independent variables were the estimated urgency level and the quality of consultation. For each of the dependent variables, we ran two models, correcting for clustering effects (GPCs and triage nurses). In the first model, we only used quality of consultation. In the second multilevel analysis, we added nurse-estimated urgency to the model. We only presented the second model since the odds ratios (OR’s) only slightly changed. We used SPSS 16.0 for bivariate statistical analyses and MLwin for logistic multilevel analysis.

Results
Description of data
In total, 6739 nurse telephone contacts of 623 triage nurses from 25 GPCs across the Netherlands were available for analysis. Most contacts were non-urgent, either urgency level 3 (37.3%) or level 4 (52.7%; Table 1). In 9.9% of contacts, triage nurses estimated the urgency as urgent (1.4% level 1 and 8.5% level 2). Nurses made appropriate decisions in >90% of contacts, 90.5% for estimation of urgency, 96.1% for estimation of follow-up advice and 94.8% for estimation of timing, respectively. Triage nurses overestimated the level of urgency in 18.8% of level 1 contacts ($n = 18$), and they underestimated 7.1% of level 4 contacts ($n = 251$).

Bivariate associations
The appropriateness of decisions in general tended to decrease for increasing urgency (from level 4 to 1, Table 1). Estimation of urgency was appropriate in 92.9% of non-urgent contacts (level 4) and in 81.3% of urgent contacts (level 1). For follow-up advice, the percentages for appropriate estimations of non-urgent contacts and urgent contacts were 95.5% and 92.7%, respectively, and for timing 95.2% and 86.5%, respectively. Differences between appropriate decisions were significant for most levels.

For contacts with appropriate decisions, nurses achieved a higher score on the quality of consultation (Table 2). The mean score on quality of consultation was 75.7% for appropriate estimation of urgency compared to 65.6% for inappropriate estimations. The difference of 10% was accounted for by a positive score on 3.5 extra items. Concerning the estimation of follow-up advice, the percentages for appropriate and inappropriate estimation were 75.3% and 59.8%, respectively, and concerning the estimation of timing 75.4% and 61.4%, respectively.

The quality of consultation was inversely related to urgency (Table 2), varying from 69.1% for level 1 to

<table>
<thead>
<tr>
<th>TABLE 1</th>
<th>Estimation of urgency by triage nurse and appropriate decisions (%)</th>
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<tbody>
<tr>
<td>Urgency</td>
<td>Estimation of urgency(^a) (% appropriateness)</td>
</tr>
<tr>
<td>---------</td>
<td>---------------------------------------------------------------</td>
</tr>
<tr>
<td>Level 1, $n = 96$ (1.4)</td>
<td>81.3</td>
</tr>
<tr>
<td>Level 2, $n = 574$ (8.5%)</td>
<td>82.2</td>
</tr>
<tr>
<td>Level 3, $n = 2518$ (37.4%)</td>
<td>89.2</td>
</tr>
<tr>
<td>Level 4, $n = 3551$ (52.7%)</td>
<td>92.9</td>
</tr>
<tr>
<td>Total, $N = 6739$</td>
<td>90.5</td>
</tr>
</tbody>
</table>

\(^a\)Significant differences between urgency levels (chi-square; $P < 0.05$), except for 1 versus 2 (urgency), 1 versus 2, 1 versus 4, 2 versus 4 (follow-up advice) and 1 versus 2 and 3 versus 4 (timing).

\(^b\)Triage nurses overestimated the level of urgency in 18.8% of level 1 contacts ($n = 18$), and they underestimated 7.1% of level 4 contacts ($n = 251$).
75.9% for level 4. Urgent contacts scored significantly lower on quality of consultation than non-urgent contacts. The difference on quality of consultation between level 1 and level 4 was 7%.

Logistic multilevel analysis

Logistic multilevel analysis showed that the quality of consultation was positively related to appropriateness of decisions, and this effect remained significant when urgency levels were added to the model (Table 3). In this model, a 10% improvement of quality of consultation resulted in a 1.82 higher probability of an appropriate estimation of urgency [OR 1.82; 95% confidence interval (CI): 1.69–1.95]. Therefore, a positive score on 3.5 items resulted in a 1.82 higher probability. With increasing urgency levels, the probability of an appropriate urgency estimation decreased compared to the lowest urgency level (OR = 0.76 for level 3 to OR = 0.58 for level 1). The probability of an appropriate estimation of follow-up advice and timing was OR 2.69 (95% CI: 2.41–3.01) and OR 2.41 (95% CI: 2.20–2.63), respectively, for every 10% increase in quality of consultation. The probability of an appropriate estimation of follow-up advice was significantly higher for contacts estimated as level 2 and 3 compared to the lowest urgency level 4 (OR 2.25 and 2.18, respectively). The probability of an appropriate decision for timing was higher for level 3 contacts compared to level 4 contacts (OR 1.54; 95% CI: 1.22–1.96).

Discussion

Summary of main findings

The appropriateness of decisions yielded high scores in this sample of telephone contacts. We found a significant positive association between quality of consultation and appropriateness of decision concerning urgency, follow-up advice and timing. Also, high urgency was associated with suboptimal quality of consultation. An increase in urgency seemed to be related to a decrease of appropriate decisions for urgency estimations and an increase for follow-up advice and timing. These findings emphasize the importance of the quality of triage consultations, although the clinical relevance might be limited.

Comparison with existing literature

Two simulated patient studies, which were conducted shortly after the introduction of GPCs in the Netherlands, found higher figures for suboptimal decisions than our study (19% and 51% undertriage, respectively).2111 Over time the quality of triage consultations seems to have improved, which may be related to enhanced clinical experience and professional development of triage nurses. International studies have reported figures on appropriateness in nurse telephone triage varying from 49% up to 98%.131418 Quality of consultation represents a mix of competences, such as communication skills, medical knowledge, history taking and interpretation of answers.11 The question remains which nurse competences are associated with high quality of consultation. Previous studies showed that neither educational background, employment percentage (i.e. hours per week), gender, professional or work experience affected the decision.211819 Also, nurses do not always ask all recommended questions or they ask only a few questions in history taking.1520 Even so, in a previous study, we found that incomplete asking of recommended questions was unrelated to the appropriateness of urgency estimation. There are possibly other features or competencies that are related to high nurse performance, such as self-confidence and other psychological factors.

Also, we found that the quality of consultation was lower in contacts with estimated high urgency. Following identification of a highly urgent contact, nurses probably act rapidly. Consequently, they may not have enough time to deliver high quality of consultation. The question is whether it is necessary to provide a good quality of consultation in these highly urgent contacts since appropriate decisions seem far more important. In fact, highly urgent contacts can be estimated with very few questions.8 On the other hand, rapid triage could also lead to overtriage, which might result in lack of capacity and delay in treatment.21 Perhaps, triage nurses should actually take extra time in apparently highly urgent contacts, to prevent possible overtriage. Conversely, in non-urgent contacts, nurses achieve a higher quality of consultation. Nurses

Table 3 Logistic multilevel analysis of appropriateness of decisions (OR and 95% CI)

<table>
<thead>
<tr>
<th>Triage decisions</th>
<th>Estimation of urgency</th>
<th>Estimation of follow-up advice</th>
<th>Estimation of timing</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>OR</td>
<td>95% CI</td>
<td>OR</td>
</tr>
<tr>
<td>Quality score (/10)</td>
<td>1.82</td>
<td>1.69–1.95</td>
<td>2.69</td>
</tr>
<tr>
<td>Level 1</td>
<td>0.58</td>
<td>0.33–1.03</td>
<td>1.43</td>
</tr>
<tr>
<td>Level 2</td>
<td>0.56</td>
<td>0.43–0.73</td>
<td>2.18</td>
</tr>
<tr>
<td>Level 3</td>
<td>0.76</td>
<td>0.63–0.92</td>
<td>2.25</td>
</tr>
<tr>
<td>Level 4 (reference)</td>
<td>1.00</td>
<td></td>
<td>1.00</td>
</tr>
</tbody>
</table>

*We corrected for clustering effects (GPCs and triage nurses); only for estimation of timing, there was an interaction effect for level 2 and 3 compared to level 4 (not presented in this table).
possibly take more time to collect relevant information and relate with the patient, in order to give appropriate advice and or reassurance and realize patient compliance. Hence, this could improve quality of consultation.

The appropriateness of decisions on estimated urgency decreases with increasing urgency. In situations of high urgency, there seems to be a risk that nurses fail to undertake appropriate actions. Since the incidence of non-urgent contacts is high, nurses consequently have more experience with these requests for help, which might result in more appropriate decisions. Moreover, in case of uncertainty, nurses possibly tend to make safe decisions, resulting in overtriage. Furthermore, nurses probably use pattern recognition, especially in highly urgent contacts, which could result in shortcuts and a potential risk of information loss. In addition, potentially urgent contacts and workload in general could put pressure on triage nurses, which could have resulted in suboptimal performance of nurses.

Strengths and limitations of the study
In this study, we used a large dataset that contained up-to-date information on the performance of nurse telephone consultation in the Netherlands. Furthermore, all contacts were assessed with a validated instrument. The three outcome variables for appropriateness of decisions reflected the definition of triage. In addition, appropriateness of decisions was assessed by individual observers, mainly triage nurses, rather than an expert panel or record review of the follow-up. The best ‘gold standard’ for assessment of appropriateness of triage is debatable, and we might question the use of individual observers for this purpose. Even so, triage nurses are trained to use the national telephone guidelines and assess triage contacts accordingly.

Observers mainly assessed telephone contacts of their own GPCs, which may have reduced the objectivity of assessments. Also, GPCs selected a convenience sample of recorded nurse telephone contacts for quality assessment; this selection might have introduced bias and reduced generalizability. Furthermore, quality of consultation and appropriateness of decisions were measured simultaneously, using the same instrument and the same observers. We cannot rule out that outcomes might have influenced each other. We used assessments with one measurement instrument of 29 GPCs. These GPCs differed concerning size, level of urbanization and organization, but limiting our selection to GPCs which used the HAAKplus might have introduced bias. Although our results were statistically significant, the effect sizes and clinical impact were small. Quality of consultation was measured with a composite measure reflecting 35 items, thus a statistically significant difference implies an increase on three or four items. Other factors might contribute to the decision-making process in telephone triage.

Furthermore, we were not able to control for additional covariates, such as nurse education and experience and patient characteristics, which could have potentially affected our results. Because of our large sample size, we expected that the effect of additional covariates would be limited.

Implications for future research and clinical practice
Firstly, assessment with the HAAKplus should be performed by observers who are employed at other GPCs than the triage nurses, in order to enhance objectivity. Furthermore, discussion should be directed to the necessity of good quality consultation in highly urgent contacts since appropriate decisions seem far more important in these cases. Consequently, the assessment of highly urgent contacts might be directed specifically to the medical content and safety of triage rather than communication skills. In addition, research should focus on quality of consultation and triage decisions in urgent contacts. Is a rapid decision the best option or could extra triage time result in a decrease of overtriage?

Computerized decision support systems (CDSSs) are currently being implemented in the Netherlands, with the objective to improve safety and consistency of triage. However, nurses might not use these support systems as intended. Future research should investigate the use of these CDSSs (e.g. the Netherlands Triage Standard) and the effects on quality of consultation and appropriateness of decisions. Finally, features of nurses and their decision-making process, which are related to good quality consultation and appropriateness of decisions, should be studied. Insight into these important competencies could help in selecting the most suitable triage professionals, considering the increasing demand for emergency care and the expected shortage of health care professionals. Other factors might contribute to quality of triage as well, such as perceived time pressure and organization of the GPC.

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Declaration
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Ethical approval: GPCs consented to participate in this study. The ethical committee Arnhem–Nijmegen waived approval for this study.
Conflict of interest: none.

References


