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Communicative characteristics of general practitioner and nurse-led telephone triage: An observational study of 200 recorded calls

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1 **Communicative characteristics of general practitioner and nurse-led telephone triage: An observational**
2 **study of 200 recorded calls**

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1 ABSTRACT

2 **Objectives:** Out-of hours (OOH) telephone triage is used to manage patient flow, but knowledge of the
3 communicative skills of telephone triagists is limited. The aim of this study was to compare communicative
4 parameters in general practitioner- (GP) and nurse-led OOH telephone triage and to discuss differences in
5 relation to patient-centred communication and safety issues.

6 **Design:** Observational study.

7 **Setting:** Two Danish OOH settings: a large-scale general practitioner cooperative (GPC) in the Central
8 Denmark Region (n=100 GP-led triage conversations) and Medical Helpline 1813 (MH-1813) in the Capital
9 Region of Denmark (n=100 nurse-led-triage conversations with use of a clinical decision support system
10 (CDSS)).

11 **Participants:** 200 audio-recorded telephone triage conversations randomly selected.

12 **Primary and secondary outcome measures:** Conversations were compared regarding duration, speaking
13 time, question types, caller's expression of negative affect and nurses and GPs' responses to caller's
14 negative affectivity by use of the Mann-Whitney U test and the Student's t-test,

15 **Results:** Compared to GPs, nurses had longer telephone contacts (137 vs. 264 sec.; P=0.001) and asked
16 significantly more questions (5 vs. 9 questions; P=0.001). In 36% of nurse-led triage conversations, triage
17 nurses either transferred the call to a physician or had to confer the call with a physician. Nurses gave the
18 callers significantly more spontaneous talking time than GPs (23.4 vs. 17.9 sec.; P=0.01). GPs seemed more
19 likely than nurses to give an emphatic response when a caller spontaneously expressed concern, however
20 this difference was not statistically significant (36 vs. 29%; P= 0.6).

21 **Conclusions:** When comparing communicative parameters in GP and nurse-led triage, several differences
22 were observed. However, the impact of these differences in the perspective of patient-centred

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1 communication and safety needs further research. More knowledge is needed to determine what
2 characterises good quality of telephone triage communication.

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4 **Keywords:**

5 'Telephone triage'; 'communication'; 'out-of-hours'; 'patient safety'

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STRENGTHS AND LIMITATIONS OF THE STUDY

- The first study to thoroughly compare communicative parameters between GPs and nurses in OOH services.
- Use of randomly selected, real-life triage contacts reflect the diversity and challenges the triage meet in an OOH centre.
- Use of clear definitions of communicative parameters.
- Lack of information on call-handlers (e.g. age, sex) and patients' reasons for inquiry.
- Although the contacts were scored by only one rater, a pilot study of five randomly selected triage calls with two independent raters revealed near complete agreement between the raters and all registered expressions of negative affect were discussed by two raters.

1 BACKGROUND

2 Telephone triage (TT) at OOH centres is a well-established system in many western countries [1]. TT is used
3 to handle patient flow and ultimately evaluate patients' need for medical attention and ensure that
4 patients are allocated to the right level of care [2, 3]. It has proven to be efficient and cost saving for health
5 systems [4, 5]. A study found that the introduction of TT increased number of telephone contacts to the
6 OOH centres, but also reduced the need for clinic consultations and home visits performed by general
7 practitioners (GPs) [6].

8 Although TT is frequently used, knowledge of the communicative skills of telephone triagists is limited [7,
9 8]. Studies have identified failure to listen to the caller and inappropriate handling of the caller's worry as
10 frequent threats to patient safety [2, 9, 10]. Other studies comparing GP- and nurse-led TT have mainly
11 focused on call-length and questioning. One study found that GPs and nurses have similar call-length [11]
12 whereas another study found nurses to have longer calls [5]. One study found nurses to mainly ask closed-
13 ended questions [2], and another study found nurses to ask more questions compared to GPs [11].
14 Differences in questioning between GPs and nurses may be explained by nurses' use of computer decision
15 support software (CDSS) [11, 12].

16 An increasing workload in OOH services and shortage of GPs have induced a reorganizing of the OOH
17 centres in many countries including replacing GP- with nurse-led triage [6, 13-15]. In the Capital Region of
18 Denmark the OOH system in 2014 was replaced by the medical helpline 1813 (MH-1813), mainly using
19 nurses to perform the triage [16]. Consequently, the situation in Denmark enables a unique comparison of
20 OOH TT conducted by either a nurse using CDSS or a GP in two presumably similar patient populations.
21 The aim of this study was to compare communicative quality indicators in TT performed by GPs and nurses.
22 We specifically examined length of call [5, 11], spontaneous talking time [17], question types [2, 11] and
23 caller's expression of negative affect and triagist's response [2, 9] as possible indicators of quality TT
24 communication. The study hypotheses were: TT nurses have longer telephone contacts, use more open-

1 ended questions, give the caller more spontaneous talking time before interrupting and respond more
2 emphatic to callers expression of concern compared to TT GPs.

3 4 **METHODS**

5 **Design**

6 We conducted an observational study, assessing 200 audio-recorded TT conversations (100 with nurses and
7 100 with GPs) from two OOH care services in Denmark on a list of communicative quality indicators. This
8 study was part of a bigger study assessing communication, patient safety and efficiency of 1,950 randomly
9 selected TT calls from two Danish health regions: the Central Denmark Region and the Capital Region of
10 Denmark [18].

11 12 **Setting**

13 In Denmark, the OOH services are organised in five administrative regions. Four out of five regions,
14 including Central Denmark region, have a GPC delivering OOH care with GPs performing the TT. In 2014 it
15 was politically determined to replace the OOH system in the Capital Region of Denmark with the medical
16 helpline 1813 (MH-1813) where predominantly nurses using CDSS conduct TT [10, 16]. The Central
17 Denmark Region has a population of 1.2 million citizens [19] and the Capital Region of Denmark 1.7 million
18 citizens [10]. The use of the OOH services in Denmark is free of charge for the callers. Potential outcomes
19 for the triage are home visit, a consultation at an OOH centre or hospital, or the caller is given advice on
20 self-care [10].

21 22 **Selection**

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1 The TT calls were recorded during an inclusion period of two weeks in November 2016. We random
2 selected 200 conversations from the 1,950 conversations used in the main study (figure 1 has inclusion
3 criteria). Inclusion criteria 1 to 5 were applied before inclusion, for the main study, but violation of criteria 6
4 to 8 could first be detected during the assessment process for the current study. Therefore, 125 GP triage
5 calls and 125 nurse triage calls were randomly selected to ensure the goal of 100 nurse and 100 GP TT
6 conversations. Inclusion stopped after assessment of 100 triage conversations in each group (Figure 2).

7 **Outcome measures**

8 To assess the recorded triage conversations the following outcome measures were selected: Length of
9 contact, question types, spontaneous talking time, speaking time triagist and speaking time patient,
10 negative affect and response to negative affect. Some of the outcome measures such as length of contact
11 and question types were selected based on previous studies [11]. Other measures were chosen according
12 to relevance and defined after discussion by the research group. The definitions were:

- 13 • Length of contact: time from start to end of a contact measured in seconds. The time nurses used
14 to confer with a physician was included in length of contact.
- 15 • Question types: open-ended questions, open-ended requests, closed-ended questions and leading
16 questions
 - 17 ○ Open-ended questions: were defined as questions which provide a broad set of response
18 possibilities and facilitate a further (broad) elaboration of the caller's situation or
19 symptoms (e.g. "How can I help you?" or "Could you please describe your pain").
 - 20 ○ Closed-ended questions: were defined as questions, which limit the caller to answers such
21 as "yes" or "no", a number, or a selection from a brief list of choices (e.g. "Does your foot
22 hurt?" or "Is the pain worse in your foot, ankle or toes?").

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4 1 ○ Leading questions: were defined as questions where the triagist intentionally or
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6 2 unintentionally created a question, which more or less led the caller to a specific answer
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9 3 (e.g. “You don’t have a fever, do you?”).

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11 4 We defined some general criteria for determining question types. Firstly, questions were not classified
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14 5 based on the caller’s response but the intention of the triagist. For example, if a caller answered to a
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16 6 closed-ended question with a detailed report, the question was still registered as “closed-ended”. If double
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18 7 questions were asked, only the last question was categorized. And questions/requests about civil
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20 8 registration numbers, personal identification information and the caller’s localization were not registered.

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23 9 • Spontaneous talking time: was defined as the amount of time the caller was allowed to speak
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25 10 uninterruptedly by the triagist, measured from when the caller began to elaborate on the reason
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27 11 for contact until the interruption by the triagist. If the triagist interrupted the caller to gather
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29 12 his/her civil registration number, the spontaneous talking time continued if the triagist afterwards
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31 13 asked the caller to proceed. Supporting the caller to elaborate by using words like “yes” and
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33 14 “please go on” was included into the spontaneous talking time.
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35 15 • Speaking time triagist and speaking time patient were two parameters created to assess the ratio
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37 16 of time the triagist and patient spoke. Filling in medical records was included in the triagist speaking
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39 17 time. For nurse-led triage, time used to consult a physician or calls to plan admission to hospitals
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41 18 was excluded. Patient speaking time included the amount of time the patient used to think of an
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43 19 answer.
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45 20 • Negative affect was defined as caller’s negative emotional expressions related to symptoms or the
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47 21 situation. The expression “I feel pain” was not interpreted as negative affect if the pain did not
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49 22 explicitly lead to a negative emotional affect such as “I feel pain, and it makes me scared”. The
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51 23 negative affect could be expressed verbally (“I am worried”) or non-verbally in form of crying burst
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53 24 or heavy sighs, which is also used in the RIAS-model by Roter and Larson [20]. Each triage
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4 1 conversation was classified as 1) no emotional affect, 2) spontaneously expressed negative affect
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6 2 and 3) invited expression of negative affect (i.e. when the triagist invited the patient to express
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8 his/her emotional state). The sentences containing negative affect were transcribed and registered.
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11 4 • Response to negative affect was registered when the caller had spontaneously expressed negative
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13 5 affect. The triagist response was classified as 'no empathic response' or 'emphatic response'. An
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15 6 emphatic response was defined according to the RIAS-model as: "Statements that paraphrase,
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17 7 interpret, recognize and name the others emotional state" [20]. All responses to spontaneously
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19 8 expressed negative affect were transcribed and registered in order to be assessed by EV and AFP.
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23 9 **Assessment of triage conversation**

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26 10 Based on the above included outcome measures, a standardised scoring scheme was developed and pilot-
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28 11 tested. In the pilot-test, EV and DG analysed individually five conversations, after which they discussed
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30 12 discrepancies. The discrepancies were minor, concerning only one question out of the five calls and did not
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32 13 lead to adjustments. EV analysed remaining 200 conversations using the scoring scheme. All transcribed
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34 14 negative affect and triagists' responses were reviewed and scored by AFP after assessment by EV and in
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36 15 case of disagreement, scoring was discussed until consensus was reached.
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40 16 **Statistical analysis**

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43 17 By use of the Mann-Whitney U test for not normally distributed data and the Student's t-test for unpaired
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45 18 samples for normally distributed data, the following outcomes were compared between GPs and nurses:
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47 19 number of leading questions, closed and open-ended questions, the share of open-ended questions out of
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49 20 the total number of questions, duration of call, triagist's talk time, patient's talk time and patient's share of
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51 21 total talk time. The proportion of calls with spontaneous and requested negative affectivity among GPs and
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53 22 nurses was compared using the Chi-square test. The Chi-square test was also used to compare the
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55 23 proportion of nurses and GPs' calls in which an emphatic response followed spontaneous negative
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57 24 affectivity. Statistical significance was assumed for $p < 0.05$ and was analysed with STATA version 14.2.
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1 RESULTS

2 *Length of contact and talking time (table 1)*

3 Nurses had statistically significantly ($P=0.001$) longer contacts compared to GPs (median length: nurses =
4 264s; GPs = 137s). In 36% of nurse-triage contacts, triage nurses either transferred the contact to a
5 physician or had to confer the contact with a physician. Triage nurses allowed the patients significantly
6 ($P=0.01$) more talking time before interrupting compared with GPs (nurses: median of 23.4s, GPs 17.9 s).
7 GPs had a median speaking time of 66.5 seconds, which was significantly shorter than nurses who had a
8 median speaking time of 120.5 seconds. However, the difference in patients share of talking time when
9 comparing GPs and nurses was not statistically significant (46.8 vs. 47.6%; $P=0.98$).

10 *Question types (table 1)*

11 In general nurses asked more questions than GPs ($P=0.001$). Open-ended questions represented 16.6% of
12 GPs' total number of questions and 18.4% of nurses' (Table 1). The difference was not statistically
13 significant. Nurses used statistically significantly more closed-ended questions ($P=0.001$) and leading
14 questions ($P=0.0045$) compared to GPs. Callers expressed negative affect in 23% of the contacts, which was
15 independent of whether the triagist was nurse or GP (Table 2). In 36% and 29% of contacts with expression
16 of negative affect, GPs and nurses responded emphatically, respectively ($P=0.6$) (Table 3). See Box 1 for
17 examples of emphatic vs non-emphatic response.

18 Callers were invited to express negative affect in four out of the 200 contacts, corresponding to 2%. GPs
19 requested negative affect in 3% of calls and nurses in 1% the difference was not significant.

20 DISCUSSION

21 **Main findings**

22 Compared to GPs, nurses had significantly longer telephone contacts and asked significantly more
23 questions overall. Although nurses compared to GPs used significantly more open-ended questions, no

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4 1 difference was found concerning the share of open-ended questions to total number of questions. Nurses
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6 2 gave callers significantly longer spontaneous talking time, but no difference was found for the patients'
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8 3 share of total talking time. The level of spontaneous as well as invited expression of negative affect was the
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10 4 same in nurse and GP-led triage contacts. The likelihood of an emphatic response to caller's expression of
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12 5 negative affect appeared slightly higher for GPs (36%) than for nurses (29%). This difference was however
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14 6 not significant.

7 **Strength and limitations**

8 This study is one the first to thoroughly compare communicative parameters between GPs and nurses in
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10 9 OOH services. The use of randomly selected, real-life triage contacts reflected the diversity and challenges
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12 10 the triagist meet in an OOH centre, which is a major strength of the present study. We also used clear
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14 11 definitions of communicative parameters, which was lacking in previous studies on the use of open-ended
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16 12 questions [2, 9]. A question, which propose an answer of a "single word structure" (e.g. "yes" or "no") was
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18 13 weighted in our definition of closed-ended questions. In contrast to this definition, the RIAS model also
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20 14 includes "When, where, how many or how long" as closed-ended questions [21]. Our chosen definition of
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22 15 closed-ended questions might have led to an underestimation of these and a subsequent overestimation of
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24 16 open-ended questions. However, since this possible overestimation of open-ended questions is for both
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26 17 GPs and nurses, this potential overestimation has not biased the results. The study also had some
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28 18 limitations. First, the contacts were scored by only one rater (EV). However, a pilot study of five randomly
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30 19 selected triage calls with two independent raters revealed near complete agreement between the raters.
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32 20 Moreover, all registered expressions of negative affect were discussed by two raters to assure consensus of
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34 21 classification of type (spontaneous vs. invited) and response (empathically/non-empathically). Differences
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36 22 in classification of the response (emphatically/non-emphatically) to negative affect were present in less
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38 23 than 2.5% of total calls with an expression of negative affect. Second, we lacked information on call-

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4 1 handlers (e.g. age, sex) and patients' reasons for inquiry to take into account when testing of differences
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6 2 between GPs and nurses.
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9 3 **Comparison with existing literature**

10 4 *Length of contact and speaking time*

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15 5 Mohammed et al. [5] also found that TT nurses had longer calls compared to TT GPs. However, in their
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17 6 study neither GPs nor nurses used CDSS, which could compromise direct comparison between the present
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19 7 and their study. In contrast Murdoch et al. found no difference in contact length when comparing GPs and
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21 8 nurses [11]. We suggest that use of CDSS and high percentage of calls conferred with a physician were
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23 9 reasons for the longer calls in nurse TT. It is unclear what the effect of call duration is on effectiveness and
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25 10 safety. If short on triage staff, longer contacts could increase the waiting line leading to decreased patient
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27 11 satisfaction [22] and being a danger for seriously ill patients not having the opportunity to bypass the line
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29 12 [23].
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34 13 One Swedish study investigated reasons for malpractice claims and found the parameter 'failure to listen'
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36 14 was the most common reason [9]. The median time for spontaneous talking time was approximately 20
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38 15 seconds in our study. It could potentially harm patient safety, if the patient is not allowed to fully elaborate
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40 16 on the symptoms, which could lead to misdiagnosing. An American study reported that patients had an
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42 17 average of 22 seconds before being interrupted [17]. They also showed that allowing the patient to finish
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44 18 his/her speak did not prolong the total consultation length.
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48 19 *Question types*

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51 20 In general, we found nurses to ask more questions than GPs. This might be associated with nurses having
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53 21 longer contacts and their use of the CDSS tool. In agreement to other studies, we found that nurses used
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55 22 more closed-ended than open-ended questions [2, 9]. Murdoch et al. [11] found that nurses asked more
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57 23 questions, mainly being closed-ended, whereas GPs used more open-ended questions. This might be
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1 explained by the CDSS tool, which is designed to gather information on the patients reported symptoms
2 often as a closed-ended question [11]. We found that GPs asked relatively few questions, open-ended as
3 well as closed-ended. Meyers et al. [24] found that doctors have a high level of diagnostic confidence, with
4 a mismatch between confidence and diagnostic accuracy. The few questions in GP-triage could be a result
5 of too high confidence, which potentially could cause inadequate anamnesis and be a risk for patient
6 safety. For unknown reasons, we found nurses to use significantly more leading questions. Leading
7 questions should be avoided as they suggest a certain answer, which may prevent the patient from
8 delivering vital information.

9 *Negative affect*

10 Murdoch et al. found that 43% of GP questions were directed against caller's concerns or expectations and
11 obtaining details of medical history compared to 11% of nurse questions [11]. Our results showed that GPs
12 and nurses invited the patient to express their emotional state in less than 2% of the contacts. This is
13 striking because worry is a frequent motive for contacting OOH care and increases the likelihood of being
14 triaged to a clinical consultation [25]. One study suggested that failure to listen to caller's concern is a
15 probable reason for errors of assessment in TT [9]. One Swedish study found that triage-nurses mainly
16 responded to expression of concerns with closed-ended medical questions, and only 6% of contacts with
17 expression of concerns had an emphatic response from the triagist [2]. In our study, nurses and GPs
18 responded with an emphatic response in 29% and 36% of contacts with spontaneous negative affect,
19 respectively. A possible reason for nurses' lower rate of response to negative affect could be the CDSS tool.
20 When negative affect is unhandled, callers might feel less satisfied and be prone to call again. The focus on
21 empathically responses to expression of negative affect originates from medical literature on patient-
22 centeredness. The concept of patient-centred communication has been introduced as the gold standard of
23 face-to-face consultations resulting in greater patient satisfaction and safety [2, 26]. However, it remains
24 unclear whether patient-centeredness is also the gold standard of telephone triage communication. Triage

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4 1 calls can be of an acute nature where the ultimate goal is to triage the patient acutely to the right level of
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6 2 care, perhaps making patient-centeredness less relevant as also mentioned by Murdoch et al. [11].
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9 3 The study hypotheses regarding TT nurses having longer contacts, using more open-ended questions and
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11 4 giving the caller more spontaneous talking time were confirmed. We did not confirm the hypothesis that
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14 5 nurses responded more emphatically to callers expression of concern compared to TT GPs.
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17 6 *Recommendations for practice and future research*

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- 20 7 • Future studies are necessary to clarify to what degree longer contacts compromise the
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22 8 effectiveness of the triage system, but makes the triage safer for the callers and vice versa.
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24 9 • How to improve triagist handling of negative affect is an important area for further research.
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26 10 • Future studies should examine whether the included quality indicators in this study reflects patient-
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28 11 centeredness, i.e. by determining whether scores on the quality indicators associate with patient
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30 12 satisfaction.
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33 13 • Future studies should examine whether patient-centeredness is relevant to OOH services, e.g.
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35 14 increases TT efficiency and patient safety.
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38 15 **CONCLUSION**

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41 16 This study demonstrated differences in communicative parameters between GP and nurse-led TT. Nurses
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43 17 had longer contacts, asked more questions and gave more spontaneous talking time to callers compared to
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45 18 GPs. GPs seemed to respond slightly more often emphatically to callers spontaneously expressed negative
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47 19 affect compared to nurses, but the difference was not statistically significant. In less than 2% of the calls,
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49 20 the caller was invited to express his/her emotional state. Further research is needed to define high quality
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51 21 TT communication and to assess the consequences of the communicative differences in relation to
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53 22 efficiency of OOH services and patient safety.
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1 LIST OF ABBREVIATIONS

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7 2 Out-of hours (OOH), general practitioner (GP), large-scale general practitioner cooperative (GPC), “Medical
8
9 3 Helpline 1813” (MH-1813), clinical decision support system (CDSS), Telephone triage (TT).

4 DECLARATIONS

5 Competing interests

6 None Declared

7 Funding

8 This study was part of another study supported by the Danish foundation TrygFonden, the Foundation for
9 Primary Health Care Research (*Praksisforskningsfonden*) in the Central Denmark Region, the Committee for
10 Quality Improvement and Continuing Medical Education in general practice (*Kvalitets- og Efteruddannelses-*
11 *udvalget*) in the Central Denmark Region and the Foundation for General Practice (Praktiserende Lægers
12 Uddannelses- og Udviklingsfond).

13 Authors' contributions

14 EV, DG and AFP contributed to the conception and design of the study. EV collected the data and EV, DG
15 and AFP analysed the data. EV wrote the first draft of the study and DG, AFP, LH and MBC provided critical
16 revisions of manuscript and have approved submission of the final manuscript.

17 A data sharing statement

18 Due to problems with safeguarding the confidentiality and anonymity of recorded patient calls and call
19 handlers, there is no data that can be shared.

20 Ethics approval and consent to participate

21 According to Danish law, the study needs no approval from the National Committee on Health Research
22 Ethics, as it included no biomedical intervention. The project has been approved and is registered in the

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4 1 Record of Processing Activities at the Research Unit for General Practice in Aarhus in accordance with the
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6 2 provisions of the General Data Protection Regulation (GDPR).
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17 6 HEADINGS OF FIGURES

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20 7 **Figure 1.** Exclusion criteria
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23 8 **Figure 2:** Flow diagram of included calls
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Box 1: Examples of emphatic vs. non-emphatic response to a patient's expression of negative affect

Example 1: Spontaneous negative affect with an emphatic answer.

Patient: "I am really worried. I don't know what to do"

Triage nurse: "That is only understandable. I will do my best to help you".

Example 2: spontaneous negative affect with a non-emphatic answer.

Patient: "This is totally crazy. I have never experienced anything like this. I am so worried!"

Triage nurse: "So, do you have any pain in your head?"

Example 3: Requested negative affect

Patient: Calls about a son with a high temperature.

GP: "Are you worried about your child? When you are a first time mother I can surely understand if you are worried".

Patient: "Yes, I am very worried about this situation".

GP: "I will do my best to help you and your son".

Table 1. Description of communicative parameters between GP and nurse-led triage

	All n = 200	GPs n = 100	Nurses n = 100	
Outcome	Median (IQI)*	Median(IQI)	Median(IQI)	P-value**
Length of contact (sec)	199 (121-322)	137 (91-231)	264 (178-390)	0.001
Calls consulted with physician (%)		NA***	36 %	
Spontaneous talking time (sec)	19.6 (12-31.8)	17.9 (10.6-27)	23.4 (13.6-36)	0.01
Speaking time triagist (sec)	98 (58-155)	66.5 (45-127)	120.5 (85-194)	0.001
Speaking time patient (sec)	91.5 (56-140)	62 (46-114)	110.5 (87-188)	0.001
Patients' share of total talking time (%)	47.3	46.8	47.6	0.98
Total number of questions (n) ****	7 (4-12)	5 (2-7)	9 (6-15.5)	0.001
Open-ended questions (n) *****	1 (0-2)	1 (0-2)	2 (1-3)	0.001
Closed-ended questions (n)	6 (3-9.5)	3.5 (2-6)	8 (5-13)	0.001
Share of open questions out of total number of questions (%)	17.7(0-33)	16.6 (0-33)	18.4 (0.1-29)	0.838
Leading questions (n)	1 (0-1)	0 (0-1)	1 (0-2)	0.004

*IQI = interquartile interval (25% and 75% percentiles)

** For difference between GPs and nurses

*** NA = not assessed

**** Total number of questions included open-ended and closed-ended questions. Leading questions were not included.

***** Number of questions

1

2 **Table 2.** Negative affect in triage calls and triagist response to spontaneously negative affect

Outcome	All n = 200	GPs n = 100	Nurses N = 100	chi2	P
No spontaneous affect*	154 (77)	78 (78)	76 (76)		
Spontaneous affect	46 (23)	22 (22)	24 (24)	0.11	0.74
No emphatic response	31 (67)	14 (64)	17 (71)		
Emphatic response	15 (33)	8 (36)	7 (29)	0.27	0.6

3 *n (%)

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4 **Table 3.** Requested negative affect. Caller invited by triagist to elaborate on negative affect
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	All	GPs	Nurses		
Outcome	n = 200	n = 100	n = 100	chi2	P
Requested affect*	4 (2)	3 (3)	1 (1)		
No requested affect	196 (98)	97 (97)	99 (99)	1.02	0.3

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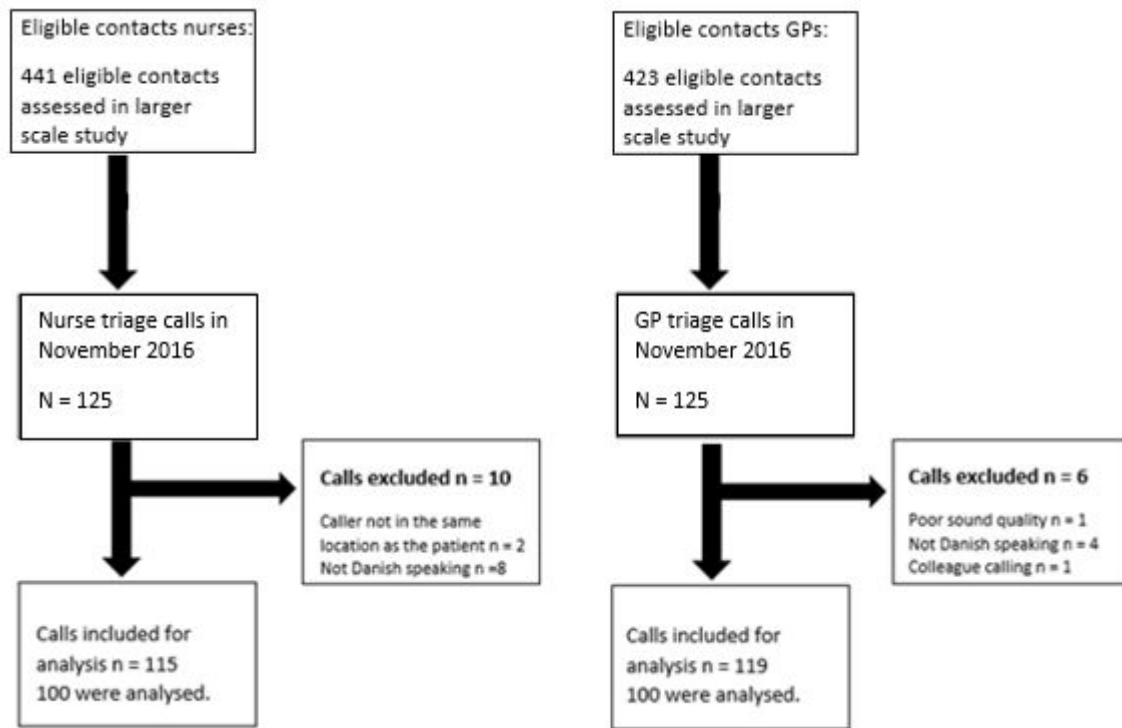
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Figure 1. Exclusion criteria

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1. The patient had ≥ 7 contacts to the OOH service in the inclusion period.
 2. The call was a mistake, e.g. it was not the patient's intention to contact the OOH center or there was no sound.
 3. The patient called for simple renewal of prescription.
 4. The patient called for an estimated time of arrival for a planned home visit or for a telephone number to other healthcare professionals.
 5. Caller was another health professional.
 6. The conversations were of poor sound quality making it impossible to analyze.
 7. The caller was not in the same location as the patient.
 8. The patient was not Danish speaking or not native Danish speaking and this was considered to influence the communication between patient and triagist negatively.
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Figure 2



view only

STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of cross-sectional studies

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	1
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4
Objectives	3	State specific objectives, including any prespecified hypotheses	4-5
Methods			
Study design	4	Present key elements of study design early in the paper	5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5-8
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	6
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	6-8
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	6-8
Bias	9	Describe any efforts to address potential sources of bias	8
Study size	10	Explain how the study size was arrived at	6
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	8
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	8
		(b) Describe any methods used to examine subgroups and interactions	Not applicable
		(c) Explain how missing data were addressed	Not relevant
		(d) If applicable, describe analytical methods taking account of sampling strategy	Not applicable
		(e) Describe any sensitivity analyses	Not applicable
Results			

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	6 and figure 2
		(b) Give reasons for non-participation at each stage	6 and figure 2
		(c) Consider use of a flow diagram	Figure 2
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Not applicable
		(b) Indicate number of participants with missing data for each variable of interest	Not applicable
Outcome data	15*	Report numbers of outcome events or summary measures	Table 1
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	Not applicable
		(b) Report category boundaries when continuous variables were categorized	Not applicable
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	Not applicable
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	Not applicable
Discussion			
Key results	18	Summarise key results with reference to study objectives	9-10
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	10-11
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	11-13
Generalisability	21	Discuss the generalisability (external validity) of the study results	11-13
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	14

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.

BMJ Open

Communicative characteristics of general practitioner and nurse-led telephone triage at two Danish out-of-hours services: An observational study of 200 recorded calls

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9 3 Emil Vilstrup¹, Dennis Schou Graversen^{1,2}, Linda Huibers¹, Morten Bondo Christensen^{1,2} & Anette Fischer
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1 ABSTRACT

2 **Objectives:** Out-of hours (OOH) telephone triage is used to manage patient flow, but knowledge of the
3 communicative skills of telephone triagists is limited. The aim of this study was to compare communicative
4 parameters in general practitioner- (GP) and nurse-led OOH telephone triage and to discuss differences in
5 relation to patient-centred communication and safety issues.

6 **Design:** Observational study.

7 **Setting:** Two Danish OOH settings: a large-scale general practitioner cooperative (GPC) in the Central
8 Denmark Region (n=100 GP-led triage conversations) and Medical Helpline 1813 (MH-1813) in the Capital
9 Region of Denmark (n=100 nurse-led triage conversations with use of a clinical decision support system
10 (CDSS)).

11 **Participants:** 200 audio-recorded telephone triage conversations randomly selected.

12 **Primary and secondary outcome measures:** Conversations were compared regarding length of call,
13 distribution of speaking time, question types, caller's expression of negative affect and nurses and GPs'
14 responses to caller's negative affectivity by use of the Mann-Whitney U test and the Student's t-test,

15 **Results:** Compared to GPs, nurses had longer telephone contacts (137 vs. 264 sec.; P=0.001) and asked
16 significantly more questions (5 vs. 9 questions; P=0.001). In 36% of nurse-led triage conversations, triage
17 nurses either transferred the call to a physician or had to confer the call with a physician. Nurses gave the
18 callers significantly more spontaneous talking time than GPs (23.4 vs. 17.9 sec.; P=0.01). Compared to
19 nurses, GPs seemed more likely to give an emphatic response when a caller spontaneously expressed
20 concern, however this difference was not statistically significant (36 vs. 29%; P= 0.6).

21 **Conclusions:** When comparing communicative parameters in GP and nurse-led triage, several differences
22 were observed. However, the impact of these differences in the perspective of patient-centred

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1 communication and safety needs further research. More knowledge is needed to determine what
2 characterises good quality of telephone triage communication.

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4 **Keywords:**

5 'Telephone triage'; 'communication'; 'out-of-hours'; 'patient safety'; 'Denmark'

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1 STRENGTHS AND LIMITATIONS OF THE STUDY

- 2 • The first study to thoroughly compare communicative parameters between GPs and nurses in OOH
3 services.
- 4 • Use of randomly selected, real-life triage contacts reflect the diversity and challenges the triagist
5 meet in an OOH service.
- 6 • Use of clear definitions of communicative parameters.
- 7 • Lack of information on call-handlers (e.g. age, sex) and patients' reasons for inquiry.
- 8 • One rater scored all contacts, but a pilot study of five randomly selected triage calls with two
9 independent raters revealed near complete agreement between the raters and two raters
10 discussed all registered expressions of negative affect.

1 BACKGROUND

2 Telephone triage (TT) at OOH centres is a well-established system in many western countries [1]. TT is used
3 to handle patient flow and ultimately evaluate patients' need for medical attention and ensure that
4 patients are allocated to the right level of care, which is important elements of patient safety and efficiency
5 [2, 3]. It has proven to be efficient and cost saving for health systems [4, 5]. A study found that the
6 introduction of TT increased number of telephone contacts to the OOH centres, but also reduced the need
7 for clinic consultations and home visits performed by general practitioners (GPs) [6].

8 Although TT is frequently used, knowledge of the communicative skills of telephone triagists is limited and
9 there seems to be no agreement on indicators of what characterises good quality in telephone triage [7, 8].

10 Studies have identified failure to listen to the caller and inappropriate handling of the caller's worry as
11 frequent threats to patient safety [2, 9, 10]. Other studies comparing GP- and nurse-led TT have mainly
12 focused on call-length and questioning. One study found that GPs and nurses have similar call-length [11]
13 whereas another study found nurses to have longer calls [5]. One study found nurses to mainly ask closed-
14 ended questions [2], and another study found nurses to ask more questions compared to GPs [11].

15 Differences in questioning and call length between GPs and nurses may be explained by nurses' use of
16 computer decision support software (CDSS) [11, 12]. One study found call length to correlate with the
17 quality of communication and studies have mentioned short calls as a potential risk to patient safety [2,
18 13].

19 An increasing workload in OOH services and shortage of GPs have induced a reorganizing of the OOH
20 centres in many countries including replacing GP- with nurse-led triage [6, 14-16]. Studies have suggested
21 nurse TT to decrease the GP workload in primary care [17, 18] In the Capital Region of Denmark the OOH
22 system in 2014 was replaced by the medical helpline 1813 (MH-1813), mainly using nurses to perform the
23 triage [19]. Consequently, the situation in Denmark enables a unique comparison of OOH TT conducted by
24 either a nurse using CDSS or a GP in two presumably similar patient populations.

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4 1 The aim of this study was to compare communicative quality indicators in TT performed by GPs and nurses.
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6 2 We specifically examined length of call [5, 11], spontaneous talking time[20], question types [2, 11] and
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8 3 caller's expression of negative affect and triagist's response [2, 9] as possible indicators of quality TT
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10 4 communication. The study hypotheses were: TT nurses have longer telephone contacts, give the caller
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12 5 more spontaneous talking time before interrupting and respond more emphatic to callers expression of
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14 6 concern compared to TT GPs. Due to mixed previous findings regarding questioning technique, this aspect
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16 7 was examined as a research question: How does use of open and closed-ended questions associate with
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18 8 profession?
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30 10 **METHODS**

29 11 **Design**

32 12 We conducted an observational study, assessing 200 audio-recorded TT conversations (100 with nurses and
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34 13 100 with GPs) from two OOH care services in Denmark on a list of communicative quality indicators. This
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36 14 study was nested within a larger scale study assessing communication, patient safety and efficiency of
37
38 15 1,950 randomly selected TT calls from two Danish health regions: the Central Denmark Region and the
39
40 16 Capital Region of Denmark [21].
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43 17 **Patient and Public Involvement**

46 18 Patients were not involved through use of recordings of real-life calls to OOH services. The findings of the
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48 19 study will be shared with the public to whom quality of OOH services is of high importance.
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54 21 **Setting**

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1 In Denmark, the OOH services are organised in five administrative regions. Four out of five regions,
2 including Central Denmark region, have a GPC delivering OOH care with GPs performing the TT. In 2014, it
3 was politically determined to replace the OOH service in the Capital Region of Denmark with the medical
4 helpline 1813 (MH-1813) where predominantly registered nurses using CDSS conduct TT [10, 19]. The
5 nurses performing TT at MH-1813 all undergo a 6-week introduction programme and MH-1813 conducts
6 audits of nurse contacts [21]. The CDSS triage tool is a locally developed tool with detailed guidelines
7 divided into three main sections: somatic illness, somatic injury and psychiatric illness. The tool supports
8 the nurses' decision-making, by suggesting essential questions based on a selected symptom as well as the
9 most accurate triage outcome [10]. The Central Denmark Region has a population of 1.2 million citizens
10 [22] and the Capital Region of Denmark 1.7 million citizens [10]. The nurses at MH-1813 and GPs at the GPC
11 answer the same type of calls, as both services are the first point of contact when experiencing none life
12 threatening health problems outside office hours. In both regions, emergency medical services take care of
13 the life-threatening health problems. The use of the OOH services in Denmark is free of charge for the
14 callers. Potential outcomes for the triage are home visit, a consultation at an OOH centre or hospital, or the
15 caller is given advice on self-care [10].

17 Selection

18 The TT calls were recorded during an inclusion period of two weeks in November 2016. We random
19 selected 200 conversations from the 1,950 conversations used in the larger-scale study (figure 1 displays
20 exclusion criteria). Exclusion criteria 1 to 5 were applied before inclusion, for the larger scale study, but
21 violation of criteria 6 to 8 could first be detected during the assessment process for the current study.
22 Therefore, 125 GP triage calls and 125 nurse triage calls were randomly selected to ensure the goal of 100
23 nurse and 100 GP TT conversations. Inclusion stopped after assessment of 100 triage conversations in each
24 group (Figure 2).

1 Outcome measures

2 To assess the recorded triage conversations the following outcome measures were selected: Length of
3 contact, question types, spontaneous talking time, speaking time triagist and speaking time patient,
4 negative affect and response to negative affect. Some of the outcome measures such as length of contact
5 and question types were selected based on previous studies [11]. Other measures were chosen according
6 to relevance and defined after discussion by the research group. The definitions were:

- 7 • Length of contact: time from start to end of a contact measured in seconds. The time nurses used
8 to confer with a physician was included in length of contact.
- 9 • Question types: open-ended questions, open-ended requests, closed-ended questions and leading
10 questions
 - 11 ○ Open-ended questions: were defined as questions which provide a broad set of response
12 possibilities and facilitate a further (broad) elaboration of the caller's situation or
13 symptoms (e.g. "How can I help you?" or "Could you please describe your pain").
 - 14 ○ Closed-ended questions: were defined as questions, which limit the caller to answers such
15 as "yes" or "no", a number, or a selection from a brief list of choices (e.g. "Does your foot
16 hurt?" or "Is the pain worse in your food, ankle or toes?").
 - 17 ○ Leading questions: were defined as questions where the triagist intentionally or
18 unintentionally created a question, which more or less led the caller to a specific answer
19 (e.g. "You don't have a fever, do you?").

20 We defined some general criteria for determining question types. Firstly, questions were not classified
21 based on the caller's response but the intention of the triagist. For example, if a caller answered to a
22 closed-ended question with a detailed report, the question was still registered as "closed-ended". If double
23 questions were asked, only the last question was categorized. In addition, questions/requests about civil
24 registration numbers, personal identification information and the caller's localization were not registered.

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4 1 • Spontaneous talking time: was defined as the amount of time the caller was allowed to speak
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6 2 uninterrupted by the triagist, measured from when the caller began to elaborate on the reason
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8 3 for contact until the interruption by the triagist. If the triagist interrupted the caller to gather
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10 4 his/her civil registration number, the spontaneous talking time continued if the triagist afterwards
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12 5 asked the caller to proceed. Supporting the caller to elaborate by using words like “yes” and
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14 6 “please go on” was included into the spontaneous talking time.
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17 7 • Speaking time triagist and speaking time patient were two parameters created to assess the ratio
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19 8 of time the triagist and patient spoke. Filling in medical records was included in the triagist speaking
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21 9 time. For nurse-led triage, time used to consult a physician or calls to plan admission to hospitals
22
23 10 was excluded. Patient speaking time included the amount of time the patient used to think of an
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25 11 answer.
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28 12 • Negative affect was defined as caller’s negative emotional expressions related to symptoms or the
29
30 13 situation. The expression “I feel pain” was not interpreted as negative affect if the pain did not
31
32 14 explicitly lead to a negative emotional affect such as “I feel pain, and it makes me scared”. The
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34 15 negative affect could be expressed verbally (“I am worried”) or non-verbally in form of crying burst
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36 16 or heavy sighs, which is also used in the RIAS-model by Roter and Larson [23]. Each triage
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38 17 conversation was classified as 1) no emotional affect, 2) spontaneously expressed negative affect
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40 18 and 3) invited expression of negative affect (i.e. when the triagist invited the patient to express
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42 19 his/her emotional state). The sentences containing negative affect were transcribed and registered.
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45 20 • Response to negative affect was registered when the caller had spontaneously expressed negative
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47 21 affect. The triagist response was classified as ‘no empathic response’ or ‘emphatic response’. An
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49 22 emphatic response was defined according to the RIAS-model as: “Statements that paraphrase,
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51 23 interpret, recognize and name the others emotional state” [23]. All responses to spontaneously
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53 24 expressed negative affect were transcribed and registered in order to be assessed by EV and AFP.
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59 25 **Assessment of triage conversation**

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4 1 Based on the included outcome measures, a standardised scoring scheme was developed and pilot-tested.
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6 2 In the pilot test, EV and DSG analysed individually five conversations, after which they discussed
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8 3 discrepancies. The discrepancies were minor, concerning only one question out of the five calls and did not
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10 4 lead to adjustments. EV analysed remaining 200 conversations using the scoring scheme. All transcribed
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12 5 negative affect and triagists' responses were reviewed and scored by AFP after assessment by EV and in
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14 6 case of disagreement, scoring was discussed until consensus was reached.
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18 7 **Statistical analysis**

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21 8 Using the Mann-Whitney U test for non-normal distributed data and the Student's t-test for unpaired
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23 9 samples for normally distributed data, the following outcomes were compared between GPs and nurses:
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25 10 number of leading questions, closed and open-ended questions, proportion of open-ended questions out of
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27 11 the total number of questions, duration of call, triagist's talking time, patient's talking time and patient's
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29 12 share of total talking time. The proportion of calls with spontaneous and requested negative affectivity
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31 13 among GPs and nurses was compared using the Chi-square test. The Chi-square test was also used to
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33 14 compare the proportion of nurses and GPs' calls in which an emphatic response followed spontaneous
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35 15 negative affectivity. Statistical significance was assumed for $p < 0.05$ and was analysed with STATA version
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42 17 **RESULTS**

43 18 *Length of contact and talking time*

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45 19 Nurses had statistically significantly ($P=0.001$) longer contacts compared to GPs (median length: nurses =
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47 20 264s; GPs = 137s) (*table 1*). In 36% of nurse-triage contacts, triage nurses either transferred the contact to a
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49 21 physician or had to confer the contact with a physician. Triage nurses allowed the patients significantly
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51 22 ($P=0.01$) more talking time before interrupting compared with GPs (nurses: median of 23.4s, GPs 17.9 s).
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53 23 GPs had a median speaking time of 66.5 seconds, which was significantly shorter than nurses who had a
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4 1 median speaking time of 120.5 seconds. However, the difference in patients share of talking time when
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6 2 comparing GPs and nurses was not statistically significant (46.8 vs. 47.6%; $P=0.98$).

3 *Question types*

4 In general nurses asked more questions than GPs ($P=0.001$). Open-ended questions represented 16.6% of
5 GPs' total number of questions and 18.4% of nurses' (Table 1). The difference was not statistically
6 significant. Nurses used statistically significantly more closed-ended questions ($P=0.001$) and leading
7 questions ($P=0.0045$) compared to GPs. Callers expressed negative affect in 23% of the contacts, which was
8 independent of whether the triagist was nurse or GP (Table 2). In 36% and 29% of contacts with expression
9 of negative affect, GPs and nurses responded emphatically, respectively ($P=0.6$) (Table 3). See Box 1 for
10 examples of emphatic vs non-emphatic response.

11 Callers were invited to express negative affect in four out of the 200 contacts, corresponding to 2%. GPs
12 requested negative affect in 3% of calls and nurses in 1% the difference was not significant.

13 **DISCUSSION**

14 **Main findings**

15 Compared to GPs, nurses had significantly longer telephone contacts and asked significantly more
16 questions overall. Although nurses compared to GPs used significantly more open-ended questions, no
17 difference was found concerning the share of open-ended questions to total number of questions. Nurses
18 gave callers significantly longer spontaneous talking time, but no difference was found for the patients'
19 share of total talking time. The level of spontaneous as well as invited expression of negative affect was the
20 same in nurse and GP-led triage contacts. The likelihood of an emphatic response to caller's expression of
21 negative affect appeared slightly higher for GPs (36%) than for nurses (29%). This difference was however
22 not significant.

23 **Strength and limitations**

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4 1 This study is one the first to thoroughly compare communicative parameters between GPs and nurses in
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6 2 OOH services. The use of randomly selected, real-life triage contacts reflected the diversity and challenges
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8 3 the triagist meet in an OOH centre, which is a major strength of the present study. We also used clear
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10 4 definitions of communicative parameters, which was lacking in previous studies on the use of open-ended
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12 5 questions [2, 9]. A question, which propose an answer of a “single word structure” (e.g. “yes” or “no”) was
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14 6 weighted in our definition of closed-ended questions. In contrast to this definition, the RIAS model also
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16 7 includes “When, where, how many or how long” as closed-ended questions [24]. Our chosen definition of
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18 8 closed-ended questions might have led to an underestimation of these and a subsequent overestimation of
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20 9 open-ended questions. However, since this possible overestimation of open-ended questions is for both
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22 10 GPs and nurses, this potential overestimation has not biased the results. The study also had some
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24 11 limitations. First, only one rater (EV) scored the contacts. However, a pilot study of five randomly selected
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26 12 triage calls with two independent raters revealed near complete agreement between the raters.
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28 13 Moreover, all registered expressions of negative affect were discussed by two raters to assure consensus of
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30 14 classification of type (spontaneous vs. invited) and response (empathically/non-empathically). Differences
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32 15 in classification of the response (emphatically/non-emphatically) to negative affect were present in less
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34 16 than 2.5% of total calls with an expression of negative affect. Second, as we lacked information on call-
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36 17 handlers (e.g. age, sex) and patients’ reasons for contact and primary symptom, we could not take these
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38 18 aspects into account when testing differences between GPs and nurses. As triagists were kept anonymous,
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40 19 we were unable to cluster the analyses on triagist level and, as a consequence, assumptions of
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42 20 independency among observations might be violated.
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21 **Comparison with existing literature**

22 *Length of contact and speaking time*

23 Mohammed et al. [5] also found that TT nurses had longer calls compared to TT GPs. However, in their
24 study neither GPs nor nurses used CDSS, which could compromise direct comparison between the present
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1 and their study. In contrast Murdoch et al. found no difference in contact length when comparing GPs and
2 nurses [11]. We suggest that use of CDSS and high percentage of calls conferred with a physician were
3 reasons for the longer calls in nurse TT. It is unclear what the effect of call length is on effectiveness and
4 patient safety. A short call may be efficient in the short term, but inefficient in the long term, if a patient
5 calls again due to unmet needs. If triagist are too few, longer contacts could increase the waiting line
6 leading to decreased patient satisfaction [25] and being a danger for seriously ill patients not having the
7 opportunity to bypass the line [26].

8 One Swedish study investigated reasons for malpractice claims and found the parameter 'failure to listen'
9 was the most common reason [9]. The median time for spontaneous talking time was approximately 20
10 seconds in our study. It could potentially harm patient safety, if the patient is not allowed to fully elaborate
11 on the symptoms, which could lead to misdiagnosing. An American study reported that patients had an
12 average of 22 seconds before being interrupted [20]. They also showed that allowing the patient to finish
13 his/her speak did not prolong the total consultation length [20].

14 *Question types*

15 In general, we found nurses to ask more questions than GPs. This might be associated with nurses having
16 longer contacts and their use of the CDSS tool. In agreement to other studies, we found that nurses used
17 more closed-ended than open-ended questions [2, 9]. Murdoch et al. [11] found that nurses asked more
18 questions, mainly being closed-ended, whereas GPs used more open-ended questions. This might be
19 explained by the CDSS tool, which is designed to gather information on the patients reported symptoms
20 often as a closed-ended question [11]. We found that GPs asked relatively few questions, open-ended as
21 well as closed-ended. Meyers et al. [27] found that doctors have a high level of diagnostic confidence, with
22 a mismatch between confidence and diagnostic accuracy. The few questions in GP-triage could be a result
23 of too high confidence, which potentially could cause inadequate anamnesis and be a risk for patient
24 safety. For unknown reasons, we found nurses to use significantly more leading questions. Leading

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4 1 questions has the potential to suggest a certain answer, which may prevent the patient from delivering vital
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6 2 information.

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9 3 *Negative affect*

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12 4 Murdoch et al. found that 43% of GP questions were directed against caller's concerns or expectations and
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14 5 obtaining details of medical history compared to 11% of nurse questions [11]. Our results showed that GPs
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16 6 and nurses invited the patient to express their emotional state in less than 2% of the contacts. This is
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18 7 striking because worry is a frequent motive for contacting OOH care and increases the likelihood of being
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20 8 triaged to a clinical consultation [28]. One study suggested that failure to listen to caller's concern is a
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22 9 probable reason for errors of assessment in TT [9]. One Swedish study found that triage-nurses mainly
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24 10 responded to expression of concerns with closed-ended medical questions, and only 6% of contacts with
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26 11 expression of concerns had an emphatic response from the triagist [2]. In our study, nurses and GPs
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28 12 responded with an emphatic response in 29% and 36% of contacts with spontaneous negative affect,
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30 13 respectively. A possible reason for nurses' lower rate of response to negative affect could be the CDSS tool.
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32 14 When negative affect is unhandled, callers might feel less satisfied and be prone to call again. The focus on
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34 15 empathically responses to expression of negative affect originates from medical literature on patient-
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36 16 centeredness. The concept of patient-centred communication has been introduced as the gold standard of
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38 17 face-to-face consultations resulting in greater patient satisfaction and safety [2, 29]. However, it remains
39
40 18 unclear whether patient-centeredness is also the gold standard of telephone triage communication.
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42 19 Occasionally, calls to the OOH service concern severe acute conditions and emergencies needing for the
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44 20 professional to guide and direct the caller more strictly. The ultimate goal of TT is timely triage of the
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46 21 patient to the right level of care. Murdoch et al. raised the question whether patient-centeredness is the
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48 22 gold standard of triage communication or if this would contribute to longer triage times than considered
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50 23 necessary to perform the triage [11].
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1 The study hypotheses regarding TT nurses having longer contacts, using more open-ended questions and
2 giving the caller more spontaneous talking time were confirmed. We did not confirm the hypothesis that
3 nurses responded more emphatically to callers expression of concern compared to TT GPs.

4 *Recommendations for practice and future research*

- 5 • Future studies are necessary to investigate the relation of length of triage contact with
6 effectiveness and safety, to check the hypotheses of longer contacts being less efficient but more
7 safe.
- 8 • How to improve triagist handling of negative affect is an important area for further research.
- 9 • Future studies should examine whether the included quality indicators in this study reflects patient-
10 centeredness, i.e. by determining whether scores on the quality indicators associate with patient
11 satisfaction.
- 12 • Future studies should examine whether patient-centeredness is relevant to OOH services, e.g.
13 increases TT efficiency and patient safety.

14 **CONCLUSION**

15 This study demonstrated differences in communicative parameters between GP and nurse-led TT. Nurses
16 had longer contacts, asked more questions and gave more spontaneous talking time to callers compared to
17 GPs. GPs seemed to respond slightly more often emphatically to callers spontaneously expressed negative
18 affect compared to nurses, but the difference was not statistically significant. In less than 2% of the calls,
19 the caller was invited to express his/her emotional state. Further research is needed to define high quality
20 TT communication and to assess the consequences of the communicative differences in relation to
21 efficiency of OOH services and patient safety.

23 **LIST OF ABBREVIATIONS**

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4 1 Out-of hours (OOH), general practitioner (GP), large-scale general practitioner cooperative (GPC), “Medical
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6 2 Helpline 1813” (MH-1813), clinical decision support system (CDSS), Telephone triage (TT).
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9 3 **DECLARATIONS**
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12 4 **Acknowledgments**
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15 5 The authors thank the MH-1813 and GPC organisation for contribution in regards to collection of telephone
16
17 6 calls and MH-1813 the delivery of manpower for the collection of calls.
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20 7 **Competing interests**
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22
23 8 None Declared
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30
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33 12 Quality Improvement and Continuing Medical Education in general practice (*Kvalitets- og Efteruddannelses-*
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35 13 *udvalget*) in the Central Denmark Region and the Foundation for General Practice (Praktiserende Lægers
36
37 14 Uddannelses- og Udviklingsfond).
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41 15 **Authors' contributions**
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44 16 EV, DSG and AFP contributed to the conception and design of the study. EV collected the data and EV, DSG
45
46 17 and AFP analysed the data. EV wrote the first draft of the study and DSG, AFP, LH and MBC provided critical
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48 18 revisions of manuscript and have approved submission of the final manuscript.
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51 19 **A data sharing statement**
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54 20 Due to problems with safeguarding the confidentiality and anonymity of recorded patient calls and call
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56 21 handlers, there is no data that can be shared.
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1 Ethics approval and consent to participate

2 According to Danish law, the study needs no approval from the National Committee on Health Research
3 Ethics, as it included no biomedical intervention. The project has been approved and is registered in the
4 Record of Processing Activities at the Research Unit for General Practice in Aarhus in accordance with the
5 provisions of the General Data Protection Regulation (GDPR).

6 HEADINGS OF FIGURES

7 **Figure 1.** Exclusion criteria

8 **Figure 2:** Flow diagram of included calls

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For peer review only

Box 1: Examples of emphatic vs. non-emphatic response to a patient's expression of negative affect

Example 1: Spontaneous negative affect with an emphatic answer.

Patient: "I am really worried. I don't know what to do"

Triage nurse: "That is only understandable. I will do my best to help you"

Example 2: Spontaneous negative affect with a non-emphatic answer.

Patient: "This is totally crazy. I have never experienced anything like this. I am so worried!"

Triage nurse: "So do you have any pain in your head?"

Example 3: Requested negative affect.

Patient: Calls about a son with a high temperature.

GP: "Are you worried about your child? When you are a first time mother I can surely understand if you are worried".

Patient: "Yes I am very worried about this situation"

GP: "I will do my best to help you and your son"

1 **Table 1.** Description of communicative parameters between GP and nurse-led triage

	All	GPs	Nurses	
	n = 200	n = 100	n = 100	
Outcome	Median (IQI)*	Median(IQI)	Median(IQI)	P-value**
Length of contact (sec)	199 (121-322)	137 (91-231)	264 (178-390)	0.001
Calls consulted with physician (%)		NA***	36 %	
Spontaneous talking time (sec)	19.6 (12-31.8)	17.9 (10.6-27)	23.4 (13.6-36)	0.01
Speaking time triagist (sec)	98 (58-155)	66.5 (45-127)	120.5 (85-194)	0.001
Speaking time patient (sec)	91.5 (56-140)	62 (46-114)	110.5 (87-188)	0.001
Patients' share of total talking time (%)	47.3	46.8	47.6	0.98
Total number of questions (n) ****	7 (4-12)	5 (2-7)	9 (6-15.5)	0.001
Open-ended questions (n)*****	1 (0-2)	1 (0-2)	2 (1-3)	0.001
Closed-ended questions (n)	6 (3-9.5)	3.5 (2-6)	8 (5-13)	0.001
Share of open questions out of total number of questions (%)	17.7(0-33)	16.6 (0-33)	18.4 (0.1-29)	0.838
Leading questions (n)	1 (0-1)	0 (0-1)	1 (0-2)	0.004

2 *IQI = interquartile interval (25% and 75% percentiles)

3 ** For difference between GPs and nurses

4 *** NA = not assessed

5 **** Total number of questions included open-ended and closed-ended questions. Leading questions were
6 not included.

7 ***** Number of questions

11 **Table 2.** Negative affect in triage calls and triagist response to spontaneously negative affect

	All	GPs	Nurses
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Outcome	n = 200	n = 100	N = 100	chi2	P
No spontaneous affect*	154 (77)	78 (78)	76 (76)		
Spontaneous affect	46 (23)	22 (22)	24 (24)	0.11	0.74
No emphatic response	31 (67)	14 (64)	17 (71)		
Emphatic response	15 (33)	8 (36)	7 (29)	0.27	0.6

*n (%)

For peer review only

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4 **Table 3.** Requested negative affect. Caller invited by triagist to elaborate on negative affect
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	All	GPs	Nurses		
Outcome	n = 200	n = 100	n = 100	chi2	P
Requested affect*	4 (2)	3 (3)	1 (1)		
No requested affect	196 (98)	97 (97)	99 (99)	1.02	0.3

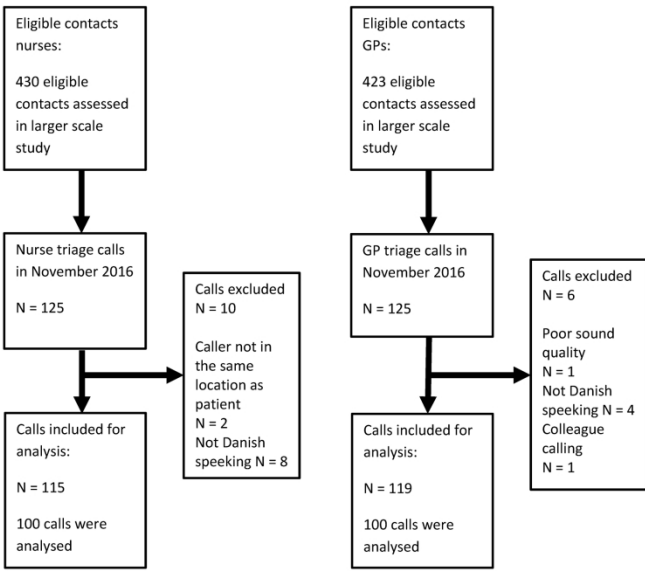
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1. The patient had ≥ 7 contacts to the OOH service in the inclusion period.
 2. The call was a mistake, e.g. it was not the patient's intention to contact the OOH center or there was no sound.
 3. The patient called for simple renewal of prescription.
 4. The patient called for an estimated time of arrival for a planned home visit or for a telephone number to other healthcare professionals.
 5. Caller was another health professional.
 6. The conversations were of poor sound quality making it impossible to analyze.
 7. The caller was not in the same location as the patient.
 8. The patient was not Danish speaking or not native Danish speaking and this was considered to influence the communication between patient and triagist negatively.
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STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of cross-sectional studies

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	1
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4
Objectives	3	State specific objectives, including any prespecified hypotheses	4-5
Methods			
Study design	4	Present key elements of study design early in the paper	5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5-8
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	6
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	6-8
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	6-8
Bias	9	Describe any efforts to address potential sources of bias	8
Study size	10	Explain how the study size was arrived at	6
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	8
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	8
		(b) Describe any methods used to examine subgroups and interactions	Not applicable
		(c) Explain how missing data were addressed	Not relevant
		(d) If applicable, describe analytical methods taking account of sampling strategy	Not applicable
		(e) Describe any sensitivity analyses	Not applicable
Results			

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	6 and figure 2
		(b) Give reasons for non-participation at each stage	6 and figure 2
		(c) Consider use of a flow diagram	Figure 2
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Not applicable
		(b) Indicate number of participants with missing data for each variable of interest	Not applicable
Outcome data	15*	Report numbers of outcome events or summary measures	Table 1
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	Not applicable
		(b) Report category boundaries when continuous variables were categorized	Not applicable
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	Not applicable
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	Not applicable
Discussion			
Key results	18	Summarise key results with reference to study objectives	9-10
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	10-11
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	11-13
Generalisability	21	Discuss the generalisability (external validity) of the study results	11-13
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	14

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.

BMJ Open

Communicative characteristics of general practitioner and nurse-led telephone triage at two Danish out-of-hours services: An observational study of 200 recorded calls

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4 1 **Communicative characteristics of general practitioner and nurse-led telephone triage at two Danish out-**
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6 2 **of-hours services: An observational study of 200 recorded calls**
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9 3 Emil Vilstrup¹, Dennis Schou Graversen^{1,2}, Linda Huibers¹, Morten Bondo Christensen^{1,2} & Anette Fischer
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1 ABSTRACT

2 **Objectives:** Out-of hours (OOH) telephone triage is used to manage patient flow, but knowledge of the
3 communicative skills of telephone triagists is limited. The aim of this study was to compare communicative
4 parameters in general practitioner- (GP) and nurse-led OOH telephone triage and to discuss differences in
5 relation to patient-centred communication and safety issues.

6 **Design:** Observational study.

7 **Setting:** Two Danish OOH settings: a large-scale general practitioner cooperative (GPC) in the Central
8 Denmark Region (n=100 GP-led triage conversations) and Medical Helpline 1813 (MH-1813) in the Capital
9 Region of Denmark (n=100 nurse-led triage conversations with use of a clinical decision support system
10 (CDSS)).

11 **Participants:** 200 audio-recorded telephone triage conversations randomly selected.

12 **Primary and secondary outcome measures:** Conversations were compared regarding length of call,
13 distribution of speaking time, question types, caller's expression of negative affect and nurses and GPs'
14 responses to caller's negative affectivity by use of the Mann-Whitney U test and the Student's t-test,

15 **Results:** Compared to GPs, nurses had longer telephone contacts (137 vs. 264 sec.; P=0.001) and asked
16 significantly more questions (5 vs. 9 questions; P=0.001). In 36% of nurse-led triage conversations, triage
17 nurses either transferred the call to a physician or had to confer the call with a physician. Nurses gave the
18 callers significantly more spontaneous talking time than GPs (23.4 vs. 17.9 sec.; P=0.01). Compared to
19 nurses, GPs seemed more likely to give an emphatic response when a caller spontaneously expressed
20 concern, however this difference was not statistically significant (36 vs. 29%; P= 0.6).

21 **Conclusions:** When comparing communicative parameters in GP and nurse-led triage, several differences
22 were observed. However, the impact of these differences in the perspective of patient-centred

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1 communication and safety needs further research. More knowledge is needed to determine what
2 characterises good quality of telephone triage communication.

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4 **Keywords:**

5 'Telephone triage'; 'communication'; 'out-of-hours'; 'patient safety'; 'Denmark'

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1 STRENGTHS AND LIMITATIONS OF THE STUDY

- 2 • The first study to thoroughly compare communicative parameters between GPs and nurses in OOH
3 services.
- 4 • Use of randomly selected, real-life triage contacts reflect the diversity and challenges the triagist
5 meet in an OOH service.
- 6 • Use of clear definitions of communicative parameters.
- 7 • Lack of information on call-handlers (e.g. age, sex) and patients' reasons for inquiry.
- 8 • One rater scored all contacts, but a pilot study of five randomly selected triage calls with two
9 independent raters revealed near complete agreement between the raters and two raters
10 discussed all registered expressions of negative affect.

1 BACKGROUND

2 Telephone triage (TT) at OOH centres is a well-established system in many western countries [1]. TT is used
3 to handle patient flow and ultimately evaluate patients' need for medical attention and ensure that
4 patients are allocated to the right level of care, which is important elements of patient safety and efficiency
5 [2, 3]. According to the World Health Organization (WHO), patient safety can be defined as the absence of
6 preventable harm to a patient during the process of health care and reduction of risk of unnecessary harm
7 associated with health care to an acceptable minimum [4]. It has proven to be efficient and cost saving for
8 health systems [5, 6]. A study found that the introduction of TT increased number of telephone contacts to
9 the OOH centres, but also reduced the need for clinic consultations and home visits performed by general
10 practitioners (GPs) [7].

11 Although TT is frequently used, knowledge of the communicative skills of telephone triagists is limited and
12 there seems to be no agreement on indicators of what characterises good quality in telephone triage [8, 9].
13 Studies have identified failure to listen to the caller and inappropriate handling of the caller's worry as
14 frequent threats to patient safety [2, 10, 11]. Other studies comparing GP- and nurse-led TT have mainly
15 focused on call-length and questioning. One study found that GPs and nurses have similar call-length [12]
16 whereas another study found nurses to have longer calls [6]. One study found nurses to mainly ask closed-
17 ended questions [2], and another study found nurses to ask more questions compared to GPs [12].
18 Differences in questioning and call length between GPs and nurses may be explained by nurses' use of
19 computer decision support software (CDSS) [12, 13]. One study found call length to correlate with the
20 quality of communication and studies have mentioned short calls as a potential risk to patient safety [2,
21 14].

22 An increasing workload in OOH services and shortage of GPs have induced a reorganizing of the OOH
23 centres in many countries including replacing GP- with nurse-led triage [7, 15-17]. Studies have suggested
24 nurse TT to decrease the GP workload in primary care [18, 19] In the Capital Region of Denmark the OOH

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4 1 system in 2014 was replaced by the medical helpline 1813 (MH-1813), mainly using nurses to perform the
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6 2 triage [20]. Consequently, the situation in Denmark enables a unique comparison of OOH TT conducted by
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8 3 either a nurse using CDSS or a GP in two presumably similar patient populations.
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11 4 The aim of this study was to compare communicative parameters in TT performed by GPs and nurses. We
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13 5 specifically examined length of call [6, 12], spontaneous talking time[21], question types [2, 12] and caller's
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15 6 expression of negative affect and triagist's response to negative affect [2, 10]. The study hypotheses were:
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17 7 TT nurses have longer telephone contacts, give the caller more spontaneous talking time before
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19 8 interrupting and respond more emphatic to callers expression of concern compared to TT GPs. Due to
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21 9 mixed previous findings regarding questioning technique, this aspect was examined as a research question:
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23 10 How does use of open and closed-ended questions associate with profession?
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31 12 **METHODS**

34 13 **Design**

36 14 We conducted an observational study, assessing 200 audio-recorded TT conversations (100 with nurses and
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38 15 100 with GPs) from two OOH care services in Denmark on a list of communicative quality indicators. This
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40 16 study was nested within a larger scale study assessing communication, patient safety and efficiency of
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42 17 1,950 randomly selected TT calls from two Danish health regions: the Central Denmark Region and the
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44 18 Capital Region of Denmark [22].
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49 19 **Patient and Public Involvement**

51 20 Patients were not involved through use of recordings of real-life calls to OOH services. The findings of the
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53 21 study will be shared with the public to whom quality of OOH services is of high importance.
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1 **Setting**

2 In Denmark, the OOH services are organised in five administrative regions. Four out of five regions,
3 including Central Denmark region, have a GPC delivering OOH care with GPs performing the TT. In 2014, it
4 was politically determined to replace the OOH service in the Capital Region of Denmark with the medical
5 helpline 1813 (MH-1813) where predominantly registered nurses using CDSS conduct TT [11, 20]. The
6 nurses performing TT at MH-1813 all undergo a 6-week introduction programme and MH-1813 conducts
7 audits of nurse contacts [22]. The CDSS triage tool is a locally developed tool with detailed guidelines
8 divided into three main sections: somatic illness, somatic injury and psychiatric illness. The tool supports
9 the nurses' decision-making, by suggesting essential questions based on a selected symptom as well as the
10 most accurate triage outcome [11]. The Central Denmark Region has a population of 1.2 million citizens
11 [23] and the Capital Region of Denmark 1.7 million citizens [11]. The nurses at MH-1813 and GPs at the GPC
12 answer the same type of calls, as both services are the first point of contact when experiencing none life
13 threatening health problems outside office hours. In both regions, emergency medical services take care of
14 the life-threatening health problems. The use of the OOH services in Denmark is free of charge for the
15 callers. Potential outcomes for the triage are home visit, a consultation at an OOH centre or hospital, or the
16 caller is given advice on self-care [11].

17 **Selection**

18 The TT calls were recorded during an inclusion period of two weeks in November 2016. We random
19 selected 200 conversations from the 1,950 conversations used in the larger-scale study (figure 1 displays
20 exclusion criteria). Exclusion criteria 1 to 5 were applied before inclusion, for the larger scale study, but
21 violation of criteria 6 to 8 could first be detected during the assessment process for the current study.
22 Therefore, 125 GP triage calls and 125 nurse triage calls were randomly selected to ensure the goal of 100

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4 1 nurse and 100 GP TT conversations. Inclusion stopped after assessment of 100 triage conversations in each
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6 2 group (Figure 2).
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9 3 **Outcome measures**

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12 4 To assess the recorded triage conversations the following outcome measures were selected: Length of
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14 5 contact, question types, spontaneous talking time, speaking time triagist and speaking time patient,
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16 6 negative affect and response to negative affect. Some of the outcome measures such as length of contact
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18 7 and question types were selected based on previous studies [12]. Other measures were chosen according
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20 8 to relevance and defined after discussion by the research group. The definitions were:

- 21 9 • Length of contact: time from start to end of a contact measured in seconds. The time nurses used
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23 10 to confer with a physician was included in length of contact.
- 24 11 • Question types: open-ended questions, open-ended requests, closed-ended questions and leading
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26 12 questions
 - 27 13 ○ Open-ended questions: were defined as questions which provide a broad set of response
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29 14 possibilities and facilitate a further (broad) elaboration of the caller's situation or
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31 15 symptoms (e.g. "How can I help you?" or "Could you please describe your pain").
 - 32 16 ○ Closed-ended questions: were defined as questions, which limit the caller to answers such
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34 17 as "yes" or "no", a number, or a selection from a brief list of choices (e.g. "Does your foot
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36 18 hurt?" or "Is the pain worse in your food, ankle or toes?").
 - 37 19 ○ Leading questions: were defined as questions where the triagist intentionally or
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39 20 unintentionally created a question, which more or less led the caller to a specific answer
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41 21 (e.g. "You don't have a fever, do you?").

42 22 We defined some general criteria for determining question types. Firstly, questions were not classified
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44 23 based on the caller's response but the intention of the triagist. For example, if a caller answered to a
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46 24 closed-ended question with a detailed report, the question was still registered as "closed-ended". If double
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- 1 questions were asked, only the last question was categorized. In addition, questions/requests about civil
2 registration numbers, personal identification information and the caller's localization were not registered.
- 3 • Spontaneous talking time: was defined as the amount of time the caller was allowed to speak
4 uninterrupted by the triagist, measured from when the caller began to elaborate on the reason
5 for contact until the interruption by the triagist. If the triagist interrupted the caller to gather
6 his/her civil registration number, the spontaneous talking time continued if the triagist afterwards
7 asked the caller to proceed. Supporting the caller to elaborate by using words like "yes" and
8 "please go on" was included into the spontaneous talking time.
 - 9 • Speaking time triagist and speaking time patient were two parameters created to assess the ratio
10 of time the triagist and patient spoke. Filling in medical records was included in the triagist speaking
11 time. For nurse-led triage, time used to consult a physician or calls to plan admission to hospitals
12 was excluded. Patient speaking time included the amount of time the patient used to think of an
13 answer.
 - 14 • Negative affect was defined as caller's negative emotional expressions related to symptoms or the
15 situation. The expression "I feel pain" was not interpreted as negative affect if the pain did not
16 explicitly lead to a negative emotional affect such as "I feel pain, and it makes me scared". The
17 negative affect could be expressed verbally ("I am worried") or non-verbally in form of crying burst
18 or heavy sighs, which is also used in the RIAS-model by Roter and Larson [24]. Each triage
19 conversation was classified as 1) no emotional affect, 2) spontaneously expressed negative affect
20 and 3) invited expression of negative affect (i.e. when the triagist invited the patient to express
21 his/her emotional state). The sentences containing negative affect were transcribed and registered.
 - 22 • Response to negative affect was registered when the caller had spontaneously expressed negative
23 affect. The triagist response was classified as 'no empathic response' or 'emphatic response'. An
24 emphatic response was defined according to the RIAS-model as: "Statements that paraphrase,

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4 1 interpret, recognize and name the others emotional state" [24]. All responses to spontaneously
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6 2 expressed negative affect were transcribed and registered in order to be assessed by EV and AFP.
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9 3 **Assessment of triage conversation**

10 4 Based on the included outcome measures, a standardised scoring scheme was developed and pilot-tested.
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12 5 In the pilot test, EV and DSG analysed individually five conversations, after which they discussed
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14 6 discrepancies. The discrepancies were minor, concerning only one question out of the five calls and did not
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16 7 lead to adjustments. EV analysed remaining 200 conversations using the scoring scheme. All transcribed
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18 8 negative affect and triagists' responses were reviewed and scored by AFP after assessment by EV and in
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20 9 case of disagreement, scoring was discussed until consensus was reached.
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26 10 **Statistical analysis**

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29 11 Using the Mann-Whitney U test for non-normal distributed data and the Student's t-test for unpaired
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31 12 samples for normally distributed data, the following outcomes were compared between GPs and nurses:
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33 13 number of leading questions, closed and open-ended questions, proportion of open-ended questions out of
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35 14 the total number of questions, duration of call, triagist's talking time, patient's talking time and patient's
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37 15 share of total talking time. The proportion of calls with spontaneous and requested negative affectivity
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39 16 among GPs and nurses was compared using the Chi-square test. The Chi-square test was also used to
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41 17 compare the proportion of nurses and GPs' calls in which an emphatic response followed spontaneous
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43 18 negative affectivity. Statistical significance was assumed for $p < 0.05$ and was analysed with STATA version
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50 20 **RESULTS**

51 52 53 21 *Length of contact and talking time*

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56 22 Nurses had statistically significantly ($P = 0.001$) longer contacts compared to GPs (median length: nurses =
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58 23 264s; GPs = 137s) (*table 1*). In 36% of nurse-triage contacts, triage nurses either transferred the contact to a
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1 physician or had to confer the contact with a physician. Triage nurses allowed the patients significantly
2 (P=0.01) more talking time before interrupting compared with GPs (nurses: median of 23.4s, GPs 17.9 s).
3 GPs had a median speaking time of 66.5 seconds, which was significantly shorter than nurses who had a
4 median speaking time of 120.5 seconds. However, the difference in patients share of talking time when
5 comparing GPs and nurses was not statistically significant (46.8 vs. 47.6%; P=0.98).

6 *Question types*

7 In general nurses asked more questions than GPs (P=0.001). Open-ended questions represented 16.6% of
8 GPs' total number of questions and 18.4% of nurses' (Table 1). The difference was not statistically
9 significant. Nurses used statistically significantly more closed-ended questions (P=0.001) and leading
10 questions (P=0.0045) compared to GPs. Callers expressed negative affect in 23% of the contacts, which was
11 independent of whether the triagist was nurse or GP (Table 2). In 36% and 29% of contacts with expression
12 of negative affect, GPs and nurses responded emphatically, respectively (P=0.6) (Table 3). See Box 1 for
13 examples of emphatic vs non-emphatic response.

14 Callers were invited to express negative affect in four out of the 200 contacts, corresponding to 2%. GPs
15 requested negative affect in 3% of calls and nurses in 1% the difference was not significant.

16 **DISCUSSION**

17 **Main findings**

18 Compared to GPs, nurses had significantly longer telephone contacts and asked significantly more
19 questions overall. Although nurses compared to GPs used significantly more open-ended questions, no
20 difference was found concerning the share of open-ended questions to total number of questions. Nurses
21 gave callers significantly longer spontaneous talking time, but no difference was found for the patients'
22 share of total talking time. The level of spontaneous as well as invited expression of negative affect was the
23 same in nurse and GP-led triage contacts. The likelihood of an emphatic response to caller's expression of

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4 1 negative affect appeared slightly higher for GPs (36%) than for nurses (29%). This difference was however
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6 2 not significant.
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9 3 **Strength and limitations**

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12 4 This study is one the first to thoroughly compare communicative parameters between GPs and nurses in
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14 5 OOH services. The use of randomly selected, real-life triage contacts reflected the diversity and challenges
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16 6 the triagist meet in an OOH centre, which is a major strength of the present study. We also used clear
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18 7 definitions of communicative parameters, which was lacking in previous studies on the use of open-ended
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20 8 questions [2, 10]. A question, which propose an answer of a “single word structure” (e.g. “yes” or “no”) was
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22 9 weighted in our definition of closed-ended questions. In contrast to this definition, the RIAS model also
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24 10 includes “When, where, how many or how long” as closed-ended questions [25]. Our chosen definition of
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26 11 closed-ended questions might have led to an underestimation of these and a subsequent overestimation of
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28 12 open-ended questions. However, since this possible overestimation of open-ended questions is for both
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30 13 GPs and nurses, this potential overestimation has not biased the results. The study also had some
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32 14 limitations. First, only one rater (EV) scored the contacts. However, a pilot study of five randomly selected
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34 15 triage calls with two independent raters revealed near complete agreement between the raters.
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36 16 Moreover, all registered expressions of negative affect were discussed by two raters to assure consensus of
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38 17 classification of type (spontaneous vs. invited) and response (empathically/non-empathically). Differences
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40 18 in classification of the response (emphatically/non-emphatically) to negative affect were present in less
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42 19 than 2.5% of total calls with an expression of negative affect. Second, as we lacked information on call-
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44 20 handlers (e.g. age, sex) and patients’ reasons for contact and primary symptom, we could not take these
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46 21 aspects into account when testing differences between GPs and nurses. As triagists were kept anonymous,
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48 22 we were unable to cluster the analyses on triagist level and, as a consequence, assumptions of
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50 23 independency among observations might be violated.
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58 24 **Comparison with existing literature**

1 *Length of contact and speaking time*

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7 2 Mohammed et al. [6] also found that TT nurses had longer calls compared to TT GPs. However, in their
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9 3 study neither GPs nor nurses used CDSS, which could compromise direct comparison between the present
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11 4 and their study. In contrast Murdoch et al. found no difference in contact length when comparing GPs and
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13 5 nurses [12]. We suggest that use of CDSS and high percentage of calls conferred with a physician were
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15 6 reasons for the longer calls in nurse TT. It is unclear what the effect of call length is on effectiveness and
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17 7 patient safety. A short call may be efficient in the short term, but inefficient in the long term, if a patient
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19 8 calls again due to unmet needs. If triagist are too few, longer contacts could increase the waiting line
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21 9 leading to decreased patient satisfaction [26] and being a danger for seriously ill patients not having the
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23 10 opportunity to bypass the line [27].

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28 11 One Swedish study investigated reasons for malpractice claims and found the parameter 'failure to listen'
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30 12 was the most common reason [10]. The median time for spontaneous talking time was approximately 20
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32 13 seconds in our study. It could potentially harm patient safety, if the patient is not allowed to fully elaborate
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34 14 on the symptoms, which could lead to misdiagnosing. An American study reported that patients had an
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36 15 average of 22 seconds before being interrupted [21]. They also showed that allowing the patient to finish
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38 16 his/her speak did not prolong the total consultation length [21].

39 17 *Question types*

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42 18 In general, we found nurses to ask more questions than GPs. This might be associated with nurses having
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44 19 longer contacts and their use of the CDSS tool. In agreement to other studies, we found that nurses used
45
46 20 more closed-ended than open-ended questions [2, 10]. Murdoch et al. [12] found that nurses asked more
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48 21 questions, mainly being closed-ended, whereas GPs used more open-ended questions. This might be
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50 22 explained by the CDSS tool, which is designed to gather information on the patients reported symptoms
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52 23 often as a closed-ended question [12]. We found that GPs asked relatively few questions, open-ended as
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54 24 well as closed-ended. Meyers et al. [28] found that doctors have a high level of diagnostic confidence, with
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4 1 a mismatch between confidence and diagnostic accuracy. The few questions in GP-triage could be a result
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6 2 of too high confidence, which potentially could cause inadequate anamnesis and be a risk for patient
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8 3 safety. For unknown reasons, we found nurses to use significantly more leading questions. Leading
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10 4 questions has the potential to suggest a certain answer, which may prevent the patient from delivering vital
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12 5 information.

16 6 *Negative affect*

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19 7 Murdoch et al. found that 43% of GP questions were directed against caller's concerns or expectations and
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21 8 obtaining details of medical history compared to 11% of nurse questions [12]. Our results showed that GPs
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23 9 and nurses invited the patient to express their emotional state in less than 2% of the contacts. This is
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25 10 striking because worry is a frequent motive for contacting OOH care and increases the likelihood of being
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27 11 triaged to a clinical consultation [29]. One study suggested that failure to listen to caller's concern is a
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29 12 probable reason for errors of assessment in TT [10]. One Swedish study found that triage-nurses mainly
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31 13 responded to expression of concerns with closed-ended medical questions, and only 6% of contacts with
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33 14 expression of concerns had an emphatic response from the triagist [2]. In our study, nurses and GPs
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35 15 responded with an emphatic response in 29% and 36% of contacts with spontaneous negative affect,
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37 16 respectively. A possible reason for nurses' lower rate of response to negative affect could be the CDSS tool.
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39 17 When negative affect is unhandled, callers might feel less satisfied and be prone to call again. The focus on
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41 18 empathically responses to expression of negative affect originates from medical literature on patient-
42
43 19 centeredness. The concept of patient-centred care is regarded as crucial for patient satisfaction and safety
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45 20 [30]. Patient-centred communication, one of the cornerstones of patient-centred care, has been introduced
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47 21 as the gold standard of face-to-face consultations and is widely endorsed as a central component of high
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49 22 quality health care [31]. However, it remains unclear whether patient-centeredness is also the gold
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51 23 standard of telephone triage communication. Occasionally, calls to the OOH service concern severe acute
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53 24 conditions and emergencies needing for the professional to guide and direct the caller more strictly. The
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1 ultimate goal of TT is timely triage of the patient to the right level of care. Murdoch et al. raised the
2 question whether patient-centeredness is the gold standard of triage communication or if this would
3 contribute to longer triage times than considered necessary to perform the triage [12].

4 The study hypotheses regarding TT nurses having longer contacts, using more open-ended questions and
5 giving the caller more spontaneous talking time were confirmed. We did not confirm the hypothesis that
6 nurses responded more emphatically to callers expression of concern compared to TT GPs.

7 *Recommendations for practice and future research*

- 8 • Future studies are necessary to investigate the relation of length of triage contact with
9 effectiveness and safety, to check the hypotheses of longer contacts being less efficient but more
10 safe.
- 11 • How to improve triagist handling of negative affect is an important area for further research.
- 12 • Future studies should examine whether the included quality indicators in this study reflects patient-
13 centeredness, i.e. by determining whether scores on the quality indicators associate with patient
14 satisfaction.
- 15 • Future studies should examine whether patient-centeredness is relevant to OOH services, e.g.
16 increases TT efficiency and patient safety.

17 **CONCLUSION**

18 This study demonstrated differences in communicative parameters between GP and nurse-led TT. Nurses
19 had longer contacts, asked more questions and gave more spontaneous talking time to callers compared to
20 GPs. GPs seemed to respond slightly more often emphatically to callers spontaneously expressed negative
21 affect compared to nurses, but the difference was not statistically significant. In less than 2% of the calls,
22 the caller was invited to express his/her emotional state. Further research is needed to define high quality

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4 1 TT communication and to assess the consequences of the communicative differences in relation to
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6 2 efficiency of OOH services and patient safety.
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12 4 **LIST OF ABBREVIATIONS**

15 5 Out-of hours (OOH), general practitioner (GP), large-scale general practitioner cooperative (GPC), "Medical
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17 6 Helpline 1813" (MH-1813), clinical decision support system (CDSS), Telephone triage (TT).
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20 7 **DECLARATIONS**

23 8 **Acknowledgments**

26 9 The authors thank the MH-1813 and GPC organisation for contribution in regards to collection of telephone
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28 10 calls and MH-1813 the delivery of manpower for the collection of calls.
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31 11 **Competing interests**

34 12 None Declared
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42 15 Primary Health Care Research (*Praksisforskningsfonden*) in the Central Denmark Region, the Committee for
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44 16 Quality Improvement and Continuing Medical Education in general practice (*Kvalitets- og Efteruddannelses-*
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46 17 *udvalget*) in the Central Denmark Region and the Foundation for General Practice (*Praktiserende Lægers*
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48 18 *Uddannelses- og Udviklingsfond*).
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52 19 **Authors' contributions**

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4 1 EV, DSG and AFP contributed to the conception and design of the study. EV collected the data and EV, DSG
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6 2 and AFP analysed the data. EV wrote the first draft of the study and DSG, AFP, LH and MBC provided critical
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8 3 revisions of manuscript and have approved submission of the final manuscript.
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11 4 **A data sharing statement**

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14 5 Due to problems with safeguarding the confidentiality and anonymity of recorded patient calls and call
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16 6 handlers, there is no data that can be shared.
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19 7 **Ethics approval and consent to participate**

20 8 According to Danish law, the study needs no approval from the National Committee on Health Research
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22 9 Ethics, as it included no biomedical intervention. The project has been approved and is registered in the
23
24 10 Record of Processing Activities at the Research Unit for General Practice in Aarhus in accordance with the
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26 11 provisions of the General Data Protection Regulation (GDPR).
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30 12 **HEADINGS OF FIGURES**

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34 13 **Figure 1.** Exclusion criteria
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37 14 **Figure 2:** Flow diagram of included calls
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For peer review only

Box 1: Examples of emphatic vs. non-emphatic response to a patient's expression of negative affect

Example 1: Spontaneous negative affect with an emphatic answer.

Patient: "I am really worried. I don't know what to do"

Triage nurse: "That is only understandable. I will do my best to help you"

Example 2: Spontaneous negative affect with a non-emphatic answer.

Patient: "This is totally crazy. I have never experienced anything like this. I am so worried!"

Triage nurse: "So do you have any pain in your head?"

Example 3: Requested negative affect.

Patient: Calls about a son with a high temperature.

GP: "Are you worried about your child? When you are a first time mother I can surely understand if you are worried".

Patient: "Yes I am very worried about this situation"

GP: "I will do my best to help you and your son"

1 **Table 1.** Description of communicative parameters between GP and nurse-led triage

	All	GPs	Nurses	
	n = 200	n = 100	n = 100	
Outcome	Median (IQI)*	Median(IQI)	Median(IQI)	P-value**
Length of contact (sec)	199 (121-322)	137 (91-231)	264 (178-390)	0.001
Calls consulted with physician (%)		NA***	36 %	
Spontaneous talking time (sec)	19.6 (12-31.8)	17.9 (10.6-27)	23.4 (13.6-36)	0.01
Speaking time triagist (sec)	98 (58-155)	66.5 (45-127)	120.5 (85-194)	0.001
Speaking time patient (sec)	91.5 (56-140)	62 (46-114)	110.5 (87-188)	0.001
Patients' share of total talking time (%)	47.3	46.8	47.6	0.98
Total number of questions (n) ****	7 (4-12)	5 (2-7)	9 (6-15.5)	0.001
Open-ended questions (n)*****	1 (0-2)	1 (0-2)	2 (1-3)	0.001
Closed-ended questions (n)	6 (3-9.5)	3.5 (2-6)	8 (5-13)	0.001
Share of open questions out of total number of questions (%)	17.7(0-33)	16.6 (0-33)	18.4 (0.1-29)	0.838
Leading questions (n)	1 (0-1)	0 (0-1)	1 (0-2)	0.004

2 *IQI = interquartile interval (25% and 75% percentiles)

3 ** For difference between GPs and nurses

4 *** NA = not assessed

5 **** Total number of questions included open-ended and closed-ended questions. Leading questions were
6 not included.

7 ***** Number of questions

11 **Table 2.** Negative affect in triage calls and triagist response to spontaneously negative affect

	All	GPs	Nurses
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Outcome	n = 200	n = 100	N = 100	chi2	P
No spontaneous affect*	154 (77)	78 (78)	76 (76)		
Spontaneous affect	46 (23)	22 (22)	24 (24)		
				0.11	0.74
No emphatic response	31 (67)	14 (64)	17 (71)		
Emphatic response	15 (33)	8 (36)	7 (29)		
				0.27	0.6

*n (%)

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4 **Table 3.** Requested negative affect. Caller invited by triagist to elaborate on negative affect
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	All	GPs	Nurses		
Outcome	n = 200	n = 100	n = 100	chi2	P
Requested affect*	4 (2)	3 (3)	1 (1)		
No requested affect	196 (98)	97 (97)	99 (99)	1.02	0.3

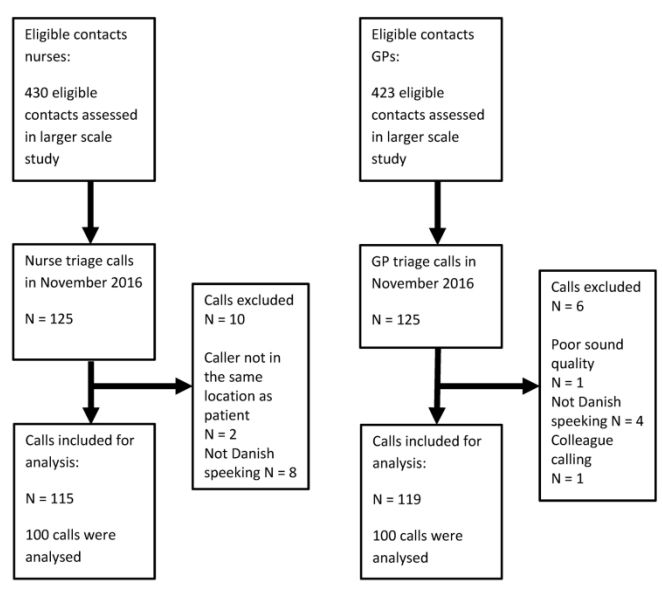
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1. The patient had ≥ 7 contacts to the OOH service in the inclusion period.
 2. The call was a mistake, e.g. it was not the patient's intention to contact the OOH center or there was no sound.
 3. The patient called for simple renewal of prescription.
 4. The patient called for an estimated time of arrival for a planned home visit or for a telephone number to other healthcare professionals.
 5. Caller was another health professional.
 6. The conversations were of poor sound quality making it impossible to analyze.
 7. The caller was not in the same location as the patient.
 8. The patient was not Danish speaking or not native Danish speaking and this was considered to influence the communication between patient and triagist negatively.
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STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of cross-sectional studies

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	1
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4
Objectives	3	State specific objectives, including any prespecified hypotheses	4-5
Methods			
Study design	4	Present key elements of study design early in the paper	5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5-8
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	6
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	6-8
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	6-8
Bias	9	Describe any efforts to address potential sources of bias	8
Study size	10	Explain how the study size was arrived at	6
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	8
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	8
		(b) Describe any methods used to examine subgroups and interactions	Not applicable
		(c) Explain how missing data were addressed	Not relevant
		(d) If applicable, describe analytical methods taking account of sampling strategy	Not applicable
		(e) Describe any sensitivity analyses	Not applicable
Results			

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	6 and figure 2
		(b) Give reasons for non-participation at each stage	6 and figure 2
		(c) Consider use of a flow diagram	Figure 2
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Not applicable
		(b) Indicate number of participants with missing data for each variable of interest	Not applicable
Outcome data	15*	Report numbers of outcome events or summary measures	Table 1
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	Not applicable
		(b) Report category boundaries when continuous variables were categorized	Not applicable
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	Not applicable
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	Not applicable
Discussion			
Key results	18	Summarise key results with reference to study objectives	9-10
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	10-11
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	11-13
Generalisability	21	Discuss the generalisability (external validity) of the study results	11-13
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	14

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.