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Diagnostic strategies in general practice and the emergency department - A comparative qualitative analysis

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Diagnostic strategies in general practice vs. the emergency department

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Abstract

Objective: We sought to explore differences and commonalities between diagnostic strategies used by clinicians in both settings.

Design: Cross-sectional study

Setting: We videotaped 282 consultations in General Practice, irrespective of presenting complaint or final diagnosis. Reflective interviews were performed with General Practitioners (GPs) after each consultation. In addition, 16 Emergency Physicians (EPs) based at two tertiary care hospitals in the United States of America were observed during 171 consultations, and their reflections recorded. Recordings of consultations and GP interviews were transcribed verbatim and analyzed using a coding system that was based on published literature and systematically checked for reliability.

Results: EPs more often considered severe conditions, even if the pre-test probability of a considered disease was conceived to be low. In contrast to general practice, patients in the emergency department (ED) were hardly able to influence the decision making process, nor did they receive assurance concerning their complaints as often as the GP's patients did. EPs apparently considered themselves more as distributionists, presented a more directive style of interviewing including a high proportion of routine questions and rarely used open questions or active listening.

Conclusions: Strategies used by physicians in both settings seem to be well adapted to their respective environments. Although a physician led diagnostic process is well established in the ER setting, we suggest that a more patient centered style might be equally or even more efficient.

Strengths and Limitations of this study:

- Large patient samples representative of the respective environment

- Investigation of decision making based on real patient physician encounters

- GP sample biased toward experienced practitioners and those actively involved in medical education

- Video recordings, observations and interviews presumably interfered with GPs' and EPs' behavior and accounts

Introduction

Making a diagnosis is perhaps the most important task the physician has to fulfil. Getting to know the cause of their problems and associated prognostic and therapeutic implications is the foremost reason why patients consult physicians.

There are two settings where the diagnostic task poses a particular challenge. Primary care (PC) and hospital emergency departments (EDs) are at the entrance to the health care system. In both settings, unselected patients present problems ranging from benign and/or undifferentiated conditions to life threatening emergencies. Both settings are highly relevant for the health care system as a whole, because clinicians in both settings act as gatekeepers and indirectly control access to other specialties by their referral of patients.

While primary care and hospital EDs have their position at the point of entry to the health care system in common, there are also important differences between both settings. Patients interpreting their symptoms as severe or even life threating are encouraged to access hospitals. Here advanced diagnostic and therapeutic technologies are available, whereas primary care is limited in this regard. While the former limits itself to managing single illness episodes, the latter prides itself for providing continuous and comprehensive care. In most industrialized countries, specialties of primary care and of emergency care have developed their own distinct traditions of clinical strategies, teaching and research.

Although diagnostic reasoning and decision making by clinicians have been studied in both settings [1-5] a direct comparison has not yet been undertaken. We sought to explore differences and commonalities between diagnostic strategies used by clinicians in both

settings. Closely related is how physicians define and understand their relationship to the patient and their role within the wider health care system.

Methods

Two available datasets of studies investigating primary care and hospital emergency physicians' diagnostic reasoning provided a unique opportunity to meet the objectives formulated above. The methods of both studies have been described in detail in previous publications [4, 5].

Settings, samples and data collection

Emergency department

Data were acquired between 2008 and 2009. Twelve EPs were shadowed during their ten-hour shifts at the EDs of two teaching hospitals in the Midwest of the US. Two observers (two researchers with Masters' degrees in psychology) independently observed and documented EPs' actions and verbal interactions with patients, relatives and colleagues using shorthand. Exchanges between residents and their supervising attending physicians were of particular interest as they naturally provided insight into their reasoning and decision-making strategies without explicit prompts. Both observers followed a strict protocol of silent observation as unobtrusive as possible. They compared their records regularly and discussed possible discrepancies.

General Practice

Data were acquired between 2010 and 2012. Twelve full-time GPs in the Marburg-Biedenkopf district of Hessen, Germany, were asked to take part in the study and all agreed. They had at least 10 years clinical experience in practice and were active teachers associated with University of Marburg Medical School. GPs were videotaped on three different occasions during consultations with patients who gave their consent in advance. GPs recruited patients for the study, regardless of their complaint. The only exception were purely administrative visits with no diagnostic implications. Participating GPs informed each patient about the study and asked for written consent to have their

consultation video recorded. GPs were instructed not to address the patient's presenting complaint(s) at this stage. After consent was obtained, consultations proceeded as usual. Sessions were scheduled so that after each consultation, GPs had sufficient time for a semi-structured interview to explain their diagnostic reasoning. These interviews were also video recorded. GPs were asked to elaborate upon their first impression and previous knowledge of each patient, as well as diagnostic hypotheses considered and gathering of diagnostic data.

Both, the written protocols for the ED and the video-material were transcribed verbatim and coded with MAXQDA software for qualitative data analysis [6]. We considered a consultation as containing a diagnostic episode if the patient brought up a new complaint, which resulted in some kind of data collection by the physician, such as taking a history, conducting a physical etc.

Data analysis

Drawing on previously published work [2, 7–9], we developed a coding tree comprising categories describing EPs' and GP' diagnostic reasoning and data collecting behavior (available upon request). Extensive discussion in our group and several iterative loops of coding and modification of the coding tree resulted in operational definitions of categories (see below). To evaluate the reliability of the codings, a subsample of 31 consultations was subjected to coding by two independent researchers. These codes included not only certain diagnostic strategies, but also diagnostic cue obtained by participating physicians. To determine inter-rater reliability, Holsti's coefficient of reliability was calculated [10]. Data analysis followed the concept of qualitative content analysis [11].

We used a smaller sample for quantifying the distribution of cues among the different phases and means of diagnosis. We defined as cue any piece of (medically) relevant information either spontaneously verbalized by the patient or specifically asked by the physician. This included also nonverbal information derived from observation, the physical examination or diagnostic tests. Subsamples were compiled by random selection from EP and GP data and contained 59 consultations each.

Definitions of relevant codes

Inductive Foraging

A phase most often (but not necessarily) at the beginning of a consultation, in which the patient is encouraged to freely explain the reason his visit and associated concerns [9]. Mostly prompted by an open question asked by the physician.

Triggered Routine

A sequence of questions either specific to an organ system or investigating around a specific symptomatic or pathomechanism. Questions are triggered by a symptom or finding and aim to further explore a clinical area.

Deductive testing

The physician has a specific hypothesis (e.g. disease) in mind, and asks one or more targeted questions to either dismiss or substantiate his hypothesis. It differs from a triggered routine, as it is clearly hypothesis driven.

Descriptive question

Question that invites the patient to further describe his symptoms or bodily functions, for example in terms of exact location, color, quality etc.

Checklist Routine

A large number of consecutive questions covering a broad diagnostic spectrum, often containing questions regarding risk factors and very common symptoms or diseases. These items are often only remotely related to the presenting complaint.

Pattern Failure

Any detail or information that does not fit the overall picture of the patient, or points to a general inconsistency within the case.

Probabilistic Reasoning

Considerations of statistical frequency of occurrence or likelihood are brought up when deliberating a diagnosis.

Spot Diagnosis

A (most often visually) perceivable feature, symptom, or combination thereof immediately leading to a diagnosis.

Self-labelling

The patient or a family member mention or suggest a diagnosis.

Reassurance

Providing information regarding the benign nature of symptoms or findings, allaying associated concerns and fears.

Data protection and ethics

The text material used in this study was anonymized. Physicians and patients gave their consent prior to observation. The ethic committees of both the involved hospitals (#08-034) and the medical school / university (SC #3650) approved the study from which ED data are reported. The ethics committee of the University of Marburg Medical School approved the study from which GP data are derived (file number 39/10).

Results

Participating clinicians and patients

The ED sample consisted of 171 patients, compared to 134 in the general practice sample. Both samples were similar in distribution of gender and age. There were 16 different EPs, compared to 12 GPs. They represented their respective demographics with the EDs sample mostly consisting of young residents in training, and the GP sample consisting of more experienced physicians. GPs had on average practiced for 21 years and were 55 years of age. Of the emergency physicians, four were in their first year of residency, five were in their second year, six in their third year, and one held the status of an attending (for details see Table 1). Inter-Rater Reliability (IRR) of coding was determined based on the codes most essential for analysis of diagnostic strategies and ranged between 77% to 79%. IRR for all cues coded was 78.9%. For details, see table 2.

Professional roles

When commenting on their role, EPs perceived themselves as "distributionists" rather than diagnosticians. They see their task in picking up hints for severe or even life-threatening disease and making sure the patient is admitted to the appropriate department of the hospital. In their view, making a positive diagnosis is not within their remit.

"RES: We look at emergencies here. If we can't find anything, you'll need good follow-up or to be admitted to answer those questions for you." (ED; Res.04, Pt.06)

"Att. to RES: Get an ultra-sound to check for a deep blood-clot. I do not worry about the abscess. You got to think: "What's going to kill him!" I guarantee there's a superficial clot, [but] a deep clot, that's what we are going to be judged by!" (ED; Res.15, Pt.13)

"Pt: I don't like the diagnosis Fibromyalgia, because you put a name on my pain that makes no sense. RES: I don't know, I didn't diagnose it...we don't diagnose in the emergency

department!" (ED; Res.05, Pt.07)

"Patient wants a diagnosis (is curious, not insistant). Attending says that isn't what the emergency department is really set up for. [...]" (ED; Att.16, Pt.18)

Contrary to the EPs, GPs often expressed a strong bond with their patients, including the desire to definitely diagnose and treat their patients.

"GP: [...] And it is expected of us to have an idea how to approach this, and I try to treat a lot on my own. Of course I could say: "Hey, there is pruritus, there is a rash, I'll send you to the dermatologist right away." But I just don't want to do that. (GP.03, Pt.04)

In contrast to EPs who usually only see and treat 'single episodes' of disease, continuity of care played a central role in GPs' professional understanding.

"GP: [...] This is a patient who I know to have many worries. Every time I see him, I look at him: Has he become even thinner? Where is his journey taking him?" (GP.07, Pt.18)

In addition GPs see themselves as caring for acute and chronic disease, covering a wide range of issues ranging from biomedical to psychosocial.

"GP: That's how it is, how it developed after some time. That you have some common ground, you meet them in different places, know something about them, for example about their jobs. I also often know the family. Because I'm interested in that, and because I find this important as a general practitioner. I want to know the person sitting in front of me. I'm not only here for diseases and their treatment." (GP.03, Pt.02)

"GP: She's a very anxious patient. Today, not too much, but I also addressed this issue. She has carcinophobia, feeling unwell or being sick cause her to fear a severe reason for that. [...] She's afflicted with fear." (GP.11, Pt.23)

Reassurance

Reassurance was present in 18% ED consultations, while it was used by GPs in 64% of encounters. There were typical differences between the two professional groups. GPs used words of reassurance mostly to either address and possibly relieve patients' fears about a certain diagnosis or personal worries.

EPs communicate their general impression to the patient, especially when hospital admission was considered as unnecessary.

"*GP: Well, there are some extrasystoles. I will look into what kind they are. But they are actually as harmless as they have always been, right? The lung is free [of pathological findings], so there is nothing bad there. Is it like back then; Is it like before your eightieth birthday, when you thought: "I will never turn eighty", but then easily went past eighty? Is it like that? Pt.: It is somewhat like that. (laughs)*" (GP.09, Pt.10)

"*RES: I think with how well you're looking, [opioid pain medication] should work for you...you're looking pretty well. But of course, come back if necessary, we are happy to have you here and take good care of you. Pt.: Can I have some more water and try if I can keep down the nausea meds? RES: Sure, you should have it in little sips. Pt.: If it works here, it should work and home, too. RES: You should do pretty well, you look good.*" (ED; Res.02, Pt.02)

Diagnostic strategies

Inductive Foraging

Inductive Foraging was almost exclusively used at the beginning of a consultation. While GPs used it in the majority of cases (91% of all consultations), EPs utilized this strategy with only a third of their patients (33% of all consultations). For GPs, this phase of the diagnostic process generated on average 26.5% of diagnostic cues, while in the ED only 4% of cues were obtained. In order to initiate

Inductive Foraging, GPs used open questions like "What leads you to me?", "What can I do for you?", or "What seems to be the problem?". In the minority of cases, in which GPs did not use inductive foraging, there often was pre-established information about the reason of the patient's visit.

Within the ED, patients had often been seen by another health professional, such as a triage nurse. As a result, relevant information had been obtained from the patient prior to the consultation with the physician.

*"RN (registered nurse) brings chart for a new patient: Shortness of breath, history of asthma. RN called respiratory already." (*ED; Res.09, Pt.02)

Spot Diagnosis

Spot diagnosis was more common in general practice, where it comprised 13% of cases, compared to only 5% in the ED's side.

*"Att. says it's called Paronychia and explains that it's an infection around the nail." (*ED; Att. 16, Pt.01)

*"Pt: Good morning. GP: So, what is it that you have? Oh. Yeah, you have shingles, right?" (*GP.09, Pt.04)

Triggered Routines

GPs used triggered routines, among other types of directed questions, typically for further investigation after the end of the phase of Inductive Foraging. There were exceptions to this order in the ED, as pre-aquired information was often available and no Inductive Foraging took place in a number of cases. Instead, EPs often picked up the most significant piece of this information, often the presenting complaint from the triage sheet, and used it as a trigger for further routine questions.

Triggered routines were utilized in 50% of consultations in the ED, and in 45% of cases seen by GPs. Contribution of cues was different, with 26% of all cues per consultation coming from triggered routines in the ED, opposed to 10% on the GPs' side. Also, the content of triggered routines differed. In the ED, the most frequent categories were neurological, cardiovascular and gastrointestinal

symptoms, while GPs used most triggered routines in conjunction with infections of the upper respiratory tract.

Descriptive Questions and Deductive Testing

GPs used descriptive questions in 89% of their consultations and they contributed 19% of all cues.

EPs used them in 21% their cases and 4% of cues were generated that way.

Deductive testing occurred in 28% of consultations in the ED and in 46% of GP consultations. It

contributed 5% (ED) and 10% (GP) of all cues on average in the respective subsample.

Checklist Routines

Checklist Routines were unique to the ED, where they were used in 19% of all consultations and

generated on average 9.5% of all cues in a given diagnostic episode.

"RES: Nausea, vomiting, dizziness? Pt: No; RES: Belly pain? Pt.: No. RES: Bloody stool? Pt.: No RES:

Chills? Pt.: No RES: Sore throat? Pt.: Yes. RES: For how long? Patient has bad allergies; RES: Ahh, me

too! Other medical history? Pt.: Antiphospholipid syndrome. [...] Patient has diabetes; RES: High

blood pressure? No; Is there a chance you are pregnant? No; Pt.: [My] last period was 2 weeks ago;

RES: Was it normal? Pt: Heavy. RES: When was it that they last checked your iodine? Pt.: Last Friday,

it was 3.0. RES: Any allergies? Pt.: Morphine, Toradol. RES: Are you a smoker? Pt: No. RES:

Alcohol/drugs? Pt: No. RES: Do you have a history of blood clots? Pt: On my dad's side of the family.

RES: Surgeries? Pt.: DNC [dilation of the cervix and curettage of the uterus] two times." (ED; Res.05,

Pt.03)

Pattern failure

Pattern failure played a role for diagnostic reasoning in 9% of ED cases and in 8% of cases seen by

GPs. As EPs were not familiar with their patients, pattern failure predominantly related to the

credibility of the patient's story.

"RES: She's an odd duck...And she asked me how old I was. You don't ask that if you are in pain. She had five surgeries in the last couple of months." (ED; Res.05, Pt.07)

Probabilistic Reasoning

30% of GP and 4% of EP cases contained probabilistic reasoning. GPs used probabilities on many occasions to explain their reasoning in depth, both to patients and to the interviewer.

"GP: My main suspicion is really a prostate problem, well...a benign one I really hope. Uhm, the main concern in this case is also this: 50 percent do have a tumor at that age, if not even more. 70 percent at age 70, that's roughly the allocation. So it is actually possible that he is fitting the statistics and has something like that." (GP.07, Pt.22)

In the cases where EPs used probabilistic reasoning, they did it in a similar fashion.

"RES: Pulmonary embolism changes can be seen in 10 percent of the patients in ECG changes. [RES means 10 percent of people with pulmonary embolism have changes in their EKG] She has some of those changes." (ED; Res.05, Pt.03)

For a summary of frequencies of the different diagnostic strategies see table 3.

Self-labelling

Self-labelling could be observed in 7% of ED patients and 64% of patients seen by the GP.

"Pt: [...] I was in the garden last week, and then i couldn't even move anymore. But that is probably a muscle soreness because of my old spinal disc history." (GP.07, Pt.06)

EPs response to self-labelling differed, mainly depending on which phase of the diagnostic process the suggestion was made in. Most attempts of self-labelling by the patient occurred into the phase of directed questions on the EP's side; in this case there was usually no response at all, presumably because the EP was intent to follow his structured train of thought.

"RES: the rhythm looks fine.. You have no abdominal pain? -No; Diarrhea? -No; Blood in your stool? -No; What meds are you taking? Pt.: Aspirin and something for memory, they checked for Alzheimer's. Daughter: Maybe he had a small stroke. RES: is it [name of medication inaudible]? Pt doesn't know RES: I will look it up. Do you take anything for hypertension? [...]" (ED; Res.01, Pt.06)

Discussion

Our study shows that although EDs and GPs are both generalists and gatekeepers to the health care system as a whole, there are significant differences between them regarding their professional roles, diagnostic strategies they use and relationship to the patient. Each professional group seems to have a very specific set of skills and processes adapted to t its respective working environment.

EPs apparently see themselves as triage agents making sure the patient is treated at the right spot of the health care system. In their diagnostic assessment of patients, they focus on acute serious, life-threatening disease. The outcome of their decision is essentially binary, i.e. admit to hospital or discharge. In their view, they have hardly any responsibility beyond this. Since they assume that the majority of their patients will obtain definite treatment by other health care providers, they provide reassurance less often than GPs did. Although perhaps rather reductionist at first glance, this approach can be understood as a realistic strategy to keep the complexity of the diagnostic task to a manageable level.

GPs on the other hand, treat the whole range of biomedical and psychosocial problems presented by their patients including long-term management. They can do so only because they see patients repeatedly so that they can build up knowledge of each case regarding risk factors, previous disease episodes and treatment, utilization behavior etc. Although individual consultations may be short in General Practice, the advantage of a continuous relationship and the accumulated knowledge of the patient's history makes it possible to quickly focus on the most pressing problems and thus confront a much larger complexity than during an isolated ER treatment episode.

Diagnostic strategies

Some strategies were used in both setting with more or less equal frequency, such as triggered routines or pattern failure. With others, however, we found characteristic differences. Inductive foraging and descriptive questions occur much more often in General Practice and contribute a considerable number of diagnostic cues. Moreover, patients contribute to the diagnostic process by communicating their own explanation in two thirds of cases. Checklist routines, on the other hand, are a typical strategy for the ER setting. At a descriptive level, these differences amount to the patient playing a more active part in General Practice, whereas physicians in ER control the encounter to a much larger degree with the patient largely answering closed questions.

Both inductive foraging and long checklists are instruments to explore the large problem space generalist physicians are typically confronted with. They differ by who is leading the process. In General Practice, at least for a brief moment at the beginning of the consultation, the patient is directing the discussion to relevant problem areas. In the ER, this endeavor is fully controlled by the physician. In the latter setting, this initial exploration is often in the hands of nursing staff who pass the resulting information on to the physician.

Pattern failure, i.e. noticing a deviation from an assumed pattern or default, plays a role for diagnostic reasoning in both groups but was used differently. For EPs the most common reference frame is 'the credible patient'. For GPs, however, pattern failure more often serves an immediate diagnostic purpose. Prior knowledge of the individual patient is crucial for comparing signs and symptoms with an assumed 'normal' state (this does not have to be a healthy or symptom-free state, especially in the chronically ill). [9]

EPs and GPs differ characteristically in their default assumption whether serious disease is present or not. EPs have this possibility constantly at the back of their minds. Their primary strategic objective is therefore the exclusion of serious etiologies. In General Practice, however, these occur only rarely. To borrow the wording suggested by Stolper et al. [12]: while a 'sense of alarm' is felt by GPs only

occasionally and has to be triggered by specific symptoms and/or findings, this seems to be the normal state for ERs. In this, both groups reflect the different prevalence of serious disease in their respective settings.

Strengths and Limitations

Our research differs from most published work in the field of medical decision making in that we investigated decision making based on real patient physician encounters. In order to capture the natural diagnostic strategies, we included consultations concerning any symptom or disease that patients presented in either primary care or the ED. In both settings, similar attention was paid during data collection to record the natural, unaltered conversations and actions during the consultations. As both samples largely represent their respective patient population and are similar to each other in terms of age and gender distribution of the participating physicians, we assume that our observations represent the respective professional groups and their actions as naturally as possible to allow for an effective comparison of the data.

There were, on the other hand, important differences regarding methods and settings chosen. The GP sample was purposely biased toward experienced practitioners and those actively involved in medical education, because we thus expected to obtain valid in-depth accounts of clinical reasoning. In the ED, we focused on interactions between resident and attending physicians to attain the same goal. Thus, while resident and attending EPs elaborated their reasoning as part of their natural interaction, GPs were interviewed to reflect on their reasoning after each consultation. In addition, interference due to an observer in the ED versus a video camera in the GPs' practice may have impacted on physicians' responses differently. Moreover, the resulting records, i.e. video recordings vs. written shorthand documentation, may have influenced data analysis in different ways. Lastly, our comparison may have been confounded by data collection being undertaken not only in different settings, as intended for the objectives of this research, but also in two different countries and health care systems (Germany versus the US).

Conclusions

To link a decision makers' strategies to the structure of his or her environment has been a fruitful paradigm in cognitive psychology, decision science and many real world applications. This approach been successful at understanding behaviours and strategies at a descriptive and analytical level. [13, 14]. If one considers our findings from this perspective, strategies used by physicians in both settings seem to be well adapted to their respective environments.

This should, however, not prevent us from asking whether things can perhaps be improved. Although a process strictly led by physicians has apparently been established in the ER setting, we suggest that a more patient centered style might be equally or even more efficient. Giving the patient sufficient time to elaborate on his or her complaints, interpretations and suggestions might save ER staff the task to complete long checklists, which pose an undue cognitive burden on many patients leading to answers of questionable validity. Moreover, once the patient has been forced into a passive mode of only answering closed questions, her or she will not be able any to point to symptoms or findings not thought of by the enquiring physician. "Inductive foraging" might thus be a strategy to be applicable more frequently in the ER setting.

The restricted triage role EPs reclaim for themselves is plausible against the background of high uncertainty posed by their working environment. This philosophy, however, is at odds with the expectations of many patients seeking help for their acute complaints, many of which are minor, at hospitals. While patients expect explanation, understanding and therapy, at crowded ERs they encounter physicians seeing themselves more or less as dispositionists. Although we have to admit that this thought is somewhat speculative, since we did not ask patients, these findings certainly support efforts at the policy or system level to improve access to primary care so that only patients with a sufficiently high likelihood for life-threatening illness attend hospital ERs. [15–17]

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Declarations

All authors have completed the Unified Competing Interest form at www.icmje.org/coi_disclosure.pdf (available on request from the corresponding author) and declare that SB, JA, MF, NDB have no relationships with companies that might have an interest in the submitted work in the previous 3 years; their spouses, partners, or children have no financial relationships that may be relevant to the submitted work; and SB, JA, MF, NDB have no non-financial interests that may be relevant to the submitted work.

The funder of the study had not influence on study design, collection, analysis, and interpretation of data, on the writing of the report or the decision to submit the article for publication.

All authors had full access to all of the data in the study and can take responsibility for the integrity of the data and the accuracy of the data analysis.

The lead author (SB) affirms that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned have been explained.

Data sharing: no additional data available

Authors' contributions

NDB, SB and MF designed the research questions, JA did the main data analysis and all authors discussed and revised the findings, SB and NDB prepared the first draft of the publication and MF and JA revised it.

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Table 1: Patient, GP and EP characteristics

	Number of ED patients (percentage of all 171 patients)	Number of GP patients (percentage of all 134 patients)
gender:		
female	104 (61%)	85 (63%)
male	65 (38 %)	49 (37%)
unknown	2 (1%)	0 (0%)
Average age (in years)	52.3	48.5
	Number of physicians ED (percentage of all 16 physicians)	Number of physicians GP (percentage of all 12 physicians)
gender:		
female	9 (56 %)	5 (42 %)
male	7 (44 %)	7 (58 %)

Table 2: Inter-Rater Reliability for the four most important codes

Code	Coefficient of reliability
"Inductive Foraging"	R = 77.8%
"Triggered Routine"	R = 76.9%
"Deductive testing"	R = 76.5%
"Descriptive question"	R = 79.2%

Table 3: Frequencies of different diagnostic strategies and relative contribution to cues generated

Strategy used	Emergency Department (% of all 171 consultations)	General Practitioners (% of all 134 consultations)
Inductive Foraging (% of all cues generated)	33 % (4 %)	91 % (26,5 %)
Triggered Routines (% of all cues generated)	50 % (26 %)	45 % (10 %)
Deductive Testing (% of all cues generated)	28 % (5 %)	46 % (10 %)
Descriptive Questions (% of all cues generated)	21 % (4 %)	89 % (19 %)

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Diagnostic strategies in general practice and the emergency department - A comparative qualitative analysis

Diagnostic strategies in general practice vs. the emergency department

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Abstract

Objective: We sought to explore differences and commonalities between diagnostic strategies used by clinicians in General Practice and the Emergency Department.

Design: Qualitative study

Settings: We videotaped 282 consultations of 12 General Practitioners (GP) in Germany, irrespective of presenting complaint or final diagnosis. Reflective interviews were performed after each consultation. In addition, 171 consultations of 16 Emergency Physicians (EPs) based at two tertiary care hospitals in the Midwest of the United States were observed, and their conversations recorded. Recordings of consultations and GP interviews were transcribed verbatim and analyzed using a coding system that was based on published literature and systematically checked for reliability.

Results: EPs more often considered acute and severe conditions, even if pre-test probabilities were low. In contrast, GPs more often involved their patients in the decision making process and provided assurance concerning their complaints. To focus their workup, EPs used a more directive style of interviewing including a high proportion of routine questions and rarely used open questions or active listening.

Conclusions: Strategies used by physicians in both settings seem to be well adapted to their respective environments. Whereas the physician-led diagnostic process in the ED is well suited to rule out life-threating disease, diagnosis and appropriate treatment of everyday problems may require a more patient-centered style.

Strengths and Limitations of this study:

- Large patient samples representative of the respective environment

- Investigation of decision making based on real patient-physician encounters

- GP sample biased toward experienced practitioners and those actively involved in medical education

- Video recordings, observations and interviews presumably interfered with GPs' and EPs' behavior and the accounts of their reasoning

Introduction

Making a diagnosis is perhaps the most important task the physician has to fulfil. Getting to know the cause of their problems and associated prognostic and therapeutic implications is the foremost reason why patients consult physicians.

There are two settings where the diagnostic task poses a particular challenge. General Practice (GP) and hospital Emergency Departments (EDs) are at the entrance to the health care system. In both settings, unselected patients present problems ranging from benign and/or undifferentiated conditions to life threatening emergencies. Both settings are highly relevant for the health care system as a whole, because clinicians in both settings act as gatekeepers and indirectly control access to other specialties by the referral of patients.

While General Practice and hospital EDs are both a point of entry to the health care system, there are also important differences between these settings. Patients interpreting their symptoms as severe or even life threatening are encouraged to access hospital EDs. Here advanced diagnostic and therapeutic technologies are available, whereas General Practice is limited in this regard. While the former limits itself to managing single illness episodes, the latter prides itself for providing continuous and comprehensive care. In most industrialized countries, specialties of General Practice and of emergency care have developed their own distinct traditions of clinical strategies, teaching and research.

Although diagnostic reasoning and decision making by clinicians have been studied in both settings,[1-5] a direct comparison has not yet been undertaken. We sought to explore differences and commonalities between diagnostic strategies used by clinicians in both

settings. In addition, we aimed to explore how physicians in both settings define and

understand their relationship with the patient and their role as decision makers within the

wider health care system.

Methods

Two existing datasets of studies investigating General Practitioners' and hospital emergency

physicians' diagnostic reasoning provided a unique opportunity to meet the objectives formulated

above. The methods of both studies have been described in detail in previous publications [4, 5].

A checklist regarding standards for reporting qualitative research (SRQR) is added as a supplementary

file.

Settings, samples and data collection

Emergency Department

Data were collected between 2008 and 2009. Twelve Emergency Physicians (EPs) were shadowed

during their ten-hour shifts at the EDs of two teaching hospitals in the Midwest of the US. Two

observers (two researchers with Masters' degrees in psychology) independently observed and

documented EPs' actions and verbal interactions with patients, relatives and colleagues using

shorthand. All participants agreed to be part of the study. Unconscious patients and patients in need

of emergency treatment were not observed. Particular interest was on the exchanges between

residents and their supervising attending physicians as they naturally provided insight into their

reasoning and decision-making strategies without requiring explicit prompts. Both observers

followed a strict protocol of silent observation to keep their presence as unobtrusive as possible.

They compared their records regularly and corrected possible discrepancies in the data collection

process.

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General Practice

Data were acquired between 2010 and 2012. Twelve full-time GPs in the Marburg-Biedenkopf district of Hessen, Germany, were asked to take part in the study and all agreed. They had at least 10 years clinical experience in practice and were active teachers associated with University of Marburg Medical School. GPs were videotaped on three different occasions during consultations with patients who gave their consent in advance. GPs recruited patients for the study, regardless of their complaint. The only exception were purely administrative visits with no diagnostic implications. Participating GPs informed each patient about the study and asked for written consent to have their consultation video recorded. GPs were instructed not to address the patient's presenting complaint(s) at this stage. After consent was obtained, consultations proceeded as usual. Sessions were scheduled so that after each consultation, GPs had sufficient time for a semi-structured interview to explain their diagnostic reasoning. Interviews were conducted by an experienced GP researcher and also video recorded. GPs were asked to elaborate upon their first impression and previous knowledge of each patient, diagnostic hypotheses they considered, and diagnostic data they gathered.

Both the written protocols for the ED and the video-material were transcribed verbatim and coded by two researchers with MAXQDA software for qualitative data analysis [6]. We considered a consultation as containing a diagnostic episode if the patient brought up a new complaint, which resulted in some kind of data collection by the physician, such as taking a history, conducting a physical examination etc.

Data analysis

Drawing on previously published work [2, 7–9], we developed a coding tree comprising categories describing EPs' and GPs' diagnostic reasoning strategies and data collection behavior (the coding tree is available upon request). Extensive discussion in our group and several iterative loops of coding and

modification of the coding tree resulted in operational definitions for the identified categories (see below).

We used a randomly selected subsample (59 consultations of both the GP and EP data) for quantifying the number of cues physicians collected using each diagnostic strategy. We defined as cue any piece of (medically) relevant information either spontaneously verbalized by the patient or specifically asked by the physician. This included also nonverbal information derived from observation, the physical examination or diagnostic tests.

To evaluate the reliability of the codings, a subsample of 31 consultations was coded by two independent researchers. The resulting codes focused not only on diagnostic strategies, but also on the diagnostic cues that participating physicians obtained using these strategies. To determine inter-rater reliability, Holsti's coefficient of reliability was calculated [10]. Data analysis followed the concept of qualitative content analysis [11].

Definitions of relevant codes

Inductive Foraging

A phase most often (but not necessarily) at the beginning of a consultation, in which the patient is encouraged to freely explain the reason of his visit and associated concerns [9]. This strategy is mostly prompted by an open question asked by the physician.

Triggered Routine

A sequence of questions either specific to an organ system, a specific symptomatic or pathomechanism. Questions are triggered by a symptom or finding and aim to further explore a clinical area.

Deductive testing

The physician has a specific hypothesis (e.g. disease) in mind, and asks one or more targeted

questions to either dismiss or substantiate his hypothesis. Deductive testing differs from a triggered

routine, as it is clearly hypothesis driven.

Descriptive question

Questions that invite the patient to further describe his symptoms or bodily functions, for example in

terms of exact location, color, quality etc.

Checklist Routine

A large number of consecutive questions covering a broad diagnostic spectrum, often containing

questions regarding risk factors and very common symptoms or diseases. These items are often only

remotely related to the presenting complaint.

Pattern Failure

Any detail or information that does not fit the overall picture of the patient, or points to a general

inconsistency within the case.

Probabilistic Reasoning

Considerations of the statistical frequency of occurrence or likelihood are brought up when

deliberating a diagnosis.

Spot Diagnosis

A (most often visually) perceivable feature, symptom, or combination thereof immediately leading to

a diagnosis.

Self-labelling

The patient or a family member mention or suggest a diagnosis.

Reassurance

Providing information regarding the benign nature of symptoms or findings, allaying associated

concerns and fears.

Data protection and ethics

The text material used in this study was anonymized. All physicians and patients gave their consent

prior to observation. The ethic committees of both the involved hospitals (#08-034) and the medical

school / university (SC #3650) approved the study from which ED data are reported. The ethics

committee of the University of Marburg Medical School approved the study from which GP data are

derived (file number 39/10).

'Patient and Public Involvement'

Patients or public were not involved in study design, recruitment or dissemination of results.

Results

Participating clinicians and patients

The ED sample consisted of 171 patients, compared to 134 patients where a diagnostic process took place (out of 282 videotapes consultations) in the general practice sample. Patients in both samples were similar in distribution of gender and age. There were 16 different EPs, compared to 12 GPs. The EPs mostly consisted of young residents in training who were supervised by more experienced attending physicians, whereas the GP sample consisted of more experienced physicians only. GPs had on average practiced for 21 years. Of the EPs, four were in their first year of residency, five were in their second year, six in their third year, and one held the status of an attending. The clinical experience of the supervising attending physicians ranged from 5 to 31 years, with a mean of 13 years (for details see Table 1). Inter-Rater Reliability (IRR) of coding was determined based on the codes most essential for analysis of diagnostic strategies (listed in table 2) and ranged between 77% to 79%. IRR for all cues coded was 78.9%. For details, see table 2. We first report how physicians in both settings define their professional role as decision makers within the wider health care system and how they tend to relate to their patients. Then we elaborate the diagnostic strategies observed in the ED versus GP setting.

Professional roles and patient reassurance

Professional roles

When commenting on their role, EPs present themselves as "distributionists" rather than diagnosticians. They see their primary task in picking up hints for acute and severe or even life-threatening disease and making sure the patient is admitted to the appropriate department of the hospital or sent home with follow-up. In their view, making a positive diagnosis is not a priority.

"RES: We look at emergencies here. If we can't find anything, you'll need good follow-up or to be admitted to answer those questions for you." (ED; Res.04, Pt.06)

"Att. to RES: Get an ultra-sound to check for a deep blood-clot. I do not worry about the abscess. You got to think: "What's going to kill him!" I guarantee there's a superficial clot, [but] a deep clot, that's what we are going to be judged by!" (ED; Res.15, Pt.13)

"Pt: I don't like the diagnosis Fibromyalgia, because you put a name on my pain that makes no sense. RES: I don't know, I didn't diagnose it...we don't diagnose in the emergency department!" (ED; Res.05, Pt.07)

"Patient wants a diagnosis (is curious, not insistent). Attending says that isn't what the emergency department is really set up for. [...]" (ED; Att.16, Pt.18)

Contrary to the EPs, GPs often expressed a strong bond with their patients, including the desire to diagnose and treat their patients.

"GP: [...] And it is expected of us to have an idea how to approach this, and I try to treat a lot on my own. Of course, I could say: 'Hey, there is pruritus, there is a rash, I'll send you to the dermatologist right away.' But I just don't want to do that." (GP.03, Pt.04)

In contrast to EPs who usually only see and treat 'single episodes' of disease, continuity of care played a central role in GPs' professional understanding.

"GP: [...] This is a patient who I know to have many worries. Every time I see him, I look at him: Has he become even thinner? Where is his journey taking him?" (GP.07, Pt.18)

In addition, GPs see themselves as caring for acute and chronic disease, covering a wide range of issues ranging from biomedical to psychosocial.

"GP: That's how it is, how it developed after some time. That you have some common ground, you meet them in different places, know something about them, for example about their jobs. I also often know the family. Because I'm interested in that, and because I find this important as a general

practitioner. I want to know the person sitting in front of me. I'm not only here for diseases and their treatment." (GP.03, Pt.02)

"GP: She's a very anxious patient. Today, not too much, but I also addressed this issue. She has carcinophobia, feeling unwell or being sick cause her to fear a severe reason for that. [...] She's afflicted with fear." (GP.11, Pt.23)

Patient reassurance

Reassurance was present in 18% of the ED consultations, while it was used by GPs in 64% of the encounters. There were typical differences between the two professional groups. GPs use words of reassurance mostly to address and possibly relieve patients' fears about a certain diagnosis or personal worries. EPs communicate their general impression to the patient, especially when they consider hospital admission unnecessary and plan to discharge their patient.

"*GP: Well, there are some extrasystoles. I will look into what kind they are. But they are actually as harmless as they have always been, right? The lung is free [of pathological findings], so there is nothing bad there. Is it like back then; Is it like before your eightieth birthday, when you thought: "I will never turn eighty", but then easily went past eighty? Is it like that? Pt.: It is somewhat like that. (laughs)*" (GP.09, Pt.10)

"*RES: I think with how well you're looking, [opioid pain medication] should work for you. You're looking pretty well. But of course, come back if necessary, we are happy to have you here and take good care of you. Pt.: Can I have some more water and try if I can keep down the nausea meds? RES: Sure, you should have it in little sips. Pt.: If it works here, it should work at home, too. RES: You should do pretty well, you look good.*" (ED; Res.02, Pt.02)

Diagnostic strategies

We describe the observed patterns for each coded diagnostic strategy in turn. For a summary of frequencies of the diagnostic strategies in the ED versus GP setting see table 3.

Inductive Foraging

Inductive Foraging was almost exclusively used at the beginning of a consultation. While GPs used it in the majority of cases (91% of all consultations), EPs utilized this strategy with only a third of their patients (33% of all consultations). For GPs, this phase of the diagnostic process generated on average 26.5% of diagnostic cues, while in the ED only 4% of cues were obtained with Inductive Foraging. In order to initiate Inductive Foraging, GPs used open questions like "What leads you to me?", "What can I do for you?", or "What seems to be the problem?". In the minority of cases, in which GPs did not use Inductive Foraging, there often was pre-established information about the reason of the patient's visit. In the ED, patients had often already been seen by another health professional, such as a triage nurse. As a result, relevant information had been obtained from the patient prior to the consultation with the physician, reducing the need to engage in Inductive Foraging.

"RN (registered nurse) in the ED brings chart for a new patient: Shortness of breath, history of asthma. RN called respiratory already." (ED; Res.09, Pt.02)

Spot Diagnosis

Spot diagnosis was more common in the GP setting, where it comprised 13% of cases, compared to only 5% in the ED.

"Att. says it's called Paronychia and explains that it's an infection around the nail." (ED; Att. 16, Pt.01)

"Pt: Good morning. GP: So, what is it that you have? Oh. Yeah, you have shingles, right?" (GP.09, Pt.04)

Triggered Routines

GPs used triggered routines, among other types of directed questions, typically to continue and focus

the investigation based on the insights gained with Inductive Foraging. In the ED pre-acquired

information was often available so that Inductive Foraging was not necessary. Instead, EPs tended to

pick up on the most significant piece of the pre-acquired information, often the presenting complaint

from the triage sheet, and used it as a trigger for further routine questions.

Triggered routines were utilized in 50% of consultations in the ED, and in 45% of the cases seen by

GPs. The number of cues this strategy yielded differed in the ED compared to the GP setting, with

26% of all cues per consultation coming from triggered routines in the ED, opposed to 10% on the

GPs' side. Also, the content of triggered routines differed. In the ED, the most frequent categories

were neurological, cardiovascular and gastrointestinal symptoms, while GPs used most triggered

routines in conjunction with infections of the upper respiratory tract.

Descriptive Questions and Deductive Testing

GPs used descriptive questions in 89% of their consultations and they contributed 19% of all cues.

EPs used them in 21% of their cases and 4% of cues were generated that way. Deductive testing

occurred in 28% of consultations in the ED and in 46% of the GP consultations. It contributed 5% (ED)

and 10% (GP) of all cues on average in the respective subsample.

Checklist Routines

Checklist Routines were unique to the ED, where they were used in 19% of all consultations and

generated on average 9.5% of all cues in a given diagnostic episode.

"RES: Nausea, vomiting, dizziness? Pt: No; RES: Belly pain? Pt.: No. RES: Bloody stool? Pt.: No RES:

Chills? Pt.: No RES: Sore throat? Pt.: Yes. RES: For how long? Patient has bad allergies; RES: Ahh, me

too! Other medical history? Pt.: Antiphospholipid syndrome. [...] Patient has diabetes; RES: High

blood pressure? No; Is there a chance you are pregnant? No; Pt.: [My] last period was 2 weeks ago;

RES: Was it normal? Pt: Heavy. RES: When was it that they last checked your iodine? Pt.: Last Friday, it was 3.0. RES: Any allergies? Pt.: Morphine, Toradol. RES: Are you a smoker? Pt: No. RES: Alcohol/drugs? Pt: No. RES: Do you have a history of blood clots? Pt: On my dad's side of the family. RES: Surgeries? Pt.: DNC [dilation of the cervix and curettage of the uterus] two times." (ED; Res.05, Pt.03)

Pattern failure

Pattern failure played a role for diagnostic reasoning in 9% of the ED cases and in 8% of the cases seen by GPs. As EPs were not familiar with their patients, pattern failure predominantly related to the credibility of the patient's story.

"RES: She's an odd duck...And she asked me how old I was. You don't ask that if you are in pain. She had five surgeries in the last couple of months." (ED; Res.05, Pt.07)

Probabilistic Reasoning

Overall, 30% of the GP cases and 4% of the cases in the ED contained probabilistic reasoning. GPs used probabilities on many occasions to explain their reasoning in depth, both to patients and to the interviewer.

"GP: My main suspicion is really a prostate problem, well...a benign one I really hope. Uhm, the main concern in this case is also this: 50 percent do have a tumor at that age, if not even more. 70 percent at age 70, that's roughly the allocation. So it is actually possible that he is fitting the statistics and has something like that." (GP.07, Pt.22)

In the cases where EPs used probabilistic reasoning, they did it in a similar fashion.

"RES: Pulmonary embolism changes can be seen in 10 percent of the patients in EKG changes. [RES means 10 percent of people with pulmonary embolism have changes in their EKG] She has some of those changes." (ED; Res.05, Pt.03)

Self-labelling

Self-labelling could be observed in 7% of the ED patients and in 64% of the patients seen by the GP.

"Pt: [...] I was in the garden last week, and then I couldn't even move anymore. But that is probably a muscle soreness because of my old spinal disc history." (GP.07, Pt.06)

EPs response to self-labelling differed mainly depending on the phase of the diagnostic process in which the suggestion was made. Patients attempted self-labelling most frequently when EPs asked directed questions. In these cases EPs usually did not respond, presumably to keep their diagnostic focus on acute and severe diseases.

"RES: The rhythm looks fine. You have no abdominal pain? -No; Diarrhea? -No; Blood in your stool? - No; What meds are you taking? Pt.: Aspirin and something for memory, they checked for Alzheimer's. Daughter: Maybe he had a small stroke. RES: is it [name of medication inaudible]? Pt doesn't know. RES: I will look it up. Do you take anything for hypertension? [...]" (ED; Res.01, Pt.06)

Discussion

Our study shows that although EPs and GPs are both generalists and gatekeepers to the health care system, there are marked differences regarding their professional roles, the frequency of use of diagnostic strategies and their interaction with the patient. Each psional group seems to have a very specific set of skills and processes adapted to its respective working environment.

In their diagnostic assessment of patients, EPs tend to focus on acute serious, life-threatening disease and on triage to make sure that the patient is treated at the right spot of the health care system. The outcome of their decision is essentially binary. The either admit a patient to the hospital or discharge with follow-up. In their view and actions, they are hardly concerned with diagnosis and therapy above and beyond a focus on life-threatening diseases. Since they assume that the majority of their patients will obtain definite treatment by other health care providers, they also reassure their patients less often than GPs. Although this strategy seems rather reductionist at first glance, it

certainly is a pragmatic strategy that helps avoid missing rare but potentially life-threatening diseases despite the complexity of the diagnostic task in an uncertain and stressful environment.

GPs, on the other hand, treat the whole range of biomedical and psychosocial problems presented by their patients, including long-term management. They can do so only because they see their patients repeatedly so that they can accumulate knowledge about each patient regarding risk factors, previous disease episodes, treatments, health care utilization behavior etc. Although individual consultations may be short in General Practice, the advantage of a continuous relationship and the accumulated knowledge of the patient's history helps GPs to quickly focus on the currently most pressing problems and and thus address a much larger variety of problems than during an isolated ED treatment episode that is focused on acute and severe diseases.

Diagnostic strategies

Some strategies were used in both setting with more or less equal frequency, such as triggered routines or pattern failure. For other strategies, however, we found characteristic differences. Inductive Foraging and Descriptive Questions occur more often in General Practice and contribute a considerable number of diagnostic cues. Moreover, patients contribute to the diagnostic process by communicating their own explanation in two thirds of the cases in the GP setting. Checklist routines, on the other hand, are a typical strategy in the ED. At a descriptive level, these differences amount to the patient playing a more active part in General Practice, whereas physicians in the ED control the encounter to a much larger degree, for instance, by asking patients mainly closed questions related to potentially life-threatening diseases. This focus may also explain why EPs use probabilistic reasoning less frequently than GPs. Although acute, time critical illness requires immediate action, it is often less probable than more common, benign diseases. [5]

Both Inductive Foraging and Checklist routines are instruments to explore the large problem space generalist physicians are typically confronted with. They differ by who is leading the process. In General Practice, at least for a brief moment at the beginning of the consultation, the patient is

directing the discussion to relevant problem areas. In the ED, patient input is more controlled by the physician. One explanation for this pattern is that in the latter setting, the initial exploration is often in the hands of nursing staff who pass the resulting information on to the physician.

Pattern failure, that is, noticing a deviation from an assumed pattern or default, plays a role for diagnostic reasoning in both groups but was used differently. For EPs the most common reference frame is 'the credible patient'. For GPs pattern failure more often serves an immediate diagnostic purpose. Prior knowledge of the individual patient is crucial for comparing signs and symptoms with an assumed 'normal' state (this does not have to be a healthy or symptom-free state, especially in the chronically ill). [9]

EPs and GPs differ characteristically in their default assumptions about whether life-threatening disease is present or not. EPs always consider life-threatening disease given that their primary objective is to exclude serious etiologies. In General Practice serious diseases occur only rarely. To borrow the wording suggested by Stolper et al. [12]: while a 'sense of alarm' is felt by GPs only occasionally and has to be triggered by specific symptoms and/or findings, this seems to be the normal state for EDs. This characteristic difference between GPs and EPs reflects the different prevalence of serious disease in their respective settings and is an explanation for the observed differences in diagnostics strategies.

Strengths and Limitations

Our research differs from most published work in the field of medical decision making in that we investigated decision making based on real patient-physician encounters. In both settings, similar attention was paid during data collection to record the natural, unaltered conversations and actions during the consultations. In order to do so, we included consultations concerning any symptom or disease that patients presented in either the GP or the ED domain. As both samples largely represent their respective patient population, we assume that our observations represent EPs' and GPs'

encounters with patients and their actions as naturally as possible to allow the comparison of

physicians' diagnostic strategies across the two domains.

There were, on the other hand, important differences regarding methods and settings chosen. The

GP sample was purposely biased toward experienced practitioners (practicing medicine for on

average 21 years) and those actively involved in medical education. By doing so, we expected to

obtain valid in-depth accounts of clinical reasoning. In the ED, we had the same goal but focused on

educational interactions between resident and attending physicians to attain it. Whereas the ED

sample mainly contained young residents in training supervised by experienced colleagues, the

observed GPs were experienced themselves. Thus, resident and attending EPs elaborated their

reasoning as part of their natural interaction, and GPs had to be interviewed to have them reflect on

their reasoning after each consultation. In addition, the recording technology, that is, video

recordings vs. written shorthand documentation, yielded different levels of detail in the data which

may have influenced data analysis. Also, interference due to an observer in the ED versus a video

camera in the GPs' practice may have impacted physicians' responses differently. Differences in

training of each group of physicians and differences in the specific 'culture' of the surrounding work

environment might have affected our results. That is, our comparison may have been confounded by

data collection being undertaken not only in different settings, as intended for the objective of this

research, but also in two different countries and health care systems (Germany versus the US). Lastly,

our analysis largely focused on the initial history taking and interaction with the patients. We did not

analyze the examination techniques or how physicians used the result of test orders and further

investigations to revise their reasoning. We did also not include the patients' perspective on the

different diagnostic approaches of their physicians.

Conclusions

To study decision makers' strategies as an adaptation to the particular structure and challenges of their environment has been a fruitful approach in decision science [13, 14] and approaches to improving work system performance [15]. If one considers our findings from this descriptive perspective, strategies used by physicians in both settings seem to be well adapted to their respective environments. This descriptive lens should not, however, prevent us from asking whether and how existing approaches may be improved.

The physician-dominated process has been established as the general diagnostic approach in the ED setting to avoid missing rare but life-threatening diseases. However, diagnosis and treatment of everyday complaints may require a more patient-centered style, for instance, in situations when patient input and disease experience is central for physicians to understand the problematic at hand. [16] When the patient has sufficient time to elaborate on his or her complaints, interpretations and suggestions, ED staff might not need to go through long checklists, which may pose an undue cognitive burden on many patients and lead to answers of questionable validity. Moreover, patients who only passively answer closed questions will likely not point to symptoms or findings not thought of by the enquiring physician. Listening to the patient–for instance, by using Inductive Foraging– might thus be a strategy that may be used more frequently also in the ED setting. To what extent it may already be used during ED nurse triage, we cannot answer with this study.

The EPs' focus on triage is an effective strategy to avoid missing life-threatening diseases in an environment that is marked by high uncertainty, limited resources and time. As a single strategy is at odds, however, with the clinical needs and expectations of patients seeking help, explanation and therapy for their often minor complaints. Needs related to non-lethal, everyday complaints will likely be more reliably met in GP settings and with the diagnostic strategies we observed there. Thus, our findings support two practical implications. A first implication relates to educational efforts that aim at helping generalist physicians gauge when to rely on EPs' more time-efficient approach to detect critical diseases and when to engage in GPs' more time-intensive but patient-centered diagnostic

strategies. The second implication relates to efforts at the policy level that aim at improving access to

primary care for patients with everyday complaints while making sure that patients with a sufficiently

high likelihood of a life-threatening illness can readily access hospital EDs to receive acute treatment.

[17–19]

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Declarations

All authors have completed the Unified Competing Interest form at www.icmje.org/coi_disclosure.pdf (available on request from the corresponding author) and declare that SB, JA, MAF, NDB have no relationships with companies that might have an interest in the submitted work in the previous 3 years; their spouses, partners, or children have no financial relationships that may be relevant to the submitted work; and SB, JA, MAF, NDB have no non-financial interests that may be relevant to the submitted work.

The funder of the study had not influence on study design, collection, analysis, and interpretation of data, on the writing of the report or the decision to submit the article for publication.

All authors had full access to all of the data in the study and can take responsibility for the integrity of the data and the accuracy of the data analysis.

The lead author (SB) affirms that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned have been explained.

Data sharing: no additional data available

Authors' contributions

NDB, SB and MAF designed the research questions, JA did the main data analysis and all authors discussed and revised the findings, SB and NDB prepared the first draft of the publication and MAF and JA revised it.

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Table 1: Patient, General Practitioner (GP) and Emergency Physician (EP) characteristics

	Number of patients seen by EPs (percentage of all 171 patients)	Number of patients seen by GPs (percentage of all 134 patients)
gender: female	104 (61%)	85 (63%)
male	65 (38 %)	49 (37%)
unknown	2 (1%)	0 (0%)
Average age (in years)	52.3	48.5
	Number of EPs (percentage of all 16 physicians)	Number of GPs (percentage of all 12 physicians)
gender: female	9 (56 %)	5 (42 %)
male	7 (44 %)	7 (58 %)
	EPs	GPs
Mean clinical experience (in years)	Residents: 2 years Attendings: 13 years	21 years

Table 2: Inter-Rater Reliability for the four most important codes

Code	Coefficient of reliability
"Inductive Foraging"	R = 77.8%
"Triggered Routine"	R = 76.9%
"Deductive testing"	R = 76.5%
"Descriptive question"	R = 79.2%

Table 3: Frequencies of the four most important diagnostic strategies and their relative contribution
to the number of all cues generated

Strategy used	Emergency Department (% of all 171 consultations)	General Practitioners (% of all 134 consultations)
Inductive Foraging (% of all cues generated)	33 % (4 %)	91 % (26,5 %)
Triggered Routines (% of all cues generated)	50 % (26 %)	45 % (10 %)
Deductive Testing (% of all cues generated)	28 % (5 %)	46 % (10 %)
Descriptive Questions (% of all cues generated)	21 % (4 %)	89 % (19 %)

Standards for Reporting Qualitative Research (SRQR)*

http://www.equator-network.org/reporting-guidelines/srqr/

	Page/line no(s).
Title and abstract	
Title - Concise description of the nature and topic of the study Identifying the study as qualitative or indicating the approach (e.g., ethnography, grounded theory) or data collection methods (e.g., interview, focus group) is recommended	1
Abstract - Summary of key elements of the study using the abstract format of the intended publication; typically includes background, purpose, methods, results, and conclusions	2
Introduction	
Problem formulation - Description and significance of the problem/phenomenon studied; review of relevant theory and empirical work; problem statement	3
Purpose or research question - Purpose of the study and specific objectives or questions	3
Methods	
Qualitative approach and research paradigm - Qualitative approach (e.g., ethnography, grounded theory, case study, phenomenology, narrative research) and guiding theory if appropriate; identifying the research paradigm (e.g., postpositivist, constructivist/ interpretivist) is also recommended; rationale**	Described in the two 'original studies'
Researcher characteristics and reflexivity - Researchers' characteristics that may influence the research, including personal attributes, qualifications/experience, relationship with participants, assumptions, and/or presuppositions; potential or actual interaction between researchers' characteristics and the research questions, approach, methods, results, and/or transferability	4-5; Table1
Context - Setting/site and salient contextual factors; rationale**	4-5
Sampling strategy - How and why research participants, documents, or events were selected; criteria for deciding when no further sampling was necessary (e.g., sampling saturation); rationale**	4-5
Ethical issues pertaining to human subjects - Documentation of approval by an appropriate ethics review board and participant consent, or explanation for lack thereof; other confidentiality and data security issues	7
Data collection methods - Types of data collected; details of data collection procedures including (as appropriate) start and stop dates of data collection and analysis, iterative process, triangulation of sources/methods, and modification of procedures in response to evolving study findings; rationale**	4-5

Data collection instruments and technologies - Description of instruments (e.g., interview guides, questionnaires) and devices (e.g., audio recorders) used for data collection; if/how the instrument(s) changed over the course of the study	4-5
Units of study - Number and relevant characteristics of participants, documents, or events included in the study; level of participation (could be reported in results)	8; Table 1
Data processing - Methods for processing data prior to and during analysis, including transcription, data entry, data management and security, verification of data integrity, data coding, and anonymization/de-identification of excerpts	5-6
Data analysis - Process by which inferences, themes, etc., were identified and developed, including the researchers involved in data analysis; usually references a specific paradigm or approach; rationale**	5-6
Techniques to enhance trustworthiness - Techniques to enhance trustworthiness and credibility of data analysis (e.g., member checking, audit trail, triangulation); rationale**	5-6

Results/findings

Synthesis and interpretation - Main findings (e.g., interpretations, inferences, and themes); might include development of a theory or model, or integration with prior research or theory	8-14
Links to empirical data - Evidence (e.g., quotes, field notes, text excerpts, photographs) to substantiate analytic findings	8-14

Discussion

Integration with prior work, implications, transferability, and contribution(s) to the field - Short summary of main findings; explanation of how findings and conclusions connect to, support, elaborate on, or challenge conclusions of earlier scholarship; discussion of scope of application/generalizability; identification of unique contribution(s) to scholarship in a discipline or field	14-16
Limitations - Trustworthiness and limitations of findings	16-17

Other

Conflicts of interest - Potential sources of influence or perceived influence on study conduct and conclusions; how these were managed	18-19
Funding - Sources of funding and other support; role of funders in data collection, interpretation, and reporting	18

*The authors created the SRQR by searching the literature to identify guidelines, reporting standards, and critical appraisal criteria for qualitative research; reviewing the reference lists of retrieved sources; and contacting experts to gain feedback. The SRQR aims to improve the transparency of all aspects of qualitative research by providing clear standards for reporting qualitative research.

**The rationale should briefly discuss the justification for choosing that theory, approach, method, or technique rather than other options available, the assumptions and limitations implicit in those choices, and how those choices influence study conclusions and transferability. As appropriate, the rationale for several items might be discussed together.

Reference:
O'Brien BC, Harris IB, Beckman TJ, Reed DA, Cook DA. **Standards for reporting qualitative research: a synthesis of recommendations.** *Academic Medicine*, Vol. 89, No. 9 / Sept 2014
DOI: 10.1097/ACM.0000000000000388