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Redaktionens forord

Af redaktionen: Gitte B. Tygesen, Iben Duvald, Christian Skjærbæk, Helene Skjøt-Arkil, Peter Biesenbach, Lea Holst og Mikkel S. H. Jensen

Dansk Tidsskrift for Akutmedicin har som sit erklærede formål at bidrage til vidensdeling inden for det akutmedicinske og -sygeplejefaglige område. Vi ved, at der i danske akutafdelinger konstant arbejdes med større eller mindre projekter for at skabe sikre arbejdsgange og øge behandlingskvaliteten for patient-erne. Det er vigtigt, at vi har et sted, hvor vi kan fortælle hinanden om succeserne, så de kan sprede sig og komme flere patienter til gode, end på de afdelinger, hvor de måtte være blevet til. I tidsskriftet anser vi det også for vigtigt, at vi kan lære af hinanden, når forsøg ikke viser sig, at have den forventede effekt. Det kan tjene som inspiration til andre, der arbejder med samme problemstilling.

I dette nummer bringer vi en artikel af Torbjørn Shields Thomsen og medforfattere fra Hvidovre Hospital, der har undersøgt om patienternes udtrykte bekymring ved akut indlæggelse (degree of worry) kunne associeres til risikoen for ikke-planlagt genhenvendelse inden for 30 dage. De fandt ikke sådan en sammenhæng. Det negative resultat er ikke desto mindre med til at sætte fokus på et relevant emne. Genhenvendelser efter indlæggelse er en ofte anvendt kvalitetsparameter, men kan være svær at tolke, da genhenvendelser ikke er et entydigt negativt fænomen. Forfatterne rejser selv det relevante spørgsmål om graden af bekymring ved udskrivelse kunne være en bedre prædiktor for ikke-planlagt genhenvendelse. Det er bestemt værd at undersøge.

Af øvrige artikler i denne nummer bringer vi et bidrag fra Odense Universitetshospital af Trine Ladegaard og medarbejdere. De har undersøgt muligheden for at forbedre dokumentation af indikation for KAD – anlæggelse ved brug af elektronisk reminder på de kliniske oversigtstavler. Artiklen er inspirerende af flere årsager. Den sætter fokus på 1) patientsikker dokumentation, 2) tiltage til potentiel forebyggelse af hospitalserhvervede infektion, og 3) hvordan kan vi bruge IT værktøjer til at hjælpe akutafdelingens personale til at huske de mange ting, der er vigtige for os.

Vi bringer også et diagnostisk studie af Afshah Khan Agha og Marmood Ramazan plus kollegaer fra Sygehus Sønderjylland, som viser at en stor andel af de patienter som diagnosticeres med pneumoni på akutmodtagelsen ikke har et nytilkommet infiltrat på røntgen af thorax. Det skal vi være opmærksomme på når vi bruger røntgen af thorax i den diagnostiske udredning af pneumoni.

Akutte rygsmerter er en hyppig henvendelsesårsag i en akutafdeling. I de fleste tilfælde dækker det over godartede og ikke tidskritiske tilstande. En kasuistik af Emma Katrine Metzler og medarbejdere minder os om, at der er andre tidskritiske tilstande end tværsnitssyndrom, cauda equina syndrom og rumperet aortaaneurisme, at tænke på.

Fra vores egen verden kan reaktionen endnu en gang berette om god tilgang af artikler. Vi har imidlertidig svært ved altid at finde fagfællebedømmere og få gjort bedømmelsen færdig inden for en tid, der er rimelig for forfatterne. Redaktionen har derfor besluttet nye tiltag, der vil blive indskrevet i tidsskriftets vejledninger. Fremover vil alle forfattere ved indsendelse blive bedt om at angive navne på 3 potentielle bedømmere. Vi ønsker ikke at gå på kompromis med den blindede bedømmelsesproces, så navnene kommer alene til at indgå i den pulje af bedømmere, vi overvejer til hver enkelt artikel.

Det er ikke mindst i bidragsydernes interesse, at vi kan få udført fagfællebedømmelse. Vi har derfor også en forventning om, at når man publicerer i Dansk Tidsskrift for Akutmedicin også stiller sig til rådighed som bedømmer. Det vil fremover fremgå af vores forfattervejledning.

God sommer fra redaktionen

Dansk Tidsskrift for Akutmedicin

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Original-, udviklings-, og kvalitets artikler

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Original-, udviklings-, og kvalitets artikler

Degree of Worry and unscheduled returns to the emergency department within 30 days: An observational prospective cohort study

Abstract

BACKGROUND:

Unscheduled return visits to emergency departments are widely used as an indicator of quality of care. However, it is debated which patient-related variables accurately predict unscheduled return visits. This study aimed to investigate whether Degree of Worry, a novel patient-reported outcome, at the emergency department arrival is associated with unscheduled return visits within 30 days after the initial visit.

AIM:

To investigate the association between a novel patient-reported outcome measure at emergency department arrival and 30-day Unscheduled Return Visits.

METHOD:

The setting for this observational study was the emergency department at the Copenhagen University Hospital at Hvidovre in the Capital Region of Denmark. Exclusion criteria were lack of consent, <18 years of age, non-Danish speaking, highest triage level, mental impairment, orthopedic injuries, or under the influence of drugs or alcohol. Patients were asked to rate their Degree of Worry on arrival to the emergency department, and 30-day unscheduled return visits were determined by follow-up in medical records. The primary outcome was the association between a high Degree of Worry (7–10) and 30-day unscheduled return visits. This was tested using three logistic regression analyses: 1) crude; 2) semi-adjusted for triage level, sex, age, and chronic disease; and 3) adjusted for self-rated health, triage level, sex, age, and chronic disease.

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RESULTS:

A total of 1,945 patients were screened: 824 were eligible for inclusion and provided informed consent. The association between unscheduled return visits and Degree of Worry was 1) crude: OR (odds ratio) 1.03 (95% CI (confidence interval): 0.73–1.45) for 30-day unscheduled return visits; 2) semi-adjusted: OR 0.98 (95% CI: 0.68–1.41); and 3) fully adjusted including self-reported health: OR 0.91 (95% CI: 0.62–1.32).

CONCLUSION:

Our analysis showed no significant association between Degree of Worry at emergency department arrival and 30-day unscheduled return visits in any of the three analyses.

TRIAL REGISTRATION:

Clinicaltrials.gov number: NCT04226040.

What is already known?

- Degree of Worry (DOW) is associated with higher odds of referral and acute hospital admission when used in pre-hospital telephone triage.

What is new in the current study?

- In this study we investigated whether DOW was associated with unscheduled return visits (URVs), we found no association between DOW and URVs, which could be due to a lack of statistical power or to the fact that DOW at admission is not related to URVs.

How is this useful to Danish emergency departments?

- Patient-reported outcome measures are highly relevant in a patient-centered health care system. Therefore, it is useful to uncover which patient-reported outcomes probed for at admission do or do not relate to URVs in a Danish setting.

Introduction

Unscheduled returns and readmissions (URVs) at hospitals are widely used as an indicator for quality of care [1,2]. Although some return visits are appropriate, existing literature indicates that a number of URVs are preventable and avoidable [2–4]. Despite the knowledge that these preventable URVs exist, very few variables predicting them have been identified [1]. In a European multicenter study, researchers asked 1,398 readmitted patients and their relatives, primary nurse and treating physician whether the readmission was 1) predictable and 2) preventable. In a total of 27.8% of the included individuals, it was determined that readmission was potentially predictable and, in 14.4%, potentially preventable; however, there was very little agreement between patients and health care professionals on the matter of predictability and preventability (kappa values from 0.105 to 0.173). When a patient reported that they were not ready for discharge during the index admission, readmission was more likely to occur [1]. Accurately identifying people who have a higher risk of a URV may help decrease overall URV rates, but, although attempts have been made to create readmission prediction models, no such models are widely used in Europe, mainly due to their American origin (different case mix and non-comparable health care systems) [5–7]. A number of patient-related factors are linked to higher URV rates, e.g. alcohol-related problems, homelessness, and low level of education and social status, but many URV patients represent broader issues, including patient-related social issues and environmental aspects [1,3]. This indicates the relevance of using a patient-report outcome (PRO) marker to identify patients who are likely to return. PRO markers can provide insights into the health, quality of life, and functional status associated with health care or treatment of patients, but all these factors are beyond the scope of the purely physiological parameters of clinical and para-clinical tests [8].

Degree of Worry (DOW) is a PRO developed for telephone triage used by a medical helpline in the Capital Region of Denmark. It is a single-item questionnaire which asks the patient: “How worried are you about the situation you find yourself in today on a scale from 1 to 10, where 1 is minimally worried and 10 is maximally worried?” DOW captures the patient’s illness experience, especially with respect to consequence and emotional load (in writing). Additionally, DOW is linked to the duration of symptoms and the patient’s perception of the urgency of their situation [9,10]. When used in prehospital telephone triage, a higher DOW is associated with higher odds for referral to face-to-face consultation at emergency departments (EDs) and subsequent admission [9,11]. The DOW question resembles the numeric Rating Scale for Pain and the question “How much pain are you in on a scale from 0 to 10, where 0 is no pain and 10 is the worst imaginable pain?” [12]. The numeric rating scale is used to gain insight into the patent’s subjective experience of pain conveyed in an objective manner.

Although the existing literature does not agree on the scale of expenditure of time and resources that URVs represent, it appears to be accepted that URVs do present a burden on health care systems and that some of this burden is preventable [3,4]. Beyond this, very few measurable variables that consistently predict URVs exist

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[1]. This study aimed to investigate whether DOW is associated with URVs to the ED.

Objective

The objective of the present study was to evaluate the association between patients' self-reported DOW at arrival and unscheduled returns within 30 days (30-day URVs).

Methods

Study design

This study had an observational prospective cohort design, and data collection consisted of a short survey with a 30-day follow-up. The study is reported according to the STROBE guidelines[13].

Setting

Data were collected at the ED at the Copenhagen University Hospital at Hvidovre, in the Capital Region of Denmark with a catchment population of 553,000 [14]. Data collection was initiated on January 14, 2020, paused temporarily between March 10 and June 2 the same year due to the COVID-19 situation, and resumed on June 2, 2020. Inclusion in this study ended on December 19, 2020, with a 30-day follow-up. Patients were included between 0800 AM and 1100 PM.

Participants

Patients arriving at the ED were screened for inclusion on arrival; eligible patients were briefed on the project verbally and in writing, and participants provided informed consent. Exclusion criteria were lack of informed consent, <18 years of age, non-Danish speaking, highest triage level (red), mental impairment, orthopedic injuries, or under the influence of drugs or alcohol.

Ethical considerations

The study was approved by the Data Protection Agency of the Capital Region of Denmark (file no. P-2019-762). The need for formal approval from the Scientific Ethics Review Committee of the Capital Region of Denmark was waived by the Committee (file no. H-19070022). This study was conducted in accordance with the ethical principles stated in the Declaration of Helsinki[15].

Data sources

Eligible and consenting participants were interviewed by an assistant – specifically trained nurses and nursing- and medical students, including some of the authors - who followed a structured survey. The interviewer typed the participants' responses into a secure web-based software platform (Research Electronic Data Capture [REDCap]) [16]. The survey included data on sociodemographic indicators (e.g. level of education, work status, and social relationships), DOW, the Brief Illness Perception Questionnaire [17], self-reported health (SRH) and chronic disease. For the present study, data on patients' DOW, SRH, sex, age and chronic illness were used, and information on patients' URV, triage level and death within 30 days was collected manually from the electronic medical records.

The survey was extended to participants before they were seen by the treating physician, preferably after triage. If there was waiting time to be triaged, the survey was carried out before being seen by the nurse. DOW was collected before the first physician encounter to ensure that the rating was unaffected by information relayed by the physician. If data collection was interrupted by the treating physician's primary

assessment, data were included if the primary question of DOW had been answered. Patients were only included once.

Variables

The primary outcome of the study was 30-day URVs [18,19] to any ED in Denmark's Capital Region or Region Zealand.

DOW was measured as the response to the question "How worried are you about the situation you find yourself in today on a scale of 1 to 10, where 1 is minimally worried and 10 maximally worried?" For the analyses, DOW was dichotomized into low (1–6) and high (7–10), based on previous findings of a higher risk of hospital admission at DOW levels of 7–10 and no increased risk at the lower DOW levels [11].

SRH was measured on a five-level scale as the response to the question "How would you rate your health in general: 1) very good, 2) good, 3) moderate, 4) fair or 5) poor?" SRH was analyzed as a categorical variable [20].

Derived from patients' survey answers, age was dichotomized into adults (≤65 years old) and elderly (>65 years old) [11].

Figure 1 - Flowchart of included patients, exclusions and total Unscheduled return visits. DOW = Degree of Worry. PIN = personal identification number.

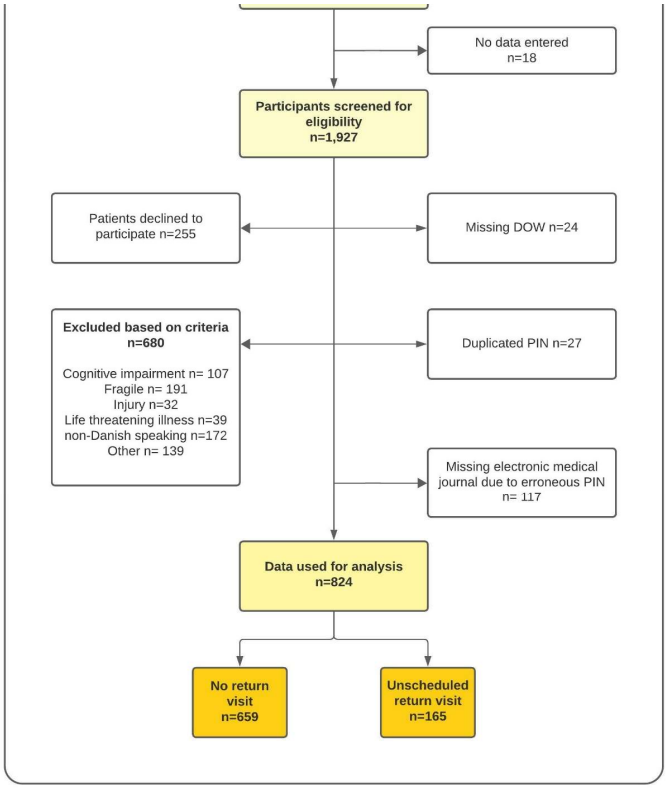

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Table 1 - Descriptive information on Degree of Worry (DOW), self-reported health (SRH), sex, age, triage level, chronic disease, death, and unscheduled return visit (URV) outcome of the study population.

	URV[2], no (N=659)	URV, yes (N=165)	Total (N=824)
DOW[1]			
High	275 (41.7%)	70 (42.4%)	345 (41.9%)
Low	384 (58.3%)	95 (57.6%)	479 (58.1%)
SRH[3]			
1 (Very good)	60 (9.1%)	11 (6.7%)	71 (8.6%)
2 (Good)	180 (27.3%)	20 (12.1%)	200 (24.3%)
3 (Moderate)	234 (35.5%)	63 (38.2%)	297 (36.0%)
4 (Bad)	133 (20.2%)	45 (27.3%)	178 (21.6%)
5 (Very bad)	52 (7.9%)	26 (15.8%)	78 (9.5%)
Sex			
Female	362 (54.9%)	93 (56.4%)	455 (55.2%)
Male	297 (45.1%)	72 (43.6%)	369 (44.8%)
Age			
>65	259 (39.3%)	88 (53.3%)	347 (42.1%)
18-65	400 (60.7%)	77 (46.7%)	477 (57.9%)
Triage level[4]			
2 (Orange)	84 (13.8%)	23 (15.3%)	107 (14.1%)
3 (Yellow)	329 (54.1%)	76 (50.7%)	405 (53.4%)
4-5 (Green)	195 (32.1%)	51 (34.0%)	246 (32.5%)
Missing triage	51	15	66
Chronic disease			
No	70 (10.6%)	13 (7.9%)	83 (10.1%)
Yes	589 (89.4%)	152 (92.1%)	741 (89.9%)
Dead within 30 days			
No	650 (98.6%)	161 (97.6%)	811 (98.4%)
Yes	9 (1.4%)	4 (2.4%)	13 (1.6%)

DOW = Degree of Worry. 2) URV = Unscheduled Return Visit. 3) SRH = Self-Reported Health. 4) Triage levels 1-5. Level 1 patients, the critically ill, were excluded for ethical reasons. Level 5, the lowest level, was rarely used and thus grouped together with level 4.

The triage level was determined from patient records. Patients with triage level 1, the most urgent triage level, were excluded for ethical reasons. Triage level 5 was rarely used, so triage levels 4 and 5 were grouped together. Thus, triage levels 2–5 were categorized into three groups: level 2, level 3 and levels 4–5, where 2 was the most urgent and 5 the least urgent.

Data on chronic diseases were gathered from patient answers to the initial survey and dichotomized into present or not present. This was done in an effort to secure enough patients in each group, to have sufficient power to detect a potential difference. The following diseases were considered chronic diseases, based on a survey from the Danish National Centre for Societal Research [21]: asthma, allergy, acute myocardial infarction, cancer, stroke, diabetes, hypertension, angina pectoris, COPD, rheumatoid arthritis, osteoarthritis, osteoporosis, migraine, herniated discs, and psychiatric disorders.

The number of URVs was found by going through patient records to determine whether they had a visit that was unscheduled within the follow-up period. Death was not considered a URV, and patients who passed away were not counted as URVs unless they had a return visit prior to death.

All included patient records were checked by a second person to ensure accuracy of results. For data with disagreements (n = 49, 5.2%), the data was discussed by the two reviewers until consensus was reached. In case of disagreements, these were discussed with HGJ until final consensus. Consensus was reached for all data

Statistical methods

The distribution of variables was presented as frequencies with percentages. The association between DOW and 30-day URVs was analyzed by logistic regression models. Three models were fitted: 1) crude, 2) semi-adjusted (adjusted for sex, age, triage level and chronic diseases), and 3) fully adjusted (adjusted for SRH, sex, age, triage level and chronic diseases) to access potential confounding effects on DOW based on the available literature [9,18,19,22–24]. Estimates from the models are presented as odds ratios (ORs) with the corresponding 95% confidence intervals (CIs) and p-value. A p-value of less than 0.05 was considered statistically significant. All analysis was done in R 4.1.2 [25].

Results

A total of 1,945 potential participants were screened, and 824 were included in the final analysis (Figure 1), 165 (20.0%) of which had a URV within 30 days. Among URVs, 70 (42.4%) had a high DOW at index admission (Table 1). More female than male patients presented with a URV (56% females and 44% males), and more than half of the patients with a URV were above the age of 65 (n= 88, 53%). A majority of patients with a URV were assigned a non-urgent triage level (n= 127, 84.7%) at their index visit, and the vast majority of patients with URVs had one or more chronic diseases (n=152, 92.1%). Likewise, more patients with URVs rated their general health as being bad or very bad (n=71, 43.6%) compared to those who did not have a URV (n=185, 28.1%). Of those who died within 30 days, a respective total of 2.4% of patients with a URV and 1.4% without a URV died.

Association between DOW and URVs showed an OR of 1.03 (CI=0.73:1.45, p = 0.872) for high DOW compared to low DOW. The semi-adjusted model had an OR of 0.98 (CI=0.68:1.41, p = 0.920) and the fully adjusted model an OR of 0.91 (CI=0.62:1.32, p = 0.616).

Discussion

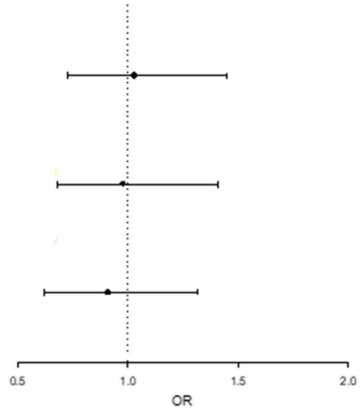
Association between DOW and URVs showed OR estimates close to 1 and with wide confidence intervals, making interpretation of our findings difficult.

Our study tested the hypothesis that a high DOW at admission was associated with 30-day URVs to the ED. We performed three analyses: 1) crude: 2) adjusted for sex, age, triage level and chronic disease; and 3) adjusted for SRH, sex, age, triage level and chronic disease. We found no statically significant association between a high DOW at index admission and 30-day URVs in all three analyses, with OR estimates close to 1, but wide confidence intervals also made interpretation difficult.

URVs to EDs are associated with several factors [19,22]. One of the most important reasons for self-referral to an ED, worldwide, is health concerns [26]. Using an objective scale to measure patients' worry makes it possible to explore the relationship between DOW and URVs further. In this context, we expected to find increased odds of URVs in patients with a high DOW. However, because we collected DOW data at the index visit, before patients were seen by a physician, this may have influenced the results. We did this so that the DOW would be unaffected by the first consultation with a physician. DOW gathered immediately before patient discharge may be more relevant to URVs because it might reflect patients' physiological and psychosocial resources at discharge, factors which are known to affect help-seeking behavior and self-referral to the ED [26]. Consequently, DOW collected before patients are seen by a physician and before start of treatment may be less directly linked to URVs. Conversely, DOW collected after treatment or at discharge after clarification from the treating doctor may show a stronger association between DOW and URVs.

Figure 2. Odds ratios (ORs) for unscheduled return visits for high Degree of Worry.

	OR (95% CI)	P-value
Crude	1.03 (0.73:1.45)	0.872
Adjusted	0.98 (0.68:1.41)	0.920
Fully adjusted	0.91 (0.62:1.32)	0.616



Results of analyses: 1) crude; 2) adjusted for sex, age, triage level and chronic disease; and 3) fully adjusted for self-rated health, sex, age, triage level and chronic disease.

Further, we investigated the effects of SRH, sex, age, triage level and chronic disease in an adjusted analysis, the results of which were insignificant (OR=0.91, 95% CI=0.62:1.32) (Figure 2). A patient's self-ratings of health are based on their current subjective physiological state [27], influenced by – among other things – age, general health and earlier health status [27], as well as chronic disease [11]. After adjusting the model for sex, age, triage level and chronic disease, the OR for DOW changes from 1.03 to 0.98, possibly indicating a combined cofounding effect from these parameters. DOW seeks to quantify a patient's perception of subjective urgency in their current situation [9]; thus it is possible that SRH also has a confounding effect on DOW. The change in the DOW OR to 0.91 when the model is additionally adjusted for SRH may also indicate that SRH has a confounding effect on DOW.

This study has limitations, and bias may have come from several sources. There will be an inherent non-response bias – patients can opt out at any time – if non-responders differ significantly from responders. In fact, non-respondents to health surveys have been found to have significantly increased morbidity compared with non-responders [28], and because morbidity increases odds of URVs [29], this may be a source of bias. Mortality bias may be present, but there were relatively few dead (1.5%) within 30 days, so excluding them from the analysis would be unlikely to change the results. These biases could affect the generalizability of the findings. We avoided information bias by double-checking the variables extracted, using two persons who had to reach consensus on any disagreement, which increased the external validity of the study. Orthopedic injuries were excluded because our study aimed to explore patients where their trajectory was not as straightforward, as some orthopedic injuries may be.

The presence of COVID-19 during the planned inclusion period caused all non-essential staff to be sent home, which resulted in a shorter inclusion period and thus fewer patients being included, which produced a less accurate result than would otherwise have been obtainable.

Dichotomizing DOW into high and low instead of analyzing it as a continuous variable may be a limitation, as information is lost, possibly making it more difficult to detect an association [30,31]. Conversely, dichotomization of a variable can be useful in clinical medicine, since it makes practical use of the variable and interpretation of results easier [30].

Approximately 12% of the patients' personal identification numbers (PINs) were entered erroneously when they were typed into the database, decreasing our sample size and thus the accuracy of our results. Unfortunately, there was no way to recover these PINs, and because they were the only identifiers of these patients, no data could be collected from their medical records.

In order for a study to be externally valid, the sample population must have characteristics similar to those of the population one tries to generalize to [32]. Despite some biases that could not be eliminated, we believe our results are generalizable to ED patients in countries with health care systems that function comparably to the Danish one, in similar patient groups to the one included in our study. Future studies should explore the fluctuation of DOW during the illness trajectory and

evaluate the association between DOW at discharge and URVs and the general applicability of DOW as a PRO marker in emergency medicine.

Conclusion

Patients with a high DOW at index admission were not found to be significantly associated with a higher rate of 30-day URVs in either crude or adjusted analyses. Estimates from the study sample indicated very little possible association between DOW and URVs; however, given the high degree of uncertainty based on the wide confidence intervals, no clear interpretation can be made of the study results.

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En elektronisk reminders effekt på dokumentation af anlæggelse af blærekateter hos akutindlagte patienter

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Keywords:
Urinary tract infections, urinary catheters, Emergency Department, reminder, documentation.

INTRODUCTION: Urinary tract infections (UTI) are one of the most common hospital-acquired infections. The incidence in Denmark, during 2020, was 37/10.000 risk days, while the incidence at Odense University Hospital was considerably higher 62/10.000 risk days. Hospital acquired UTI are associated with urinary catheter (UC) use and duration of catheterization. Reducing avoidable UC according to the indications in the national guidelines and frequent reassessments of UC are therefore important. This forms the basis for the project carried out in the Emergency Department (ED).

AIM: To examine the proportion and appropriateness of UC use and the consistent of UC documentation in all admissions from the ED, after the implementation of a virtual electronic reminder. Documentation enables reassessment of the indication and can decrease use and duration of UC and reduce the risk of UTI.

METHODS: A prospective controlled pre-post intervention study. The implementation of the virtual reminder during 3 weeks in March 2021 including daily education sessions and supervision. Data collection from patient records was performed during an 8-day period before and after the intervention.

RESULTS: In total 537 patients were included, 281 before and 256 after the intervention. Sixteen percent of the patients had a UC placed in admission from the ED, while this was 13% after the intervention. Due to a relatively small study, no statistically significant difference was detected (RR 0.83, 95% CI: [0.55-1.25]). The proportion of patients with UC placed without indications according to national guidelines were 27% before and 21% after the intervention. The size of the study and the difference did not enable a statistical based conclusion. However, the proportion of inconsistent documentation practices was improved as it was 14% before, and 6% after the intervention (RR 0.42, 95% CI: [0.24-0.75]) a statistically significant difference.

CONCLUSION: We found no difference in the proportion of patients with UC or appropriateness use of UC by implementing a reminder. However, the implementation of a reminder gave a statistically significant reduction in inconsistent documentation of patients with UC. The findings indicate that the intervention has the potential to prevent UTI in the hospital as a whole.

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Introduction

Urinvejsinfektion (UVI) er en af de hyppigste hospitalserhvervede infektioner i Danmark med en stigende incidens hen mod år 2020 [1]. Undersøgelser viser at op mod 80 % af UVI er forbundet med katerisation af urinvejene, og længden af den tid blærekateteret (KAD) er anlagt øger risikoen [2, 3].

Hospitalserhvervede infektioner overvåges i Danmark, ved hjælp af den nationale database Hospital Acquired Infections Database (HAIBA) [4]. Tilpasning til nyt datagrundlag i 2019, samt ændring i case definitionerne i HAIBA, har medført at UVI nu tilknyttes den afdeling, hvor patienten var 48 timer inden prøvetagningen i stedet for den afdelingen, som rekvirerede urinprøven. Det er derfor muligt at se overvågningstal fra hospitalets Fælles Akutmodtagelse (FAM), som ikke tidligere var tilgængelige. Ifølge HAIBA var incidensen for hospitalserhvervet UVI i hele Danmark i 2020 37 pr. 10.000 risikodøgn, mens incidensen på Odense Universitetshospital (OUH) var betragtelig højere (62), og i FAM 51 pr. 10.000 risikodøgn [4].

FAM på OUH modtager knap 200 patienter dagligt, hvoraf ca. 30 patienter overflyttes til specialiseret behandling på en anden klinisk afdeling inden for 48 timer. Internationale studier viser, at 9-12% af de patienter, der indlægges fra akutmodtagelser, får anlagt KAD, men i 30-65% af tilfældene følger indikationerne ikke de nationale retningslinjer, og kun 41% af journalerne indeholder dokumentation for KAD ordinationen [5, 6].

Studier viser endvidere, at de mest effektive metoder til forebyggelse af UVI er ved kun at anlægge KAD ved en korrekt indikation (jævnfør nationale retningslinjer), samt at seponere KAD hurtigst muligt [2].

Daglig revurdering af, om der forsat er en indikation for KAD, indgår derfor som et forebyggende tiltag i de Nationale Infektionshygiejniske Retningslinjer (NIR) udarbejdet af Central Enhed for Infektionshygiejne (CEI) på Statens Serum Institut [7]. En daglig revurdering vanskeliggøres dog i FAM af det høje patient-flow, hvor patienter ofte udskrives eller overflyttes i løbet af få timer.

Til at skabe overblik over patient-flows, samt øge gennemsigtigheden og samarbejdet benytter de kliniske afdelinger et elektronisk patient-flow management system kaldet Cetrea (Getinge Cetrea A/S). Patienters planlagte, igangværende og afsluttede behandlinger/undersøgelser registreres som aktiviteter i Cetrea og aktiveres ved brug af farvekoder, som gør klinikerne opmærksomme på, hvor langt patienten er i sit forløb. Teknologier med visuelle påmindelser kan betragtes som en reminder i den internationale klassificering af beslutningsstøttende værktøj [8]. En reminder skal støtte den kliniske beslutningstagen, samt hjælpe til overholdelse af retningslinjer [9, 10]. Internationale studier viser, at visuelle remindere forbedrer dokumentation af indikation, ordination og anlæggelse af KAD i den elektroniske patientjournal (EPJ) og nedsætter varigheden af den tid KAD er anlagt grundet klinikerens opmærksomhed på revurdering af indikationen [11, 12].

Som den primære indgang til hospitalet spiller FAM en væsentlig rolle i forebyggelsen af kateterrelaterede infektioner. Både i forhold til om der foreligger en

korrekt indikation for behandling med KAD, og at liggetiden for KAD er kortest mulig. Derfor blev en fokuseret indsats under navnet *KAD projektet i FAM*, til implementering af en visuel elektronisk reminder i Cetrea for patienter med KAD, iværksat.

På den baggrund var formålet med dette studie at undersøge hvor mange patienter, der fik anlagt KAD i FAM, samt hvilken andel af patienterne, der ifølge NIR, fik anlagt KAD med korrekt indikation. Specielt andelen af patienter, der fik anlagt KAD uden korrekt indikation, udgør en mulighed for en fremtidig reduktion i KAD anlæggelser.

Ydermere blev det undersøgt om en reminder havde effekt på dokumentationen i EPJ, idet en konsistent dokumentation muliggør revurdering af indikationen, som kan reducere den tid KAD er anlagt og dermed mindske risikoen for UVI.

Metode

Studiet var et prospektivt kontrolleret pre-post interventionsstudie foretaget i FAM.

Studiet forløb samlet over en 4 måneders periode fra februar 2021 til maj 2021.

OUH har et optageområde på ca. 430.000 indbyggere, 1000 normerede senge med 106.000 udskrevne patienter og 1.100.000 ambulante besøg årligt. Derudover varetager hospitalet regions- og højt specialiserede funktioner på landsplan. FAM har 70.000 kontakter årligt og 48 sengepladser.

Intervention

Interventionen bestod i udarbejdelsen og implementeringen af en virtuel reminder i det eksisterende elektronisk patient-flow management system Cetrea, i et samarbejde mellem Infektionshygiejnisk Enhed (IHE), afdelingsledelse og medarbejdere i FAM, samt projektlederen for Cetrea.

Reminderen blev udarbejdet som en behandlingspakke og synliggjorde patienter, der fik anlagt KAD i FAM.

KAD behandlingspakken bestod af 3 aktiviteter: *KAD, KAD revurdering (KAD revurd)* og *KAD seponering (KAD sep)*, som ved aktivering og brug af farvekoder figurerede under den enkelte patient på oversigtstavler og computerskærme (*figur 1*).

Ansvaret for aktivering af *KAD behandlingspakken* ved anlæggelse af KAD var sygeplejerskens efter lægeordination af KAD i journalen. Ansvaret for dokumentation af ordination og indikation i journalen var uændret lægens, og dokumentation for anlæggelsen var uændret sygeplejerskens, som beskrevet i

Figur 1 - Aktivering af KAD Behandlingspakken efter anlæggelse af KAD.

Farvekoder: Grøn = udført, blå = i gang, grå = planlagt, men ikke aktiveret.

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journalbekendtgørelsen fra Sundheds- og Ældre-ministeriet [13].

Aktiveringen af *KAD behandlingspakken* og farvekoder i CETREA, samt ansvarsfordelingen personalet imellem blev godkendt ved et ledergruppemøde i FAM.

Implementering

Implementeringen foregik over en 3 ugers periode i marts 2021. Den bestod af korte daglige undervisningssessioner for plejepersonale og læger, med hovedvægt på kun at anlægge KAD ved en klar indikation og efterfølgende fjerne det hurtigst muligt.

Daglige runder i FAM blev foretaget for at vejlede og hjælpe personalet i brugen af *KAD behandlingspakken* og tilbagemeldingerne herfra blev brugt til løbende at gøre status over projektet.

I de elektroniske lommekort, der benyttes i FAM (My Med Cards), blev hospitalets tværgående retningslinje for *kateter á demeure*, der følger NIR, instruktionsfilm om KAD anlæggelse og vejledning til *KAD behandlingspakken* lagt ind. Applikationen tilgås på smartphone eller tablet, og indeholder retningslinjer og instrukser.

Ugentligt blev der sendt nyhedsbreve ud til alle plejepersonaler i FAM, indeholdende en kort beskrivelse af KAD projektet, samt vejledning til *KAD behandlingspakken*. Derudover fik speciallæger med vagter i FAM mail om KAD projektet via afdelingsledelsen i FAM.

Tre uger efter implementeringsperioden fik læger og plejepersonale i FAM en opdatering og foreløbig status af hygiejnesygeplejersken, og tre måneder senere en evaluering af projektet.

Indsamling af data

Dataindsamling før og efter interventionen blev foretaget inden for projektets aftalte tidsramme via journaludtræk i en 8 dages periode før implementeringen, samt i en 8 dages periode efter implementeringen. For at interventionen ikke skulle påvirke den eksisterende administrering og dokumentationspraksis af KAD, blev før-målingen valgt i en periode 4 uger inden implementering, og information om projektet. Tilsvarende blev efter-målingen valgt inden for tidsrammen i en periode 3 uger efter implementeringens start, for at effekten i højere grad kunne tilskrives interventionen frem for en periodeeffekt. Alle udtræk i både før- og efter-målingen blev tilgået retrospektivt.

Inklusionskriteriet var patienter overflyttet fra FAM til en anden klinisk afdeling på hospitalet i før- eller efter-målingsperioderne.

Eksklusionskriterier var patienter med permanente katetre grundet urologiske problemstillinger, dialysepatienter uden egen urinproduktion, patienter indlagt og udskrevet fra FAM indenfor 48 timer, samt patienter meldt i FAM, men overflyttet direkte til anden klinisk afdeling.

På baggrund af journaludtrækkene på alle patienter, der blev overflyttet fra FAM i de to perioder, blev der foretaget en ublindet tværfaglig journalaudit på alle elektroniske patientjournaler [14]. Lægen og sygeplejersken havde hver deres fokus i journalaudit.

Der blev målt på antallet af patienter med KAD, om indikationerne for anlæggelse af KAD fulgte NIR, samt dokumentationsgraden af KAD.

Til registrering i journalaudit blev 3 variable valgt på baggrund af nationale anbefalinger om dokumentation i

forbindelse med ordination og journalføring af enhver KAD anlæggelse [7].

De 3 KAD dokumentationsvariable var: KAD anlæggelse, KAD ordination, KAD indikation.

Dokumentationsvariablerne kunne antage værdien 0 og 1. Variablen *KAD i tekst*, blev tilføjet for at kunne registrere patienter med KAD, i tilfælde hvor de 3 KAD dokumentationsvariabler antog værdien 0, samt for at vurdere på om indikationen fulgte NIR, når denne fremgik implicit.

Dokumentation for at patienten havde KAD blev defineret ved mindst en ud af fire mulige dokumentationer (anlæggelse, ordination, indikation eller dokumentation i fritekst).

Indikationer for KAD blev kategoriseret efter den tværgående retningslinje, og vurderet lægefagligt. Indikationerne indgik ofte implicit i journalnotaterne, hvorfor bl.a. prøvesvar blev brugt i vurderingen. Fandtes der ingen umiddelbar lægefaglig indikation, eller fulgte indikationen ikke retningslinjen, anførtes dette.

Konsistent dokumenteret KAD blev defineret som opfyldelse af alle 3 KAD dokumentationsvariable. Øvrige defineredes som inkonsistente. Ved journalaudit blev fortløbende patient-ID, patientens personnummer (CPR) og KAD (dokumentation som 0 eller 1) registreret (tabel 1).

Desuden registreres antal eksklusioner ifølge eksklusionskriterierne.

Data analyse

Andelen af patienter med KAD, indikationer for anlæggelse af KAD, og inkonsistent dokumenterede KAD før og efter interventionen blev analyseret.

Statistisk signifikans blev beregnet ved chi-i-anden-test, hvor p-værdien og RR med 95% konfidensinterval blev beregnet [15]. Oprensede pseudoanonymiserede datasæt blev analyseret ved brug af den statistiske softwarepakke "Stata 16 (SE) (StataCorp. 2019. Stata Statistical Software: Release 16. College Station, TX: StataCorp LLC)".

Patienternes køn og alder blev bestemt ud fra patienternes personnumre. Der blev udført deskriptiv statistik over køn- og aldersfordeling hos patienterne i før- og efter-målingen med henblik på at vurdere, om patienterne var sammenlignelige i de to målinger.

Ansøgning om tilladelse til udtræk af journaloplysninger på baggrund af et kvalitetsprojekt og behandling af identificerbar data blev anmeldt til den regionale paraply (tidligere Datatilsynet), og blev godkendt for en tidsbegrænset periode.

Tabel 1 - Skema til registrering af KAD dokumentationsvariabler og variablen KAD i tekst ved journalaudit.

Patient ID	CPR	Dokumenteret KAD anlæggelse	Dokumenteret KAD ordination	Dokumenteret KAD indikation	Dokumenteret KAD i tekst
x	xxxxxx-xxxx	0/1	0/1	0/1	0/1

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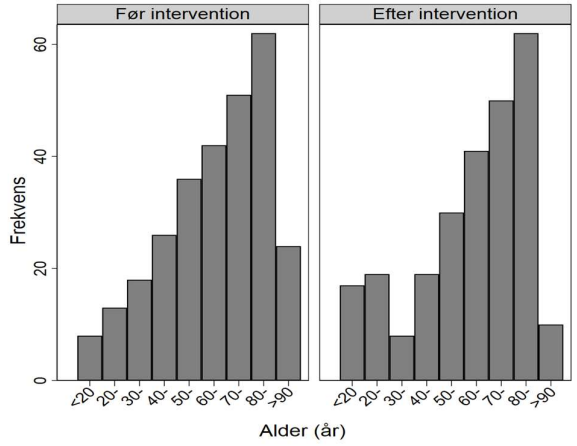
Resultater

I alt indgik 537 patienter fordelt på 281 i før-målingen inden interventionen i februar 2021, og 256 i efter-målingen efter interventionen i april 2021. I før-målingen var 147 mænd og 134 kvinder med en median alder på 69 år. I efter-målingen var 140 mænd og 116 kvinder med en median alder på 68 år. Dermed vurderedes det, at køns- og aldersfordelingen i før-målingen og i efter-målingen var sammenlignelige (figur 2).

Overflytning af patienter fra FAM med KAD

I alt blev 45 ud af 281 patienter (16%) overflyttet fra FAM med KAD før interventionen, mens 34 ud af 256 patienter (13%) blev overflyttet fra FAM med KAD efter interventionen (RR 0,83, 95% CI: [0,55-1,25]). Med udgangspunkt i det relativt lille studie blev der ikke påvist statistisk signifikant forskel i andelen af patienter, der blev overflyttet med KAD anlagt i FAM før og efter interventionen.

Figur 2 - Patienternes aldersfordeling før interventionen og efter interventionen.



Anlæggelse af KAD på korrekt indikation

I alt fik 12 ud af 45 patienter (27%) anlagt KAD på basis af en korrekt indikation før interventionen, mens 7 ud af 34 patienter (21%) fik anlagt KAD på korrekt indikation efter interventionen. Studiet og forskellen var for lille til at drage en statistisk baseret konklusion.

Samlet fik 79 ud af 537 patienter (15%) anlagt KAD i FAM i perioden før og efter interventionen. Kun 24% af disse KAD anlæggelser fulgte indikationerne i den nationale retningslinje.

Indikationerne for KAD anlæggelse, var overvejende fordelt på *kritisk diuresemåling hos intensive patienter,* samt *peroperativt ved langvarige indgreb og ved indgreb, som kræver blæretomhed*. Derudover fik en enkelt patient anlagt KAD grundet *akut urinretention, der ikke kan behandles med steril intermitterende kateterisation (SIK).*

Indikationerne der ikke fulgte NIR for KAD anlæggelse, fordelte sig overvejende på patienter, der fik anlagt KAD grundet behov for væskeskema, dernæst urinretention uden forudgående forsøg på SIK. Derudover fik to patienter anlagt KAD mhp. urinprøvetagning. Ved 11 patienter var indikationen *andet*, hvor årsagen ikke var mulig at definere ud fra journalen.

Dokumentationspraksis

I alt havde 39 ud af 281 patienter (14%) en journal med inkonsistent dokumentationspraksis før interventionen (RR 0,83, 95% CI: [0,55-1,25]), mens kun 15 ud af 256 patienter (6%) havde en journal med inkonsistent dokumentationspraksis efter interventionen (RR 0,42, 95% CI: [0,24-0,75]). Den absolutte forskel på reduktionen af inkonsistent dokumentation efter interventionen var 8% og statistisk signifikant.

Diskussion

Samlet fandt vi, at implementeringen af en elektronisk reminder i FAM i form af KAD behandlingspakken havde en statistisk signifikant reduktion på 8% på inkonsistent KAD dokumentation. Derudover viste resultaterne, at kun 24% af indikationerne for KAD anlæggelse fulgte NIR. Alle journaludtræk blev dog tilgået retrospektivt, hvorfor manglende dokumentation i nogle tilfælde vanskeliggjorde vurderingen af indikationen. Man kunne derfor ikke udelukke, om der kunne have været forhold i den enkelte patientsituation, der retfærdiggjorde KAD anlæggelse.

I modsætning til nærværende studie fandt Scott et al. en signifikant reduktion af KAD anlæggelser på 25% i en akutmodtagelse med 47 senge [11]. I studiet blev der, i modsætning til KAD projektet i FAM, foretaget fokusgruppeinterview til at identificere den aktuelle praksis for indikation for KAD anlæggelse. På baggrund af den praksis blev en reminder designet og relevant undervisning tilrettelagt [11].

I lighed med resultaterne fra nærværende studie genfindes manglende efterlevelse af gældende retningslinjer for indikationer for KAD anlæggelse i internationale studier [16-18]. Murphy et al. fandt i et kvalitativt studie med deltagelse af 30 klinikere i en akutmodtagelse, at klinikere frygtede at overse urinretention selv hos asymptomatiske patienter. Frygten for dette samt tilgængeligheden af alternativer til KAD anlæggelse, havde betydning for klinikernes valg i forhold til KAD anlæggelse [18]. I FAM fik 15 patienter anlagt KAD grundet urinretention uden at alternativer som SIK, var forsøgt.

Murphy et al. fandt ligeledes, at måling af urinoutput var en standard indikation for KAD anlæggelse ved patienter i akutmodtagelser, uden overvejelser omkring alternativer [18]. I FAM fik 31 patienter anlagt KAD på grund af væskeskemaer med måling af urinoutput.

Carter et al. fandt, at hvis lægen ikke var involveret i beslutningen om KAD anlæggelse, steg risikoen for at indikationen ikke fulgte nationale retningslinjer. Studiet var kvalitativt og blev foretaget blandt klinikere og ledere i 6 akutmodtagelser [17]. Visse instrukser for behandlingsregimer i akutmodtagelser indeholdt KAD anlæggelse som en standard, hvorfor lægerne ikke var involveret i beslutningen med inkonsistent dokumentation af indikation og ordination til følge [17]. Samtidig fandt Saint et al. i en undersøgelse blandt 288 læger, at de hos 28% af patienterne ikke var opmærksomme på, at patienten havde KAD. Indikationerne for KAD hos disse patinter fulgte som oftest ikke de nationale retningslinjer [16]. Var lægen derimod opmærksom på, at patienten havde KAD, var der statistisk signifikans for at indikationen for KAD fulgte de nationale retningslinjer [16].

Hvad ved vi?

- 80% af hospitalserhvervede urinvejsinfektioner er forbundet med katerisation af urinveje, 30-65% af indikationerne for anlæggelse af urinvejskatetre (KAD) følger ikke nationale retningslinjer i fælles akutmodtagelser og kun 41% af journalerne indeholder dokumentation for kateter ordination.

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I overensstemmelse med resultaterne i nærværende studie viser internationale studier, at dokumentationen kan øges ved indførelse af remindere [12, 19]. Cornia et al. finder, at en reminder integreret i den elektroniske patientjournal på en medicinsk afdeling øgede dokumentationsgraden fra 29% til 92% over en 4 måneders periode [12]. Reminderen blev samtidig synlig i den elektroniske patientjournal 72 timer efter KAD anlæggelsen, hvor revurdering af KAD var påkrævet. Dette kan have medvirket til den øgede dokumentationsgrad i studiet sammenlignet med KAD projektet i FAM. I FAM skulle dokumentationen foretages i to systemer og retningslinjen for indikation for KAD tilgås i en tredje, hvilket gjorde den kliniske beslutningstagen mere tidskrævende. Cornia et. al studie foregik derudover i en anden kontekst end en travl akutmodtagelse som FAM, som også kan have medvirket til den højere dokumentationsgrad [12].

I et studie af Gokula et al. blev en reminder, i form af en indikationstjekliste placeret i KAD anlægsbakkerne, hvormed dokumentationen af ordinationen blev øget fra 43% til 63% i en akutmodtagelse. Derimod var dokumentation af indikation uændret på 22% [19]. I studiet indgik 200 patienter med KAD, i modsætning til de 79 patienter med KAD i FAM, og dokumentationen blev opgjort i både ordination og indikation [19]. I KAD projektet i FAM blev dokumentationen derimod kun klassificeret som konsistent dokumentation, hvis både ordination, indikation og anlæggelse af KAD var dokumenteret i den elektroniske patientjournal.

Ancker et al. undersøgte implementering af nye remindere i et kohorte-studie over 3,5 år blandt 112 klinikere, og fandt ingen desensibilisering over tid [20]. Til gengæld blev klinikerens accept af remindere påvirket af komplekse patientforløb, antallet af remindere samt gentagne remindere ved den samme patient [20]. Man bør derfor være opmærksom på antallet af remindere hos den enkelte patient særligt ved komplekse patientforløb [20]. Derudover kunne dokumentationsgraden øges, hvis det var muligt at integrere reminderen i patientjournalen [12].

Projektet i FAM var inkonklusivt i forhold til interventionens effekt på andelen af patienter med KAD, der blev overflyttet fra FAM. Studier med fokuseret undervisning i indikationer for KAD anlæggelse viste derimod en reduktion i antallet af KAD [11, 21]. Ligeledes kunne kvalitative metoder til identificering af anvendte indikationer for KAD anlæggelse have været

Hvad tilføjer denne afhandling til vores viden?

- Implementeringen af en reminder i Fælles akutmodtagelsen øgede konsistent dokumentation af KAD i den elektroniske patientjournal. Derimod fulgte kun 24% af indikationerne for KAD anlæggelse de nationale retningslinjer, hvilket var endnu lavere end tidligere studier har vist.

Hvordan kan den bruges i danske akutmodtagelser?

- Forbedret KAD dokumentationspraksis synliggør indikationen for KAD anlæggelse hos patienter der overflyttes fra FAM, hvilket muliggør revurdering. Fundene indikerer at interventionen har potentiale til at kunne forebygge UVI på hospitalet som helhed, dog er fokus på korrekt indikation for KAD anlæggelse forsat påkrævet.

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brugt til at målrette denne undervisning [11, 18]. Fokuseret undervisning kunne derfor med fordel være tilrettelagt, som supplement til retningslinjen og de korte daglige undervisningssessioner. Derudover kunne en visuel indikationstjekliste øge dokumentationen [19].

En tværfaglig revision af standardinstrukser for KAD anlæggelser i visse behandlingsregimer i FAM kunne have været med til at sikre, at anlæggelse af KAD fulgte NIR. Disse tiltag kunne muligvis have medvirket til at reducere antallet af anlagte KAD, men det vil derudover kræve et større studie og en længere projektperiode.

Et kontinuerligt fokus i FAM og øvrige afdelinger på hospitalet, til forebyggelse af UVI via dokumentation og korrekt indikation for KAD anlæggelse ved hjælp af bl.a. målrettet undervisning er forsat påkrævet i et samarbejde med afdelingernes hygiejneansvarlige. Ligeledes skal tendenser i HAIBA følges og sammenholdes med den fokuserede indsats.

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Original-, udviklings-, og kvalitets artikler

New infiltration on chest X-ray for emergency diagnosis of pneumonia

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Keywords:
Pneumonia, chest X-ray, sensitivity, diagnosis, emergency department.

INTRODUCTION:

Pneumonia is a very common and severe infectious disease with high mortality. Despite studies showing lack of sensitivity for new infiltration on chest X-ray (CXR) in the diagnosis of pneumonia, leading literature require a new infiltration on CXR.

AIM:

We aimed to examine the proportion of pneumonia patients in the emergency department with a new CXR infiltration and compare the clinical presentation and 7-days mortality of pneumonia patients with and without new infiltration on CXR.

METHODS:

This diagnostic retrospective chart reviewing study included pneumonia diagnosed patients who were discharged from the emergency department during 2018. Initial CXR was reviewed and sensitivity of new infiltration on CXR was calculated. Hereafter, compared patient characteristics of radiograph-confirmed pneumonia patients to those without by using a chi-square test.

RESULTS:

556 journals were enrolled of which 62% had a new infiltration on their CXR, resulting sensitivity of new infiltration on CXR to be 62%. There was no significant difference in patient characteristics and mortality.

CONCLUSION:

Absence of new infiltration on CXR does not appear to exclude pneumonia diagnosis in pneumonia suspected patients. Patients with positive CXR finding did not differ from those with negative CXR.

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Introduction

Pneumonia is highly represented among the most common infectious diseases (1). There is a clinical spectrum for pneumonia that ranges from infections treated on an outpatient basis, with 1% mortality, to infections that present as medical emergencies (severe sepsis and septic shock) with mortality above 40% (2). In Denmark, the hospitalization rate for pneumonia infections is approximately 0,8% per year with a significant rise among the elderly and those with comorbidity (3). The incidence and the mortality of pneumonia infections are age- and comorbidity-dependent (4). Comorbidities include chronic obstructive pulmonary disease, diabetes mellitus, congestive heart failure, and malignancy. COPD patients are prone to frequent exacerbations in which bacterial infection is believed to play a role in at least half of these episodes (5). Hence the diagnosis of pneumonia is important to be done in early stage so the patient can be treated appropriately.

Pneumonia can be diagnosed with various methods but according to the guideline developed by the Danish Society for Respiratory Medicine and Danish Society of Infectious Diseases, the diagnosis of pneumonia requires radiological confirmation of new infiltration as well as symptoms of lower respiratory tract infection (6). Symptoms may include fever, cough, mucus production, dyspnea, and respiration-related chest pain. Besides the guideline, Danish Doctor's Handbook set the same frame for diagnosing pneumonia (7). The literature emphasizes the importance of detecting a new infiltration on CXR for pneumonia diagnosis and has set it as a requirement for the diagnosis. Studies suggest that CXR should be performed in all patients admitted with suspected pneumonia. As clinical manifestations such as respiratory symptoms, general symptoms of infection and corresponding physical findings are not sensitive or specific enough for a definitive diagnosis, a confirmatory CXR should be performed to detect infiltration (1, 2, 8).

Nevertheless, many patients present with symptoms or clinical findings suggestive of pneumonia, but the corroborating radiographic evidence required for a diagnosis is lacking or unclear. Despite this, these patients are commonly "clinically" diagnosed with pneumonia and are treated as such. Studies suggest one-third of pneumonia patients have CXR that do not provide radiographic evidence of pneumonia (9). The sensitivity of CXR in the diagnosis of pneumonia is reported to be between 67-75% (10). Despite numerous studies reporting that CXR lacks sensitivity and specificity in diagnosing pneumonia (10-13). It is still the most preferred imaging modality for the diagnosis of pneumonia (14).

Studies have shown CXR not to have an adequate sensitivity to detect a new infiltration in patients suspected with pneumonia. Leading literature requires not only symptoms of lower respiratory tract infection but also the detection of a new infiltration on CXR for the diagnosis of pneumonia. This incongruence between leading literatures requiring both symptoms of lower respiratory tract infection and a new infiltration on CXR, despite CXR's low sensitivity leaves a breach for investigation on how many patients diagnosed with pneumonia actually have new infiltration on their CXR.

Aim and objective

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We aim to examine the proportion of pneumonia patients in the emergency department with a new CXR infiltration and compare the clinical presentation and outcome of pneumonia patients with and without new infiltration on CXR.

Method

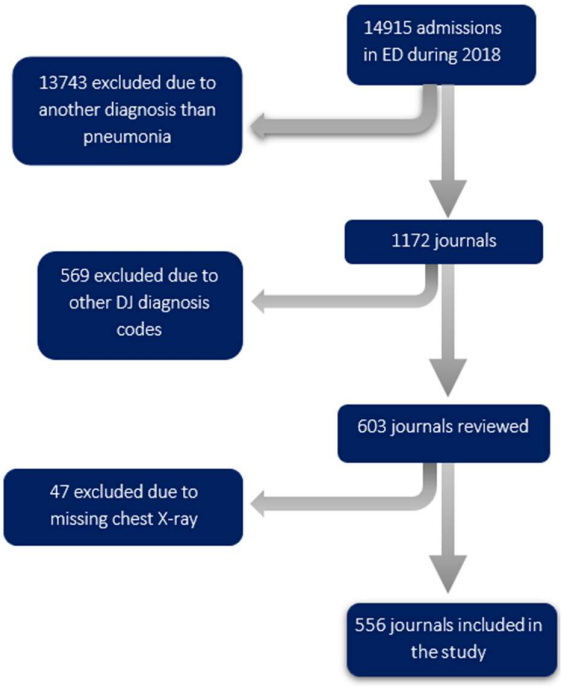
Study design

This diagnostic study was completed by retrospectively reviewing the hospital records of ED patients with a discharge diagnosis of pneumonia. The study adhered to the updated 2015 STARD reporting standards (15).

Study setting and participants

The study setting was the Emergency Department in Hospital Sønderjylland, Aabenraa, Denmark. Patients included in this study were discharged with a pneumonia diagnosis ICD-10 code of DJ13-DJ22 during 2018. Patient records that did not report completion of a CXR during admission were excluded from the study population.

Figure 1: Selection of study population



Test method

The reference standard was a discharge diagnosis of pneumonia amongst ED patients. New chest x-ray infiltration, described by the radiologists, was the index test.

Data collection

Two project assistants reviewed each medical record to collect clinical and radiographic data. Information from the medical records of patients with a pneumonia diagnosis included ID-number, age, sex, date of admission and ICD-10 discharge diagnosis, information about smoking status, symptoms, clinical signs, comorbidities, and C-reactive protein biomarker. Smoking was a categorical variable and patients were grouped according to whether they were active, non-, or former smokers. The most common signs and symptoms for pneumonia such as cough, mucus production, dyspnea, and fever, were collected from the eligible patient charts.

Comorbidities such as asthma, COPD, hypertension, diabetes mellitus (type 1 and type 2), and cardiovascular disease (congestive heart failure, aortic stenosis, mitral valve stenosis, infarction, atherosclerosis, and arrhythmias) were noted. For the radiographic data, the conclusion drawn by the on-call radiologist of each initial chest radiograph wa recorded. A CXR was classified as positive if the description described “new infiltration”, “pneumonia” or “consolidation”. It was classified negative if the above-mentioned terms were not used or the description included “no new infiltration”,

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"no pneumonia", "no consolidation" or other specific terms excluding pneumonia.

Statistical analysis

Based on CXR results, patients were stratified into two groups: positive (chest radiograph findings in concordance with pneumonia) and negative (no chest radiograph findings indicating pneumonia). The sensitivity of the index test was determined. A chi-square test was performed to evaluate the statistical difference in factors such as age, sex, comorbidities, clinical signs, and symptoms between the two groups. Statistical significance was set as $\alpha \leq 0.05$. All statistical data were analyzed using STATA version 15.0 (Texas, USA).

Ethics

The study was a quality improvement study and did not require ethical approval by Regional Committees on Health Research Ethics.

Results

A total number of 14915 admissions were recorded during 2018 in the emergency department in Hospital Sønderjylland as shown in Figure 1. The number of patient journals excluded was 14312 due to another diagnosis than pneumonia and other DJ pneumonia diagnosis codes leaving 603 journals. The included diagnosis codes were Pneumonia due to Streptococcus pneumoniae (DJ-13), Pneumonia due to Hemophilus influenzae (DJ-14), Bacterial pneumonia not elsewhere classified (DJ-15),

Pneumonia due to other infectious organisms not elsewhere classified (DJ-16), Pneumonia in diseases classified elsewhere (DJ-17), Pneumonia unspecified organism (DJ-18) and unspecified acute lower respiratory infection (DJ-22). After reviewing 603 journals, there were 47 patient records missing a CXR and these were excluded from the study resulting in 556 journals, as illustrated in Figure 1.

Patient characteristics on admission are shown in Table 1. The median age was 75 years (IQR; 64-83), 58% was male. 65% of the population had comorbidities, where CVD was dominating with 33%. 17% of the population were active smokers.

From the study population (n=556), 343 (62%) patients underwent a CXR with positive radiological findings for pneumonia. Therefore, the index test has a sensitivity of 62%. The characteristics of the study population are illustrated in Table 2. Patients with positive CXR did not display significantly different characteristics when compared with those with negative CXR.

Table 1: Patient characteristics

Patient characteristics	Study population N = 556
Age, median (IQR)	75 (64-83)
Male	321 (58%)
Female	235 (42%)
Smoking	96 (17%)
CVD	185 (33%)
HTN	171 (30%)
COPD	142 (25%)
DM	106 (19%)
Asthma	34 (6%)
Comorbidities	362 (65%)

COPD: Chronic Obstructive Pulmonary Disease, CVD: Cardiovascular Disease, DM: Diabetes Mellitus, HTN: Hypertension

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Table 2: Analysis of patient characteristics

Characteristics	Level	Missing	Positive	Negative	P-value
N			343	213	
Age	18 – 64		93 (27,1%)	50 (23,5%)	0,15
	65 – 74		64 (18,7%)	55 (25,8%)	
	75 – 84		107 (31,2%)	69 (32,4%)	
	>85		79 (23,0%)	39 (18,3%)	
Sex	Male		209 (60,9%)	112 (52,6)	0,053
	Female		134 (39,1)	101 (47,4%)	
Dyspnea		157	197 (83,5%)	135 (82,8%)	0,86
Cough		141	222 (86,4%)	128 (81,0%)	0,14
Mucus		225	151 (72,9%)	95 (76,6%)	0,46
Crackles		108	183 (64,4%)	105 (64,0%)	0,93
T>38		23	129 (39,8%)	82 (39,2%)	0,89
CRP	<10	34	13 (4,0%)	13 (6,5%)	0,16
	10 – 99		141 (43,9%)	99 (49,3%)	
	>100		167 (62,0%)	89 (44,3%)	
Smoking	Non-smoker	117	84 (31,5%)	63 (36,6%)	0,39
	Active		57 (21,3%)	39 (22,7%)	
	Former		126 (47,2%)	70 (40,7%)	
CVD			120 (35,0%)	65 (30,5%)	0,28
HTN			103 (30,0%)	68 (31,9%)	0,64
COPD			57 (26,8%)	85 (24,8%)	0,60
DM			64 (18,7%)	42 (19,7%)	0,76
Asthma			17 (5,0%)	17 (8,0%)	0,15
Comorbidities	0		119 (34,7%)	75 (35,2%)	0,75
	1		103 (30,0%)	57 (26,8%)	
	2		84 (24,5%)	58 (27,2%)	
	3		30 (8,7%)	17 (8,0%)	
	4		7 (2,0%)	5 (2,3%)	
	5		0 (0,0%)	1 (0,5%)	
7-Days- mortality			22 (6,4%)	7 (3,3%)	0,11

COPD: Chronic Obstructive Pulmonary Disease, CRP: C-Reactive Protein, CVD: Cardiovascular Disease, DM: Diabetes Mellitus, HTN: Hypertension, T: Temperature

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Discussion

This study is one of the recent studies to determine the efficacy of chest radiography for the diagnosis of pneumonia in ED patients. This study determines that chest radiography has a 62% sensitivity for pneumonia diagnosis. Interestingly, there are no clinically important features or patient characteristics that significantly distinguish radiographically confirmed pneumonia patients from those without radiographic confirmation.

The results of this study are comparable with those of previously published studies conducted in ED for the diagnosis of pneumonia, which aimed to determine the sensitivity of CXR for a pneumonia diagnosis. Bourcier et al. performed a single-center observational study and reported the CXR sensitivity for acute pneumonia as 60% (10). Basi et al. reported 66% of clinically suspected pneumonia patients had radiograph-confirmed pneumonia but 34% did not have radiographic confirmation (9). Egelund et al. screened 2501 patients with a pneumonia diagnosis, 961 patients had no new infiltrate on the CXR, resulting in a CXR sensitivity of 62% after analysis (16).

Patient characteristics and clinical features did not show any significant correlation with the presence or absence of infiltration on CXR. Hagaman et al. presented no difference in age, sex, or comorbidities when the two patient groups were compared (11). Basi et al. showed a few characteristics that distinguished patients with opacification on CXR from patients without. Patients without infiltration on CXR were older than those with radiograph-confirmed pneumonia. Significantly, many more patients with new infiltration had dyspnea (9).

Uncontrolled variables not included in patient records such as the onset of symptoms may have an impact on the opacification on chest radiographs. The time gap between symptom debut and infiltration on CXR is not precisely known. Bourcier et al. analyzed patients with onset of pneumonia for symptoms both less than 24 hours and more than 24 hours. Chest radiography confirmed pneumonia in only 23% of those presenting with symptom onset less than 24 hours whilst 61% of patients with positive CXR finding had a symptom onset after more than 24 hours. Therefore, it is suggested that a CXR has low sensitivity in early stages of pneumonia in ED patients.

Alternative diagnostic tests are being explored which could replace CXR for the diagnosis of pneumonia in

Hvad ved vi?

- Vi ved at diagnosen pneumoni kræver radiologisk påvist nytilkommet infiltrat ifølge retningslinjer

Hvad tilføjer denne afhandling til vores viden?

- Denne artikel viser at 62% af de patienter som diagnosticeres med pneumoni på akutmodtagelsen har et påvist nytilkommet infiltrat på røntgen af thorax

Hvordan kan den bruges i danske akutmodtagelser?

- På akutmodtagelsen skal vi være opmærksomme på at selvom der ikke er påvist et nytilkommet infiltrat på røntgen af thorax kan patienten godt have pneumoni alligevl.

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ED patients. Studies have shown ultrasound having superiority over chest X-rays for diagnosis of pneumonia with a higher sensitivity (10, 12). Therefore, providing a more timely and cost-effective alternative.

The difference between studies and leading literature created a gap for investigation on how many pneumonia patients had a new infiltration on CXR. This study suggests that according to literature, 62% of the discharged pneumonia patients from the ED would have gotten a pneumonia diagnosis, while the remaining 38% would not, since a new infiltration was not detected. This demonstrates that clinicians do give the diagnosis for pneumonia even though a new infiltration is missing on CXR. Other factors may play a role such as symptoms, clinical signs, and blood results besides for the CXR results. It is yet to be investigated what exactly these other factors are and what role they play in the diagnosis of pneumonia.

Limitations in this study include the retrospective study design. We were unable to control for factors in patient anamnesis done by different physicians causing missing data. In future studies, missing data could be avoided by conducting a systematic scheme for patient anamnesis in a prospective study design. Variations in the conclusions of on-call radiologists were challenging. Future research would be assisted if the same radiologist was describing all the CXRs or if the radiologist's only assignment was to detect pneumonia on the CXR. Hereby, would the CXR be described in a consistent and similar manner. Despite an adequate population size, the study was a single center. Future studies including patients from different regions in the world would allow the study's conclusions to be more representative on an international level.

Future studies ought to take into consideration the severity of the disease. A future prospective study could classify patients by CURB-65 score and examine if it has an impact on the presence or absence of infiltration on CXR.

Conclusion

This study determines sensitivity of new infiltration on CXR for pneumonia diagnosis in ED to be 62%, meaning absence of new infiltration on CXR does not appear to exclude pneumonia. Although, leading literatures require a new infiltration on CXR, it seems as clinicians not only diagnose pneumonia based on positive CXR but also other parameters, which is yet it be studied. Patients with positive CXR did not display significantly different characteristics when compared with those with negative CXR. Finally, a prospective study design would be necessary to confirm the study results since avoidable limitations occurred due to the chosen study design.

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Original-, udviklings-, og kvalitets artikler

Case reports/kasuistikker

Sjælden type subaraknoidal blødning som årsag til svære rygsmerter

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Subarachnoid hemorrhage, spinal hemorrhage, acute back pain, platelet inhibition treatment.

Resumé

Rare Type of Subarachnoid Bleeding as Cause for Severe Back Pain

Acute lower back pain is a frequent reason for admittance to the emergency department often due to disc herniation, lumbago, or acute conditions such as aortic dissection. This case presents a rare differential diagnosis to severe back pain: a spinal subarachnoid hemorrhage.

A 50-year-old woman undergoing anti-platelet treatment presented in the emergency department with severe back pain. After physical and neurological examination, the diagnosis of lumbago was given, and the patient was discharged. The following day, she experienced severe back pain and symptoms of anal dysesthesia and paresthesia, but without symptoms of cauda equina syndrome. Four days later she was diagnosed with spinal subarachnoid hemorrhage on an MRI of the lumbar spine.

Even though spinal subarachnoid hemorrhages are rare, this condition should still be considered when a patient is admitted to the emergency department with severe back pain. If this condition is overlooked, it can result in permanent neurological deficits or death.

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Introduktion

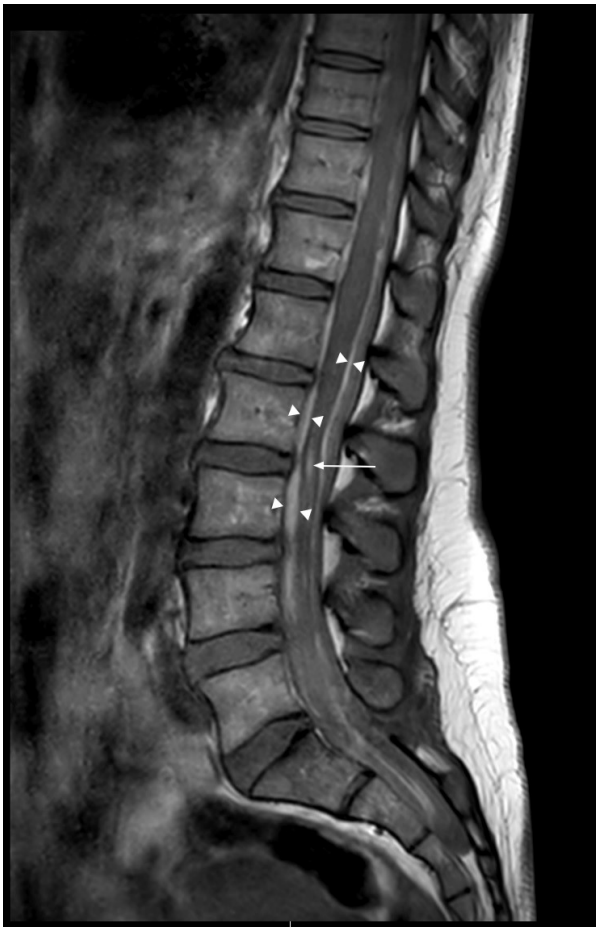
Akutte rygsmerter står for 9,2 % af alle akutte, somatiske indlæggelser i Danmark (1), hyppigt grundet muskulo-skeletale tilstande som lumbago og diskusprolaps, men mere alvorlige tilstande som galdesten, pankreatit eller livstruende tilstande som fx aortadissektion kan også være årsag til smerter i ryggen (1, 2).

Vi vil med denne case præsentere en sjælden tilstand, der er relevant som differentialdiagnose for svære, akut opståede rygsmerter.

Sygehistorie

50-årig kvinde i behandling med trombocythæmmer (Hjertemagnyl 75 mg), grundet tidligere cerebralt aneurisme, behandlet med coils, samt akut myokardieinfarkt behandlet med stent, blev indbragt til akutmodtagelsen grundet pludseligt indsættende lænderygsmerter obs. rumperet aortaaneurisme. Smerterne debuterede i den ene side af lænden, men progredierede hurtigt til hele lænden. Smerterne var turevise, uden udstråling og ifølge patienten uudholdelige. Diagnosen rumperet aortaaneurisme blev afkræftet ved CT-scanning og herefter overgik patienten til ortopædkirurgisk regi med mistanke om akut indsættende lændehold eller diskusprolaps, hvor et evt. cauda equina syndrom (2) skulle afkræftes. Patienten fremstod ved undersøgelsen neurologisk intakt med normal kraft over begge underekstremiteter og uden tegn på cauda equina syndrom ved undersøgelse af den anale sphinkter og blæreskanning. Patienten blev hjemsendt med diagnosen lumbago, smertedækket med analgetika i form af 4 g paracetamol, 50 mg morphin og 750 mg chlorzoxazon pr. døgn.

Dagen efter henvendte patienten sig i skadestuen, motorisk urolig og grædende. Der var tilkommet "red flags" (2) i form af anal dysæstesi og paræstesi i ridebukseområdet, og mistanken om cauda equina syndrom blev igen vækket. Endnu en gang blev mistanken afkræftet, da der ikke blev fundet andre "red flags", således fandt man hverken kraftnedsættelse, parese af underekstremiteterne, urinretention eller nedsat tonus af den anale sphinkter. Grundet debut af



Figur 1: MR, T1-vægtede sekvenser. Patientens spinalkanal 4 døgn efter smertedebut. Cerebrospinalvæsken er højsignalerende (lysere) omkring conus medullaris og cauda equina fra Th9 til L5-niveau, foreneligt med subaraknoidal blødning, markeret med pilehoveder. På L2 til L3-niveau ses højsignalerende område i conus medullaris, markeret med pil, foreneligt med ødem. Supplerende sekvenser viste ingen blødning over Th9-niveau.

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neuropatiske smerter blev patienten opstartet i gabapentin 3600 mg pr. døgn.

Fire døgn efter smertedebut blev der foretaget en subakut MR-skanning af columna lumbalis. Denne viste en spinal subaraknoidal blødning, se figur 1, samt på Th9-niveau en rund struktur, formentlig et aneurisme eller en tumor, som kunne være årsag til blødningen. Patienten blev konfereret med neurokirurgisk vagthavende, der valgte et konservativt behandlingsforløb. Patienten blev indlagt til observation og smertebehandling, og trombocythæmmeren blev pauseret. Patienten blev på baggrund af de initiale MR-skanningsfund udredt med supplerende MR-skanning, dog uden at man fik klarlagt årsagen til den spinale subaraknoidalblødning. Patienten blev derfor tilrådet at genoptage sin vanlige behandling med trombocythæmmer. Patienten var mobiliseret med rollator ved udskrivelsen, men symptomerne remitterede herefter, og patienten genvandt fuldt funktionsniveau.

Diskussion

Denne case beskriver en yderst sjælden årsag til akut indsættende rygsmerter, en subaraknoidal blødning i spinalkanalen. De af patienten beskrevne pludseligt opståede, ulidelige rygsmerter, også kendt som "Le Coup de Poignard Rachidien", er patognomonisk for spinal subaraknoidalblødning (3). Subaraknoidalblødning i spinalkanalen udgør <1 % af det samlede antal subaraknoidalblødninger (4, 5) og kan give ovenstående symptombillede (5). Selvom lidelsen er sjælden, kan det for klinikere i akutmodtagelser landet over være en relevant differentialdiagnose ved akut opståede, kraftige rygsmerter, især hvis patienten er i blodfortyndende behandling. Det er vigtigt at kende denne differentialdiagnose, da en subaraknoidal blødning i spinalkanalen kan have svære komplikationer med progredierende pareser, manifest cauda equina syndrom eller død (5).

Årsagen til patientens subaraknoidalblødning forbliver ukendt, men med patientens historik in mente, kan den skyldes et spinalt aneurisme og samtidig behandling med trombocythæmmer. Da patienten ved objektiv undersøgelse ikke frembød kraftnedsættelse eller sensibilitetsforstyrrelser, fik patienten jf. lokale retningslinjer ikke foretaget en akut MR-skanning, men herimod en subakut MR-skanning. Patienten blev

Hvad ved vi?

Der er mange differentialdiagnoser til svære lænderygsmerter, man som læge skal overveje, når en patient kommer ind i akutmodtagelsen. Nogle er akutte, mens andre er mindre akutte og måske endda selvlimiterende.

Hvad tilføjer denne casereport til vores viden?

Spinal subaraknoidal blødning er en meget sjælden tilstand, som bør overvejes ved svære rygsmerter, og god anamnese inkl. medicinhistorik samt adækvat billeddiagnostik kan hjælpe med at afdække, hvilke differentialdiagnoser der er relevante.

Hvordan kan dette bruges i de danske akutmodtagelser?

- Det er vigtigt at være opmærksom på denne ellers sjældne differentialdiagnose, da den kan føre til permanente neurologiske udfald eller være fatal, hvis den ikke opdages.

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informeret om at henvende sig ved forværring eller symptomer på cauda equina syndrom. Selvom spinale subaraknoidale blødninger er sjældne, bør tilstanden overvejes differentialdiagnostisk, hvis en patient kommer i akutmodtagelsen med svære rygsmerter. Hvis tilstanden overses, kan det resultere i permanente neurologiske udfald eller død.

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