Emergency teams in Danish emergency departments

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ABSTRACT

INTRODUCTION: The use of designated emergency teams for cardiac arrest and trauma patients is widely implemented. However, the use of designated teams in Danish emergency departments (EDs) has not been investigated. Our aim was to investigate the use and staffing of emergency teams in Danish EDs.

MATERIAL AND METHODS: A cross-sectional questionnaire study was sent to all 20 Danish EDs designated for emergency care.

RESULTS: The response rate was 95% (n = 19). Three EDs were excluded due to incomplete data. All EDs (n = 16) received critically ill patients, cardiac arrests and trauma patients. In all EDs, a designated team responded to cardiac arrest (CAT) and trauma patients (TT). Only 31% of EDs had access to a designated medical emergency team (MET). CAT consisted of a median of six (range 5-10) different personnel groups. Of these, three (1-6) were physicians and only one (0-2) was a senior physician. TTs consisted of a median of nine (7-11) different personnel groups. Of these, four (2-6) were physicians, and three (2-4) were senior physicians. In 25% of the EDs, there was no access to a MET. In 31% of the EDs, an ad hoc-team was created. In 14%, a team was created by the attending emergency physician. The staffing of ad hoc-teams relied on diagnosis, symptoms and triage scores.

CONCLUSION: Designated teams for patients in cardiac arrest and trauma patients are available in all Danish EDs. More senior staff form part of trauma teams than cardiac arrest teams. There is limited access to designated teams caring for critically ill medical patients in Danish EDs

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In general, the staff at Danish emergency departments (EDs) and emergency medical admission departments are junior physicians who are aided by more experienced physicians or specialists as necessary [1]. Selected patient categories benefit from an accelerated, specialized treatment delivered in accordance with specific guidelines and algorithms, e.g. ST-elevation myocardial infarction, sepsis and trauma patients [2-4].

In Danish EDs, two categories of critically ill patients are received by a specialized team; patients in cardiac arrest and trauma patients. However, the mortality of these patient categories varies. In Denmark, patients in cardiac arrest have a high mortality rate of 90%, whereas trauma patients with an Injury Severity Score ≥ 9 have an in-hospital mortality rate of 15% [5, 6]. Patients in cardiac arrest and trauma patients are received in the ED by a waiting-team consisting of several physicians from several specialties who are aided by nurses, bioanalysts, radiographers and porters. Critically ill medical patients suffering from other acute medical emergencies for example sepsis, meningitis or acute respiratory insufficiency are often received first by young physicians even though these diagnoses also carry high mortality rates [3, 7]. The introduction of medical emergency teams (MET) has been achieved in order to track deteriorating in-hospital patients and thus avoid serious adverse events such as admission to an intensive care unit (ICU) and cardiac arrest. However, published data describing the effect of a multidisciplinary reception of the critically ill medical patient in the ED are limited. To our know-

Trauma teams are well staffed in Danish emergency departments.

ORIGINAL ARTICLE

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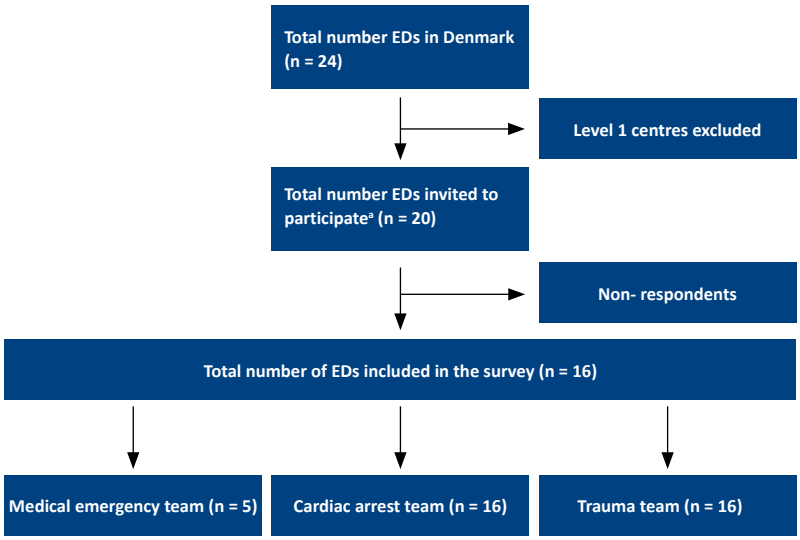
FIGURE 1

An overview of the study and the primary results.



ED = emergency department.
a) Emergency departments from the folllowing hospitals were invited: Hillerød, Esbjerg, Bispebjerg, Nykøbing Falster, Horsens, Kolding, Aabenraa, Køge, Hvidovre, Herlev, Viborg, Hjørring, Randers, Aalborg, Thisted, Holbæk, Odense, Aarhus, Slagelse, Herning.

ledge, no data have yet been published on the availability and staffing of designated METs in Danish EDs.

Accordingly, we aimed to investigate the use and staffing of cardiac arrest and trauma teams as well the availability and staffing of METs in Danish EDs.

MATERIAL AND METHODS

This was a cross-sectional questionnaire study of all EDs in the 20 Danish hospitals that are designated for emergency care. Questionnaires were sent to the heads of departments. Data were collected between June and August 2010. The four level 1 trauma centers in Denmark were excluded since the study focused on EDs that did not receive secondary referral patients and were not considered highly specialized medical centres.

The questionnaire contained questions on triage, the use and staffing of teams in emergency situations (e.g. cardiac arrest or trauma). There were also questions concerning the availability and staffing of a MET or corresponding team in the ED. Only questions regarding the use and staffing of teams are presented here. The development and testing of the questionnaire was described in detail by Lindberg et al [8]. Data on triage have previously been published [8]. All participating departments were promised anonymity. Data are presented descriptively. *Trial registration:* not relevant.

RESULTS

We received answers from 19/20 (95%) departments. A total of 16/19 (84%) answered all questions on emergency teams. The three remaining departments did not answer the questions concerning the use of teams and were therefore excluded. The average contingency population for each ED was 252,000 (range 100,000-460,000). All 16 departments received patients with cardiac arrest, trauma patients and critically ill medical and surgical patients. All sixteen departments were staffed with designated teams that were activated at a cardiac arrest or a trauma call. In 5/16 (31%) departments there was access to a designated MET in the ED. An overview of the study and the primary results are shown in **Figure 1**.

Cardiac arrest team

All EDs received patients in cardiac arrest. A complete overview of summoned personnel groups per ED are shown in **Table 1**. In one ED, a designated MET was called in case of cardiac arrest. The staffing of this MET was not possible to analyze on the basis of the data. None of the cardiac arrest teams (CATs) comprised a radiologist or radiographer. In all sixteen EDs, neither surgeons nor paediatricians were part of the CAT. The team leader of the CAT ranged from a junior medical physician in 5/16 (31%) of the EDs to a senior medical physician or senior anaesthesiology physician in 11/16 (69%) of the EDs.

Trauma team

All EDs received trauma patients. A complete overview of summoned personnel groups per ED are shown in **Table 2**. Neither internal medicine physicians nor paediatricians formed part of any trauma team (TT). In 16/16 (100%), a senior surgical physician or senior anaesthesiology physician served as TT leader.

Medical emergency team

All EDs received critically ill patients, surgical as well as medical. In 5/16 (31%) of the EDs, there was access to a designated MET. In 4/16 (25%) of the EDs, no designated team were available, and in 5/16 (31%) a team was created by the ED personnel depending on the specific patients' diagnosis and/or symptoms. In 2/16 (12%) of the EDs, it was the attending emergency physician who created the ad hoc-team. In the five EDs with access to a MET, activation was based on a triage system, e.g. Adaptive Process Triage [8]. The resources allocated to the METs or ad hoc-teams could not be analyzed as the teams were established when a specific problem arose in the ED and therefore inevitably differed from patient to patient.

DISCUSSION

Our study demonstrated that the use of emergency teams for cardiac arrest and trauma patients was implemented in all investigated Danish EDs. However, the

staffing of the teams varied greatly in terms of allocated resources and expertise. Trauma teams were generally better staffed in terms of senior physicians and supportive resources than cardiac arrest teams.

Furthermore, our study shows that in five (31%) EDs, the team leader of the cardiac arrest team was a junior physician. This confirms the findings by Folkestad et al [1] and could pose a potential problem in Danish EDs since a

TABLE 1

A complete overview of the summoned personnel groups at cardiac arrest calls in Danish emergency departments.

	Emergency department number																Median (range)
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
Personnel group																	
Emergency department nurse	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
Emergency department porters	B	B	B			B		B			B		B	B			
Senior cardiology physician				B		B		B			B						
Cardiology resident	B													B			
Cardiology trainee	B			B		B			B					B			
Senior internal medicine physician		B										B		B		B	
Internal medicine resident			B		B	B	B	B		B		B			B		
Internal medicine trainee	B		B				B	B	B	B	B		B	B	B		
Senior anaesthesia physician	B				B	B					B	B		B		B	
Anaesthesia resident				B				B									
Anaesthesia trainee					B	B				B				B	B		
Nurse anaesthetist	B		B	B	B	B			B	B		B	B	B	B	B	
Bioanalyst		B				B	B		B	B		B			B	B	
In-house porter	B		B	B		B	B		B	B							
Medical emergency teams		A															
Total number of summoned personnel groups	8	5	6	6	5	10	5	6	6	7	5	6	4	9	6	5	6 (5-10)
Number of summoned physicians	4	A	2	3	3	5	2	4	2	3	3	3	1	6	3	2	3 (1-6)
Number of summoned senior physicians	1	A	0	0	1	2	0	1	0	0	2	2	0	2	0	2	1 (0-2)

A = the staffing of the MET was not possible to analyze from the data. B = summoned at a cardiac arrest call.

TABLE 2

A complete overview of the summoned personnel groups at a trauma call in Danish emergency departments.

	Emergency department number																Median (range)
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
Personnel group																	
Emergency department nurse	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
Emergency department porter	A	A			A	A		A			A		A	A		A	
Senior orthopaedic physician	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
Orthopaedic resident	A	A		A	A			A		A					A	A	
Orthopaedic trainee			A		A	A							A				
General surgeon, senior physician							A			A	A		A				
General surgeon, resident	A	A	A	A										A			
Senior radiology physician		A	A			A		A	A	A					A		
Radiology resident					A												
Senior anaesthesia physician	A	A	A	A	A	A		A	A	A	A	A	A	A	A	A	
Anaesthesia resident							A				A						
Anaesthesia trainee		A	A		A	A								A		A	
Nurse anaesthetist	A	A	A	A	A	A	A		A	A	A	A	A	A	A	A	
Radiographer	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
Bioanalyst	A	A	A		A	A	A	A	A	A		A	A	A	A	A	
In-house porter			A	A	A	A	A		A	A			A		A	A	
Total number of summoned personnel groups	9	11	11	8	12	11	8	8	8	10	8	7	10	9	9	10	9 (7-12)
Number of physicians summoned	4	6	6	4	6	5	3	4	3	5	4	2	4	4	4	4	4 (2-6)
Number of senior physicians summoned	2	3	3	2	2	3	2	3	3	4	3	2	3	2	3	2	3 (2-4)

A = summoned at a trauma call.

review by Hunziker et al [9] has shown that strong leadership skills directly affect team performance and resuscitation success in simulated cardiac arrest situations. Focus on leadership training or reorganization of the CAT should therefore be considered in these places.

The staffing of trauma teams in Danish EDs varied in terms of allocated resources. In Denmark, the Danish National Board of Health has outlined recommended staffing for level-one trauma centres, but no recommendations for level-two trauma centres exist [10]. The staffing of level-two trauma centres therefore relies on local planning in each of the 20 EDs. Our study demonstrated that local staffing of the TTs showed inconsistency, especially with regard to the summoning of general surgeons and radiologists – despite the fact that these specialties were present in-house in the investigated hospitals. This may indicate that a more consistent trauma team composition in Danish EDs should be considered.

In 5/16 (31%) Danish EDs, a designated MET was available. In another 7/16 (43%) of the EDs, an ad hoc-team was created when critically ill patients were expected or present in the ED. In the remaining 4/16 (25%) of the EDs, there was no access to a designated team to treat critically ill patients in the ED. This could be considered a problem since critically ill patients with certain diagnoses, e.g. bacterial meningitis, non-traumatic coma and acute respiratory failure, all carry a mortality rate around 25% [11-13], and the lack of a designated team might cause inconsistent or delayed resource allocation to such patients in the EDs. This finding was in contrast to the better organized TTs which enjoyed a substantial resource allocation to patients with a relatively lower mortality rate. The evidence in support of establishing a TT is well-documented [4, 14, 15]. However, data on the use of a designated MET for the critically ill medical patients in the ED are sparse. Nevertheless, it was demonstrated that applying MET-calling criteria to critically ill patients in the ED easily identified the patients in need of intensive care [16]. Also, one Danish single-centre study showed that a multidisciplinary team reception of critically ill medical patients in the ED ensures early treatment and admission to relevant departments including the ICU [17]. Furthermore, such multidisciplinary team reception is associated with a decrease in ICU mortality rates for patients admitted early from the ED as compared with those admitted with a delay [18]. Since this study was unable to demonstrate which resources were allocated to the critically ill medical patient, the resource allocation presumably relied on the ED personnel's experience or local arrangements. Therefore, further studies into the impact of a designated team reception of critically ill medical patients in the ED are warranted.

This study had a number of limitations. The results were based on a questionnaire. Also, data were collected in a period characterized by major structural changes in Danish healthcare, especially in EDs. We did, however, achieve a high response rate and the data are therefore considered valid and representable for Danish EDs.

In 2007 the Danish National Board of Health reformed the entire emergency medical set-up in Denmark [10]. This was done with a view to concentrating the expertise and specialties needed for advanced treatment options at fewer locations, so that the quality of treatment would increase. Furthermore, it was underlined that patients should be met by senior physicians upon arrival to the ED. This study has demonstrated that despite these goals, junior physicians still serve as CAT team leaders in some EDs. We have also shown that there is an inconsistency in the staffing of trauma teams in Danish EDs. Concerning the reception of critically ill medical patients, only few EDs have a well-organized system based on systematic triage and access to a designated team for these patients. However, our data were collected at a time when major changes occurred in this field, and we urge that a new survey be conducted at a time when the emergency setup in Denmark has matured.

CONCLUSION

Designated teams for patients in cardiac arrest and trauma patients are available in all Danish EDs. More senior staff form part of trauma teams than cardiac arrest teams. There is limited access to designated teams caring for critically ill medical patients in Danish EDs.

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LITERATURE

1. Folkestad L, Brabrand M, Hallas P. Supervision of junior doctors and allocation of work tasks regarding admissions and further treatment of acute admitted patients. Ugeskr Læger 2010;172:1662-6.
2. Jernberg T, Johanson P, Held C et al. Association between adoption of evidence-based treatment and survival for patients with ST-elevation myocardial infarction. JAMA 2011;305:1677-84.
3. Levy MM, Dellinger RP, Townsend SR et al. The Surviving Sepsis Campaign: results of an international guideline-based performance improvement program targeting severe sepsis. Int Care Med 2010;36:222-31.
4. van Olden GD, Meeuwis JD, Bolhuis HW et al. Clinical impact of advanced trauma life support. Am J Emerg Med 2004;22:522-5.
5. Fakta om tal fra Dansk Hjertestopregister 2011. København: Dansk Råd for Genoplivning, 2011.
6. Overgaard M, Hoyer CB, Christensen EF. Long-term survival and health-related quality of life 6 to 9 years after trauma. J Trauma 2011;71:435-41.
7. Rubenfeld GD, Herridge MS. Epidemiology and outcomes of acute lung injury. Chest 2007;131:554-62.
8. Lindberg SO, la Cour JL, Folkestad L et al. The use of triage in Danish emergency departments. Dan Med Bul 2011;58:A4301
9. Hunziker S, Johansson AC, Tschan F et al. Teamwork and leadership in cardiopulmonary resuscitation. J Am Coll Cardiol 2011;57:2381-8.
10. Sundhedsstyrelsen. Styrket Akutberedskab – planlægningsgrundlag for det regionale sundhedsvæsen 2007. København: Sundhedsstyrelsen, 2007.
11. Delerme S, Ray P. Acute respiratory failure in the elderly: diagnosis and prognosis. Age Ageing 2008;37:251-7.

12. Forsberg S, Hojer J, Ludwigs U. Prognosis in patients presenting with non-traumatic coma. J Emerg Med 2010;14(Suppl 1):P333.
13. Tunbridge A, Read RC. Management of meningitis. Clin Med 2004;4:499-505.
14. Georgiou A, Lockey DJ. The performance and assessment of hospital trauma teams. Scand J Trauma Resusc Emerg Med 2010;18:66.
15. Lansink KW, Leenen LP. Do designated trauma systems improve outcome? Curr Opin Crit Care 2007;13:686-90.
16. Etter R, Ludwig R, Lersch F et al. Early prognostic value of the medical emergency team calling criteria in patients admitted to intensive care from the emergency department. Crit Care Med 2008;36:775-81.
17. Christensen D, Maaloe R, Jensen NM et al. Quality of care using a multidisciplinary team in the emergency room. Dan Med Bul 2011;58: A4227.
18. Parkhe M, Myles PS, Leach DS et al. Outcome of emergency department patients with delayed admission to an intensive care unit. Emerg Med (Fremantle) 2002;14:50-7.