Report on the Emergency Care System in Region Midtjylland

Key Findings, Assessment and Recommendations

May 2008

Prepared by
HARVARD MEDICAL FACULTY PHYSICIANS
Department of Emergency Medicine
at
Beth Israel Deaconess Medical Center
A teaching hospital of Harvard Medical School

Address for correspondence:
Philip D. Anderson, MD
Director, International Emergency Medicine
Department of Emergency Medicine
Beth Israel Deaconess Medical Center
One Deaconess Road, W/CC-2
Boston, Massachusetts 02215 USA
Telephone: +1 (617) 754-2324
FAX: +1 (617) 754-2350

Email: pdanders@bidmc.harvard.edu

REPORT ON THE EMERGENCY CARE SYSTEM IN REGION MIDTJYLLAND

Table of Contents

RECOMMENDATIONS

APPENDICES

I. General Appendix

II. Educational Appendix

REGIONAL PROJECT COMMITTEE

Harvard Medical Faculty Physicians would like to thank the following individuals from the Region who worked closely with us to conduct the site visit, gather and analyze data and prepare our final report.

Region Midtjylland:

Hans Peder Graversen

Erika Christensen

Helle Hygum Olsen

Lars Dahl Pedersen

Jan Greve

Overview

OVERVIEW

I. Executive Summary

Politicians and healthcare leaders in Denmark have called for the development of a "world-class" emergency care delivery service that delivers uniformly high quality care to all people, regardless of the time or place of their presentation to the healthcare system. HMFP believes that with the right vision, planning, resources and leadership, this is achievable.

HMFP was asked by the Region to assess the current emergency care delivery system and regional plans for modifying that system in accordance with recommendations from Sundhedsstyrelsen (the Danish National Board of Health). In conjunction with this review we were also asked to:

- propose a strategy for developing training programs for physicians and nurses to staff the future fælles akut modtagelse (FAM), and
- develop recommendations for optimizing the implementation of the proposed future FAM and related aspects of the emergency care delivery system.

We undertook an assessment of the current emergency care system in partnership with the members of the Regional emergency care project committee. This assessment was based on a review of structural, process and outcome data made available by the Region, published reports on emergency care delivery by Danish Regional and National healthcare bodies, other publicly available data, plus observation of the three different sectors that provide emergency care: the pre-hospital ambulance system, primary care sector and hospital sector. We visited facilities, met with emergency care providers, educators, leaders, healthcare administrators and policy makers. We also had some limited opportunities to observe the delivery of care and to interview private citizens about their impressions of the current state of affairs in emergency healthcare.

The data that we were able to obtain and base our assessment and recommendations on are limited. Besides our own direct observations during the days of our visit, the data provided to us by the Region consist primarily of structural indicators with a very limited amount of usable process and outcome data.

Our review of the emergency care system in Region Nordjylland revealed a number of strengths in each of the three emergency care sectors, as well as opportunities for improvement.

The Danish mobile intensive care units represent one of the best examples that we have seen of advanced prehospital emergency care delivery to out-of-hospital patients with life threatening conditions who require immediate life saving intervention on-scene.

Via the vagtlæge system, Danish general practitioners provide an unparalleled level of access to physician evaluation, advice and treatment for patients with non-life threatening emergencies outside of normal office hours and facilitate their access to further care in the hospital system when that proves necessary.

Many of the hospital inpatient specialty departments have developed systems that provide world-class emergency care for selected patient groups. In particular, the partnership between Interventional Cardiology and the ambulance system whereby patients with STEMI (ST elevation myocardial infarction) are diagnosed via telemedicine and

transported directly to cardiac catheterization is impressive. Most impressive is that this state-of-the-art, exceptional quality system is uniformly available everywhere in the country.

Some of the opportunities for improvement we identified have already been targeted by national and region policy makers for future initiatives; others have not.

The interface between out-of-hospital (ambulance and primary care) and in-hospital emergency care (akutmodtagelse) has been recognized by national and regional policy makers as being the weakest link in the chain of emergency care delivery. The major issues here are:

- inexperienced physician trainees without supervision are responsible for initial care of potentially very sick patients,
- too many entry points into the hospital exist for acute, undifferentiated patients, leading to high variability in the initial management,
- no single physician group currently possessing the requisite knowledge and skills to independently provide high quality initial management of all emergency patients entering the hospital system, and not enough specialists available to implement an effective, multi-specialty staffing model.

Under the current system, some categories of emergency patients appear to receive good care, while others do not. Patients who are clearly ill and have a clear diagnosis seem to receive good care because they are rapidly recognized and transferred directly to the inpatient hospital departments that are able to provide definitive care. Patients who are clearly not significantly ill are referred to the primary care sector, where they are cared for within an appropriate time frame. However, patients who are moderately ill appearing and who have an unclear diagnosis or multiple diagnoses appear to be at significant risk under the current system of not receiving timely, appropriate evaluation and treatment.

These patients are typically referred to one of many possible hospital akutmodtagelse units where their initial care is provided by inexperienced physician trainees without supervision by experienced senior physicians. This creates many opportunities for variability in care, including delays in diagnosis and treatment as well as others errors in management. When in doubt about the management of individual patients, inexperienced physician trainees appropriately tend to admit patients to the hospital, rather than send them home. This may explain, in part, the 2 – 3 fold higher per capita rate of acute hospital admissions in Denmark compared to the United States.

Insuring high quality of care irrespective of time or location (*"høj kvalitet uanset tid og sted"*) has been identified by national and regional policy makers as the number one reason for reforming the emergency care system.

While the current Danish emergency care system clearly contains many excellent features, we believe that bringing this system to a higher level, in which uniformly excellent care is provided throughout the region, will require a number of substantive changes in how emergency care is organized, delivered and managed, in particular in the hospital-based emergency care sector.

The organization and staffing of the future FAM are of central importance to addressing many of the issues outlined above.

We endorse the operational model proposed by Sundhedsstyrelsen in which the future FAM serves as a single portal of entry for all undifferentiated acute patients (except for certain specifically defined patient groups).

We do not believe that a multi-specialty physician staffing model is either feasible or compatible with the long term delivery of high quality emergency care under this consolidated FAM model and recommend the development of an emergency physician and emergency nurse role to primarily staff the FAM in the future. The clinical care model for the FAM and scope of practice of these new providers needs to be specifically defined. Specifically, the interfaces with other hospital departments and providers must be clear in order to develop competency based education and training programs to prepare individuals for success in these new and challenging clinical roles. Emergency Medicine curricula and post-graduate medical education programs from numerous countries can serve as models for future Danish emergency physician and nurse training programs. A certification mechanism for training program graduates by an appropriate certifying body will serve to establish credibility for this new clinical role.

Multi-specialty staffing will of course be necessary during the initial transition period while an emergency physician and nurse workforce is being developed. This will ideally be implemented initially as a "fagområde" training for doctors with prior specialty training in other areas. Given the general lack of specialist physicians however, we believe that a long term strategy of requiring physicians to first complete training in one specialty and then pursue additional training in emergency medicine, will further decrease the desirability of this area of clinical practice as well limit the needed production of new specialists in other clinical disciplines.

For the FAM model to succeed, these positions must be made sufficiently desirable so that talented, ambitious individuals will consider "giving up" their primary specialty. Only such motivated individuals will take ownership of these new clinical roles and embrace the difficult work of creating these new departments that can deliver high quality emergency care. In order to establish the academic and professional legitimacy that is likely necessary to attract such individuals, we believe that emergency medicine (akutmedicin) will need to be eventually recognized as a medical specialty, in accordance with world-wide trends.

The clinical care model for the future FAM and the role for the akutlaege in staffing the future FAM, which have been tentatively proposed by the Regions, are based on a number of assumptions about future patient volumes, acuity and case mix that are unlikely to be accurate, based on current data. The current model for the FAM assumes that 30% - 40% of the existing skadestue patient volume will be able to be shifted to the primary sector. This would result in a FAM patient population that is relatively smaller, but with higher average acuity than the current volume of emergency patients cared for by the combined hospital akutmodtagelser and other units receiving acute patients. It is anticipated that the FAM will be able to manage patients for up to 48 hours with significant involvement of other hospital specialists, and then discharge a significant percentage without admission to the hospital.

Trends in the primary care sector point towards a likely shortfall in the number of primary care physicians over the next 5-10 years, with the result that as many as 18% of the population in Region Midtjylland and 37% of the population in Region Nordjylland could be without a primary care physician by the year 2011. Many of these patients will likely

turn to the vagtlaege system for a portion of their primary and urgent care needs, which could easily lead to the vagtlaege system being overwhelmed and possibly collapsing.

Steps need to be taken to prevent this from occuring, but also to be prepared in the event that the vagtlaege / primary care system is overwhelmed. The future FAM needs to be organized in such a way, and its staffed adequately trained to be able to safely and effectively manage a high patient volume of mixed acuity and case mix. This means that the future akutlaege will need to possess a knowledge base and skill set that allows them to function quickly, accurately and largely independently of other specialists in the clinical environment of the FAM. This will require an educational training standard for akutlaeger that closely models the discipline of emergency medicine.

Coordination of emergency care efforts across sectors is necessary to minimize redundancy and maximize standardized care delivery across sectors. This will help insure a patient-centered approach to emergency care; the current system is organized and functions more like three separate systems than a single integrated system. We see several important issues here:

- There appears to be limited coordination of patient care activities between sectors / departments: for example, the entirely separate clinical operations of the vagtlæge konsultation and skadestue/AMA; the completely separate dispatch and operation of ambulance units (MICU) and mobile VL units.
- There appears to be little or no coordination of gathering and analysis of emergency patient encounter data between sectors and departments: ambulance system, primary sector, hospital sector, different hospital departments providing emergency patient care.
- There appears to be overlapping or unclear roles and responsibilities in a number of areas throughout the emergency care system: for example, who is responsible for 112 dispatch-associated medical assessment and decision making (medical personnel vs. police)? Who is responsible for evaluation and treatment of out-of-hospital patients who do not require hospitalization (MICU physicians vs. mobile VL)? Which physician specialists are responsible for initial management of emergency patients in the hospital?

Knowing when the desired level of quality in emergency care delivery is achieved requires that it be <u>defined</u> and <u>measured</u>. There are several major challenges here:

- The Danish Quality Model represents a state-of-the-art strategy for development of healthcare quality standards and guidelines, but DQM standards to date have focused only minimally on hospital based emergency care and not at all on emergency care delivered outside of the hospital sector. As a result there is no “system-wide” or “cross-sectoral” framework for emergency care quality.
- Individual studies report good quality of care within specific sectors and departments at specific points in time. However, these quality reviews in many cases do not appear to factor in the transfers between sectors and departments that routinely occur due to the highly distributed nature of the emergency care system. Likewise, there appears to be very little on-going “quality monitoring” with regard to emergency care delivery whereby specific process or outcome

indicators are routinely measured, analyzed and reported to overseeing agencies.

- Accessibility, reliability, and level of detail of healthcare data were identified as major problems during our assessment. The implementation of quality improvement efforts, system administration and planning requires that healthcare data be easily accessible and reliable.

The recommendations related to the development of emergency physician and nurse training programs, as well as other recommendations for further improving the quality and efficiency of emergency care delivery across the system are summarized below.

1. Develop on an inter-regional collaborative basis, coordinated training programs for physicians and nurses who will staff the future FAM.
2. Seek recognition of a "fagområde" in emergency medicine ("akutmedicin") initially and simultaneously start the process for establishing a specialty in emergency medicine within five years.
3. Develop a certification mechanism in parallel with the training programs for emergency physicians and nurses that will serve to verify the acquisition of new knowledge and skills as well as reinforce and demarcate the scope of practice of the emergency physician and nurse for the entire medical community.
4. Commit to a common inter-regional vision for the FAM organization and operation with parallel regional and hospital leadership structures that coordinate their activities.
5. Appoint a dedicated leader or coordinator for regional FAM development whose primary role is to oversee the development of the network of FAM at designated hospitals and insure that this moves forward in accordance with the expectations of Regional healthcare and political leaders.
6. Invest sufficient resources and personnel time to insure the successful development of the new emergency care delivery system.
7. Select a single designated FAM hospital within the Region to serve as a pilot project for FAM implementation; implement FAM units at subsequent hospitals based on the initial experience at the pilot hospital.
8. Adopt the organizational model for the FAM proposed by Sundhedsstyrelsen, whereby all of the existing "akutmodtagelse" functions for the hospital patients are merged into one department that functions as the single portal of entry to the hospital for acute and undifferentiated patients (except for specific well defined patient groups with clear indications for definitive care that is available on an inpatient department).
9. Clearly define the model of clinical care to be provided in the future FAM in order to demarcate the extent of patient care provided in the FAM by FAM personnel and what patient care will be provided in other departments and services that interface with the FAM, such as the inpatient specialty admitting services, the prehospital ambulance services, and the vagtlæge konsultation.

10. Clearly define the roles and scopes of clinical practice of FAM physicians and nurses in the context of the model of clinical care in the FAM described above and base these on the discipline of Emergency Medicine.
11. Implement a standardized triage algorithm for the initial evaluation of all akut and undifferentiated patients arriving at FAM hospitals.
12. Locate the vagtlæge konsultation at each designated FAM hospital in the region adjacent to the FAM and closely coordinate its operation with the FAM, so that patient care, patient satisfaction, vagtlæge productivity and satisfaction as well as resource utilization is optimized.
13. Coordinate the medical screening of patients with psychiatric complaints between the FAM and the psychiatric akut modtagelse.
14. Involve the FAM leadership at the hospital level in the planning process for renovation and new construction of FAM facilities.
15. Establish or designate a Regional Office for Healthcare Informatics with responsibility for developing a central registry for tracking all emergency patient encounter activity from all sectors within the Region.
16. Develop a standardized set of information that is gathered on all emergency patient encounters regardless of sector (hospital, prehospital, primary sector) and including all patient contacts as well as telephone contacts, so that relevant information can be centrally registered, stored and analyzed at the Regional level.
17. Adopt a standardized set of patient medical data that is documented during patient visits in the FAM and move toward the use of standardized forms for documenting these at all FAM hospital.
18. Develop a standardized electronic patient medical record that is compatible with electronic medical records in the other emergency services that interface with the FAM (prehospital, hospital-based and primary sector).
19. Develop patient data tracking and decision support tools to facilitate the delivery of high quality emergency care in the region's FAM.
20. Work with IKAS to develop an interlocking set of quality standards and guidelines for the FAM, ambulance service and vagtlæge system, which defines a cross-sectoral quality framework for uniformly excellent emergency care regardless of where or when patient seeks emergency care.
21. Develop specific clinical guidelines for the FAM along with indicators for tracking implementation and methodology for monitoring their results.
22. Fund the establishment of an independent research effort to study the impact of implementation of the FAM model.
23. Expand and develop the role of the AMK as the Lead Agency for regional oversight for all prehospital care including alarmcentral with responsibility for coordination of dispatch, prehospital medical operations, communications, education of personnel, and quality monitoring.

24. Improve dispatch strategies for the physician ambulance to more accurately target patient calls that require immmediate physician assistance.
25. Explore the development of First Responder initiatives where Police, Fire or other public safety personnel receive training in basic first aid, CPR and the use of semi-automatic external defibrillators (SAED), and are equipped with the basic equipment to perform these simple, proven, life-saving interventions that require only minimal training to perform effectively.
26. Explore possibilities for extending the hours of operation for the vagtlæge telefonvisitation and konsultation system from 16 hours per day to 24 hours per day and discontinue the mobile vagtlaege service.

These recommendations are described in further detail in the body of the report.

II. Project Description

In March 2007, HMFP entered into a three year Memorandum of Understanding with the Danish regional governments of Region Midtjylland and Region Nordjylland. The project's purpose was to provide consultation and assistance with the development of a new approach to emergency care delivery within each of the two Regions. This new approach to emergency care will feature a new type of general purpose hospital-based emergency department (fælles akutmodtagelse or FAM) as well as new emergency physician and emergency nurse roles.

This new approach to emergency care delivery in Denmark has come about in response to recommendations from Sundhedsstyrelsen (the Danish National Board of Health) in 2007, which calls for consolidation of existing services and closing of some emergency care facilities. On a regional level, hospital-based emergency care will be delivered in fewer, larger hospitals each of which contains a single fælles akut modtagelse (FAM).

The overall goal of this national restructuring is to standardize and improve the quality of emergency care that is provided to all citizens with acute illness or injury, regardless of time or place.

III. Scope of Report

For this project HMFP was asked to carry out an initial assessment of the current emergency care delivery systems in both Regions and review the regional plans for modifying that care in accordance with recommendations from Sundhedsstyrelsen (the Danish National Board of Health).

The primary focus of the assessment was to evaluate the needs for physician and nurse training to be able to staff the future FAM, and to propose a strategy and plan for developing a training program for Emergency Medicine physicians and nurses in the two Regions.

These training programs will need to be developed based on a clear understanding of the actual model of clinical care in the future FAM units, and description of the intended scope of practice of the emergency physicians and nurses. Both of these descriptions have yet to be finalized by the Regions at the time of this writing. Once these have been determined, specific training curricula can be developed. These will be based on the information gathered from our assessment of the existing emergency care delivery system, post-graduate medical education and standard world-wide practices in the field.

The secondary focus in the initial assessment was to provide recommendations to the Region for how they could most effectively implement the FAM model of hospital-based emergency care and achieve their goal of system wide high quality emergency care delivery. Optimizing the functions of other elements of the emergency care system will be required in order to provide the highest quality emergency care with the most efficient utilization of resources.

Key Findings

Methodology

System Description

Observations

Data Summary

KEY FINDINGS

I. Methodology

Pre-site visit preparation

In March 2007, HMFP began gathering background information and data from Region Midtjylland in preparation for a site visit in June 2007.

Background information and research data reviewed included relevant reports describing the existing emergency care delivery system and plans for changing these systems from both national and regional planning bodies. A range of quantitative data describing the current system of emergency care delivery and its operation was requested from the Region. Examples of requested data included numbers and types of emergency care facilities, annual patient volumes seen in the various facilities, breakdown of patient volumes in terms of initial triage acuity and subsequent disposition (discharge, transfer, observation, admission); time motion metrics describing patients' course within each facility (length of stay, time until initial evaluation, time until key interventions for patients with time sensitive problems, etc.).

Questionnaires outlining the specific lists of requested data were prepared and sent to the Regional project staff in advance of the site visit so that these could be gathered and returned to HMFP in advance of site visit. Most of the data that was provided was not available until during or after the site visit, and so could not be reviewed in advance.

The goal of this data collection was to create an objective description of the current situation as a reference point for further exploration, analysis and recommendations for improvement.

HMFP site visit

In June of 2007, HMFP senior personnel visited Region Midtjylland and Region Nordjylland over a four-week period. Their activities included observational visits to emergency care facilities, meetings with healthcare providers at these facilities, and meetings with hospital and regional healthcare administrators and leaders, and professional organizations.

Examples of key facilities visited included skadestuer, lægevagt telefon visitation, lægevagt konsultationer, akutmodtagelse / visitations afdelinger, alarmcentral, Falck vagtcentral, relevant acute care inpatient departments (interventional cardiology, intensive care units, operating theatres, inpatient wards, etc.).

The site visit provided an opportunity to gather subjective information and impressions, which prompted subsequent dialogue and additional requests for clarifying data over the succeeding weeks as information was incorporated into the report. We appreciate the frankness and honesty expressed in interviews and did our best to insure that we did not identify particular individuals with comments.

Post-Site Visit Analysis and Report Preparation

The HMFP team spent several months reviewing the information obtained during the site visit.

It had been agreed that during this post-site visit period, we would have an ongoing email and telephone dialogue with the regional project partners in order to clarify questions, discuss observations and receive input on the report preparation.

One of the challenges we faced in analyzing the information obtained during the site visit was that much of the data we requested was either not obtainable or appeared to contain inaccuracies. This limited our ability to carry out much of the quantitative analyses that we had originally proposed.

HMFP hosted an additional study group from Region Midtjylland in late September.

A detailed outline of the project report was prepared and sent to the regional project partners in advance of a follow up visit in October when we presented some of our initial findings and discussed the limitations to our assessment posed by the lack of reliable data. A decision was made by the region to attempt additional data gathering.

Following the October meeting, we began preparing report content and sending it to the regional project partners on a regular basis for their feedback and input. The Region made a significant effort to gather additional operational data which we received in early December.

In the final version of the report an attempt has been made to incorporate as much of the feedback and comments that were received from the Regional project group members.

Presentation of Assessment Findings and Recommendations

An inter-regional conference was organized by Region Nordjylland and Region Midtjylland on 27-28 March 2008 where these report findings and recommendations were presented along with the Regions' plans for specific initiatives related to emergency care system development.

Key Findings

II. System Description

In this section we, describe the organization and function of the emergency care system in Region Midtjylland as of 1 January 2007 when the region came into existence. We also report the relevant operational data from national and regional sources.

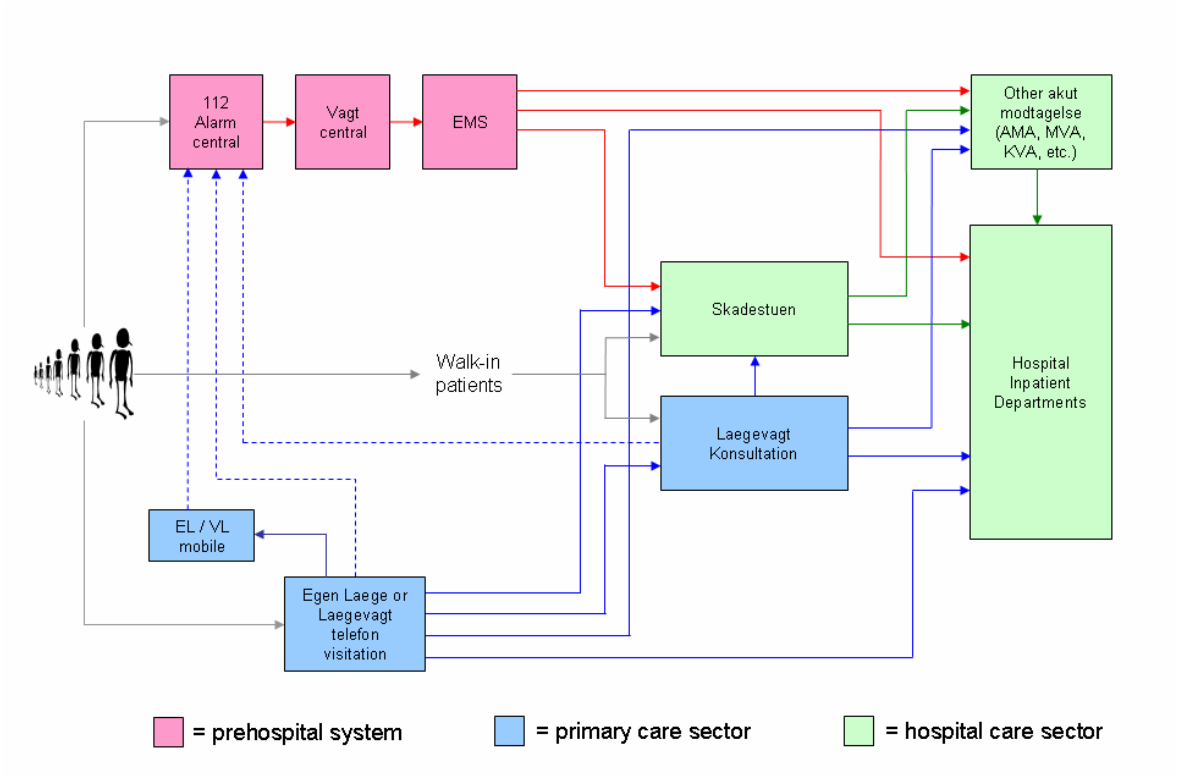


Figure 1. Emergency Care Process Flow Model, Denmark (2006)

Alarmcentral

In the event of an acute illness or injury, patients can call 1-1-2 which puts them in contact with one of seven police-operated emergency call centers (alarmcentral) throughout the country. In Copenhagen, this function is operated by the Copenhagen Fire Department. The alarmcentral personnel are senior police officers who have received specific training in emergency dispatch. The alarmcentral personnel utilize a sophisticated, computer-assisted system which identifies the caller's exact location from land lines and within a wide perimeter for mobile phone calls and links to a detailed mapping system. Alarmcentral personnel gather information to determine the nature of the call and dispatch an ambulance unit based on their judgment of the nature of the medical emergency and the needs the caller using a basic algorithm. As soon as they have determined that an ambulance is needed they can electronically forward the basic call information to the dispatch center (vagtcentral) so that a unit can begin moving towards the scene while they continue to gather additional information from the caller. The alarmcentral personnel forward the nature of the call, along with their judgment about the level of response that is needed to the vagtcentral. The vagtcentral can follow these recommendations or send a different level of response depending on their judgment. The alarmcentral personnel can electronically forward additional information to the prehospital unit en route to the patient.

Alarmcentral personnel can give pre-arrival instructions to callers (f.eks. how to open and clear an airway, perform CPR, etc.). They have access to electronic screens that assist with giving these types of advice over the phone. The alarmcentral personnel have the right to refuse to send an ambulance if they think that it is not necessary. It is unclear whether these refusals are systematically reviewed by a medical supervisor or not.

Vagtcentral

The vagtcentral is operated by Falck, a private ambulance entrepreneur that provides ambulance service to approximately 90% of Denmark. When an ambulance is needed all information is transferred electronically from the Alarmcentral to the Vagtcentral which then dispatches the ambulance closest to the scene.

Physician ambulances and Acute cars

There are 3 physician ambulances staffed with a senior anesthesiologist 24 hours per day. Two of the "Lægeambulancer" are further staffed with a "Lægeassistent" (EMT 2), whereas the 3rd lægeambulance (Herning/Holstebro) is manned with a senior anesthesiologist exclusively. There are 3 additional part-time lægebiler from 8 am to 3 pm. It is planned to supplement the pre-hospital sector with 5 additional units staffed with nurse anesthetists in the western part of the region [1].

Primary care physicians (during routine office hours)

General practitioners typically schedule a one-hour period for phone consultation with patients. At this time, patients are given test results and can book a consultation for acute illness, regular visit or follow-up of chronic illness. If the primary care physician deems it necessary, he can call an ambulance for the patient to taken immediately to the hospital, see the patient in his office the same day, book a home visit or book the patient for a visit in the clinic within the next 5 days. Some physicians will conduct a second phone consultation during the noon hour. During the hours when the physician is seeing other patients, phone calls are typically answered by a secretary who can book consultations. Patients can be referred by the primary care physician to the hospital acutely or referred for an outpatient evaluation. Outside regular office hours, the patients can contact the on-call primary care physician (vagtlæge) or call 112 in case of acute illness.

On call primary care physician system (outside of routine office hours)

The primary care physicians in Denmark have an obligation to be on call. A system called the vagtlæge system has been established on a regional basis where GPs take call during off hours. Through this system patients can call at any time and speak directly to a GP who will evaluate their problem over the phone. There is also a GP staffed urgent care clinic to which patients can be referred acutely. A GP can also be sent to a patient's home for an acute house call. This system is managed within the Regions by a network of all the primary care physicians. The extent to which the primary care physicians take calls varies and generally is on a voluntary basis. Patients contact the vagtlæge system by phone. The physician answering the phone is located in one of the regional urgent clinics. A phone contact can lead to:

- Advice given and contact ended.

- Advice given and the patient follows up with his/her primary care physician as agreed.

- The visitations vagtlæge dispatches one of the mobile units staffed with a primary care physician on call that will visit the patient at home. After seeing the patient at home the vagtlæge can provide the patient with medications (most common groups carried), a prescription, and give the patient advice on when to follow up with their own doctor. If the patient is deemed too sick for outpatient treatment the patient will be admitted to the hospital acutely.

- The patient is asked to go to one of the "konsultationer" where he/she will be seen by a vagtlæge. Some of the "konsultationer" are only open after prior agreement with the vagtlæge covering the area as he/she might be staffing a mobile unit as well. In that instance, the patient will be told to show up at the "konsultation" at a specific time. During the early morning the demand for services is normally reduced and the vagtlæge covering the "konsultation" leaves and the area is then covered by the mobile unit that is dispatched from one of the "visitationer". The vagtlæge konsultationer are typically located at or in close proximity to the current skadestuer.

Skadeklinikker

There are currently four "Skadeklinikker" in Region Midtjylland; all staffed by nurses with specialist training in acute care medicine ("behandlersygeplejerske"). These four skadeklinikker have different hours of operation and some variation in the availability of physician backup. Patients need to be referred to these clinics by a physician. The majority of the care provided in these clinics is for treatment of minor injuries.

Emergency Departments (skadestuen)

At this time, all the Emergency Departments in Region Midtjylland only receive patients that have been referred from a physician or arrive by ambulance. Triage in the Emergency Department is carried out by the head nurse together with the secretary registering the patients. A nurse is responsible for the waiting area where s/he conducts a prioritization of the patients and informs of waiting times, etc.

The physicians covering the Emergency Department are interns and residents from the Department of Orthopedic Surgery and Medicine. They treat patients independently or in consultation with a senior physician if they have questions regarding the management of a particular patient. They can call on senior doctors based elsewhere in the hospital to assist with managing unstable or complex patients. Following this initial evaluation, the patient can either be admitted to an inpatient department, or discharged with follow-up in an outpatient clinic or with the patient's primary care physician.

A wide variety of patients are seen in the acute reception area of the Emergency Department including all critically ill patients; patients with toxic ingestions; patients that

are referred by primary care physicians and vagtlæger as well as patients that were initially planned to be admitted directly to medical specialties but deteriorate during ambulance transport and are deemed too unstable for direct admission.

Other akut modtage afsnit (AMA)

Stable patients are admitted directly to the AMA/MVA where they undergo their initial workup and treatment. Some are discharged from the AMA/MVA after less than 24 hours while others may be transferred to other specialty wards within the first 24 hours of their hospitalization for further specialized care.

Hospital inpatient departments

Hospital inpatient departments receive patients for planned (elective) admissions, admissions from the skadestuen and direct acute admissions (undifferentiated patients). Patients that have undergone an evaluation in the AMA during the first 24 hours are then transferred to the floor. Patients that are deemed stable enough to be admitted to the floor can also be directly admitted to a service where the work-up will take place. This group consists of patients that have been seen by the referring physician. Another group of patients that are often admitted directly to an inpatient service are patients with a so-called ”pen admission”, i.e. patients with a known chronic medical problem that are expected to require repeat admission on an intermittent basis. Furthermore, obstetric patients with a complication or onset of labor are admitted directly to the department.

Acute Medical Koordination (AMK)

Acute Medical Koordination is activated in the event of major accidents or disasters but is in the process of being expanded with a goal of becoming operational 24 hours per day in order to play a broader role in coordinating routine emergency care activities.

Key Findings

III. Observations

During the multi-week site visit to Region Midtjylland, the Harvard Medical Faculty Physicians (HMFP) team had the opportunity to visit the following hospitals where we met with hospital and departmental leaders, and toured the emergency care facilities:

- Randers sygehus
- Århus and Skejby sygehus
- Horsens sygehus
- Herning sygehus
- Viborg and Skive sygehus
- Silkeborg sygehus

Prior to the meetings, we provided a series of questions about the proposed changes in emergency care delivery to serve as a rough framework, but conducted the meetings as informal discussions. In the questions posed of the interviewees we asked them to describe:

- their professional role and responsibilities related to emergency care;
- if they are responsible for, or work in a clinical setting that provides emergency care, to describe that setting;
- the strengths and weaknesses of the current emergency care system;
- the changes they would like to see in emergency care delivery;
- their views of the proposed plans to develop a consolidated fælles akut modtagelse, including the concept of a new "akutlæge" or emergency physician role to staff the FAM.

In addition, the team also visited the 112 alarmcentral at the Århus Police Department, and the Falck vagtcentral, where we met formally and informally with many physicians, nurses, educators and administrators.

The following observations are drawn from these site visits and the many discussions held with the groups and individuals described above. The observations are divided into five segments: the first segment is observations on the post graduate medical education; the second through fourth segments contain observations on the three sectors of emergency care delivery; the fifth segment is titled *other issues*, which includes topics that were brought to our attention with comments and observations we felt were noteworthy.

A. POST GRADUATE MEDICAL EDUCATION

1. Turnus

The HMFP team had the opportunity to meet with a number of physicians and medical educators to discuss the current situation in post graduate medical education. We were told there is a general push now to shorten and thereby accelerate post graduate medical education for all medical specialties in order to more quickly produce specialist physicians. There has also been a decision to decrease the turnus period (internship) from 18 months to 12 months; 6 months of this will be spent in "chronic" care settings and 6 months in "acute".

We were told that the goal of turnus, which begins following graduation from medical school, is to transform medical students into doctors. We were also told that there is an expectation that turnus physicians function independently as physicians right away at the beginning of their turnus. (We discuss the issue of unsupervised emergency care delivery by junior physicians in a separate section below.) The significance of this problem became clear to us when it was explained that the amount and nature of actual clinical experience most medical students receive during the medical school experience is limited to a one year clinical rotations and that there is no defined work role for medical students when they are assigned to ward teams. During their clinical rotations most medical students function largely as observers, primarily participating in morning work rounds but without taking on extensive physician responsibilities. We were told they cannot be required to "work" as physicians because of administrative restrictions and/or labor laws. In interviews we learned this is because students "belong" to the university system, while physicians and other healthcare providers "belong" to the hospital system; this artificial divide creates a significant obstacle for medical students that limit their opportunities for acquiring clinical experience and learning the role of a physician while they are still students. Thus many medical school graduates arrive at their turnus position with little or no clinical experience working as a physician, yet they are expected to function in the role of physician and take responsibility for providing patient care. Furthermore, these brand new physicians with essentially no experience are assigned to staffing the emergency intake wards throughout the hospital system, where they are the first ones to evaluate and manage potentially sick, undifferentiated patients. In the majority of cases, they carry out this role with no direct supervision by senior physicians, unless they choose to call in a senior physician to discuss a case.

Many senior physicians expressed the view that they thought this system worked fine, and that this turnus experience was where you really learned how to function as a physician. They described it as difficult, but an important learning experience that taught physicians to think for themselves.

This model of turnus training raises a number of questions:

- How can quality emergency care (which is dependent upon rapid, accurate diagnosis and treatment) occur when completely inexperienced physicians are tasked with the primary responsibility for the initial evaluation and management of the majority of undifferentiated patients coming into the hospital system?

- Given the lack of direct supervision and graduated responsibility during turnus, much of a physician's learning must be self-directed; how does the post graduate medical education system insure that physicians acquire a uniform knowledge and skill set?

2. Specialty training

We were told the post-graduate medical education system is structured as follows:

- Turnus lasts for 18 months (changing to 12 months in August 2008)
- Introduction stilling lasts for 12 months (trainees can take more than one of these)
- Hoved uddannelse (primary specialty training) lasts 4-5 years in the specialty of choice

Following completion of specialty training, there is no certification exam or other means of verifying that the graduate acquired the knowledge and skills that they were supposed to; once you are finished with your training, you are at that point recognized as a specialist. The "certification process" consists of satisfactory completion of each position and posting that one is assigned to during the specialty training period. Trainees have a supervisor at each position or posting who is responsible for overseeing the work of the trainee and must verify that the individual has satisfactorily completed that rotation.

With regard to the question of how future training programs in emergency medicine could be structured, we were told that there are a number of "fagområder" or subspecialty training programs that have been developed in different disciplines; however there is no precedent to date in Denmark for an inter-disciplinary or cross-specialty fagområde. The consensus of the group we met with was that if the Regions ask for an akutmedicin fagområde, then the medical specialties can be asked for input on developing this.

We heard a presentation by an uddannelsesansvarlig overlæge (senior physician in charge of trainee education) from one of the regional hospitals who described his role in coordinating medical education for young doctors at his hospital. He stated that it is typical for someone in his position to get 20% protected time to work on educational activities. Other senior physicians in his department are expected to participate in education, but that there is little or no additional funding or other incentives that they receive for this. He stated that there is no budget for graduate medical education at the regional level, no differential DRG reimbursement for care provided at teaching hospitals, and no specific teaching and administrative funds that come from the hospital to the clinical departments with physician trainees.

For these reasons, the overall impression we took away is that post graduate medical education receives very limited funding, that few senior physicians are directly involved in the clinical education of physician trainees, and that there are limited resources available for establishing new post graduate training programs.

3. Senior physician supervision of emergency patient care provided by junior physicians

We had the opportunity to discuss with a number of young physicians (forvagter) working in emergency care settings the supervision they receive from senior physicians (bagvagter). We were told that the supervision they receive is variable depending on the time of day and day of the week; that it is not mandatory that a forvagt discuss every emergency patient they see with a bagvagt; they decide which patients they think are important to review with the bagvagt and also receive input from nurses as to when a bagvagt needs to see a patient.

During the weekday, it is in general not difficult to get in contact with a bagvagt to discuss a patient or have them come and see a patient. During the evening or at night and on weekends, however, it can be difficult to get in touch with a bagvagt. Some younger physicians expressed the view that there is often a reluctance to contact a bagvagt during off hours because they don't like to be bothered unless the patient is extremely ill. We were told on multiple occasions, by experienced nurses, that this is a major concern as too often patients must wait until the next morning to be seen by a senior physician before definitive care can be initiated.

B. HOSPITAL SECTOR

1. Randers Sygehus

The leadership at Randers sygehus is among the most data-driven and quality focused that we saw in the Region. They presented a clear vision for developing emergency care at their primary facility and have already taken steps to begin implementing this vision. One example is the area of diagnostic imaging: Randers was the only facility we saw that had a current generation CT scanner located directly adjacent to the skadestuen. This is an important design consideration that facilitates the rapid and safe evaluation of undifferentiated or critical patients presenting for evaluation. They have already begun work on the design planning process for a new expanded fælles akutmodtagelse. They say though that they currently lack the necessary funding to carry out this vision. In our opinion, if the region were to decide to institute the emergency care delivery change one hospital at a time, this is one of the hospitals that should be considered to begin the change process. As a demonstration project, the leadership team here seems to be properly motivated to take the steps necessary to implement the many requirements for success. A review of funding mechanisms must be done to insure that if hospitals are funded through admission rates, and if the new FAM reduces admission rates, (which has the potential to reduce overall hospital expense) that the new FAM is adequately funded to reflect the new mission.

The Nursing leadership was very focused on developing nursing education related to starting a fælles akutmodtagelse and would like to see this begin soon. We are in agreement that too often changes in nursing training lag behind changes in physician training or vice versa. Due to the necessity of physicians and nurses working very closely together, major changes in training of one must be accompanied by appropriate changes in the other.

While visiting Randers, the department leadership for the AMA reported that 40% of the patients admitted to their department are discharged within 24 hours. Most of these patients are admitted for a diagnostic evaluations and limited therapeutic interventions. In

our opinion, the majority of such patients could be efficiently managed in a fælles akutmodtagelse with access to the necessary resources and properly trained personnel.

2. Århus Hospital

We were told that currently the skadestuen/TVA, medicinsk visitations afsnit and the kirurgisk visitations afsnit (KVA) are located in separate areas within the hospital and run as separate departments. Plans for the future FAM are to merge three separate functions into a single entity; however, because the timeframe for construction of a new, combined university hospital in Skejby is several years away, the FAM function will not be moved out to Skejby for some time to come. In the meantime, there is a desire on the part of the hospital leadership to limit capital investment in renovations of the physical plant at the Nørrebrogade facility. As a result there has been limited planning for how these three departments will merge and function as a single department in the future FAM at Skejby.

Given the importance of the academic leadership role that the university hospital for Region Midtjylland needs to play in the development of the FAM model and network, this group should begin working on development of their future clinical operational model and to explore how they can begin to implement this model at the current facility on Nørrebrogade, even if significant renovations to that physical plant are not possible.

It was suggested that clinical space adjacent to the skadestuen facility at Nørrebrogade which is currently used by the orthopedics department could potentially be utilized for phased expansion of clinical functions as the new FAM model is developed. We feel it is imperative to begin sorting out some of the operational problems that will be encountered by the move to the FAM model prior to the move to the new hospital in order to build a structure that reflects the way people will work in the new model. For example, in the diagnosis and treatment model patients are typically segregated by acuity, not body system or medical specialty. Sorting out how to do this prior to moving into a new facility will almost certainly drive how to lay out the new physical space for the FAM.

3. Skejby Hospital

We met with members of the Department of Cardiology who described the system for rapid prehospital recognition of patients with ST elevation myocardial infarction using tele-cardiology and subsequent expedited transfer of patients to cardiac catheterization. This system appears to provide excellent emergency care for patients with STEMI who have abnormal initial ECGs. They reported though that 35% of patients with CP and AMI have negative or non-diagnostic ECG initially and that this represents a challenge for emergency care delivery. Their view was that all patients with chest pain should ideally be evaluated by a cardiologist to insure that they receive an adequate evaluation; however they also pointed out that nearly all patients with chest pain currently get admitted for their evaluation.

They raised questions about how well functioning systems like theirs will be integrated into the function of the future FAM and expressed the concern that the efficiencies of the current system for recognition and rapid referral of STEMI patients to PCI could be negatively impacted if these patients were required to pass through the future FAM. We have implemented systems at numerous hospitals where notification by EMS of a patient with high suspicion of STEMI is either met in the emergency department by a team from

cardiology, or in some cases taken directly from the ambulance bay to the cardiac catheterization laboratory. The value here in this model is that many of the patients that are not cardiac in nature are screened from the system, triaged and treated appropriately in the ED, and the cardiologist's valuable time is then spent treating those patients most appropriately needing their services.

4. Horsens Sygehus

The hospital leadership at Horsens was among the most impressive that we encountered in Region Midtjylland in terms of their clear vision for developing emergency care delivery, their commitment to quality improvement in general and their implementation of informatics tools for data gathering and analysis.

Strengths we noted at Horsens included:

- specific projects focusing on improving quality and effectiveness in treatment of acute patients,
- extensive use of electronic medical records,
- systematic benchmarking of quality, economy, activity, personnel,
- utilization of technology for data gathering (voice recognition, automated data capture, RFID tags, etc.),
- focus on identifying and preventing unintended events.

Perhaps most importantly – they have already established an administrative organization for the future FAM that encompasses the MVA and KVA functions; while this currently excludes trauma and hemodynamically unstable patients, cardiology, stroke, OB/GYN patients and psychiatry, they have plans for incorporating all medical and surgical emergency patients (except cardiology), GYN, psychiatry and trauma.

The staffing plan for the GVA shows specialist level physician staffing primarily during the day Mon-Fri (two specialists) with one specialist in the evening Mon-Fri and none on the weekend; the on-call team has an intern, mid level resident and senior resident or specialist, but it is unclear if that individual (bagvagt) is present in the hospital during off hours. This lack of consistent senior physician presence in the emergency department is a universal problem with emergency care delivery at all of the facilities we saw and not just an issue at Horsens. The primary limitation is one of funding and attracting adequate numbers of qualified senior physicians to function in these roles.

Another limitation with the current facility to be addressed in future plans is the proximity of the emergency department to radiology (CT scanner) and ICU, but while this is an inconvenience it should not be looked at as a barrier to implementing change.

Patients with minor injuries and major trauma are received in the skadestuen currently and not the GVA. Another strong point is the size and training of the trauma team: the trauma team consisting of 15-17 people, with biannual team training for trauma team members consisting of one day, twice a year. There is also prehospital training coordinated between the physician/nursing staff from the hospital, paramedics, and the local police and military. These elements will be part of a complete emergency care system and help to overcome

barriers to communication between the in-hospital community and the prehospital community.

5. Herning (Sygehusenheden Vest)

At Herning we met with hospital leadership and department leadership from medicine, surgery, anesthesia, and orthopedics and heard presentations on the structure and function of each department. The hospital leadership presented a strong vision and commitment to building up a distributed emergency medicine department that encompasses three different facilities in Herning, Holstebro and Ringkøbing; These facilities each have different inpatient specialty services at the present time; Herning and Holstebro are planned to be replaced within the next 5-10 years by a single hospital that will serve as the principle emergency department for the western-most part of Region Midtjylland.

The hospital in Herning will be developed as the primary emergency facility where the most seriously ill patients are referred, as well as patients with unclear diagnoses. Holstebro will operate as satellite hospitals that will function in close collaboration with Herning with clear policies and criteria for transferring patients requiring a higher level of care than can be delivered at the satellite facility. Successful implementation of this model will depend heavily on the accurate triage and referral of patients presenting to the healthcare system either via the 112 system of the primary care / vagtlæge system. The challenge with developing the physician staffing model and developing the akutlæge model is that in order for the akutlæge to be skilled and maintain their experience, they will need to have ongoing opportunities for rotating through different clinical sites, seeing a variety of patient types and acuity levels.

6. Viborg Hospital

At Viborg we toured the current skadestuen and other emergency care areas. A number of the department leaders we talked with appeared divided about moving to a system requiring senior physicians to be involved with emergency care; the majority seemed to want to continue the current system which does not require that they work nights or weekends. This comment was echoed at other facilities as well. The challenge with this dilemma is either to find incentives to have physician staff work these off hours and shifts, or to hire dedicated off hour personnel, who only work weekends and nights. This model has been successful for us in the past. A caution here is that any system where the demand is 7/24 will need to have some representation from the most experienced staff, even on nights and weekends.

The hospital leadership was unsure whether they wanted to have a separate EM department or to keep it as a division of an existing department, but as we have cited in numerous other sections of this report we support the model of the new department being organized as an independent department.

Concerns were raised by some at Viborg about how development of an emergency medicine physician figure could have a potentially negative impact on other existing specialties; some expressed a desire to proceed cautiously with this development. We can understand this, but our own experience in the transition to an emergency medicine specialty in the US and in Italy was that the development of an emergency medicine

physician ultimately freed other specialists to concentrate on their specialty and spend less time triaging patients out of the system.

We also visited the nursing run skadeklinik in Skive which functions as a satellite facility to Viborg.

7. Silkeborg Hospital

Skadestuen at Silkeborg has two rooms and sees about 17,000 patients annually. Medical service has multi-disciplinary rounds twice daily to discuss patients with diagnostic difficulties; they have only 15 new acute patients per day; at these rounds they have all of the various medical specialties represented. The volume of acute patients at this facility appeared to be quite low; and we were skeptical about how well this approach of using multi-disciplinary rounds twice daily for sorting out the initial management of complex emergency patients would work if the volume were scaled up significantly and the physicians had to see many more patients with complex problems and had to make decisions more quickly.

Silkeborg Hospital is not going to have a FAM in the future, and there is a concern that if the emergency patients are taken away it will have the effect of decreasing the educational opportunities for younger doctors. We have heard the discussion about the concept of linking non-FAM hospitals to hospitals with FAM and find this a novel approach that will provide opportunities for the medical staff at these smaller hospitals for maintaining and expanding their clinical experience.

Physician leaders told us that they get among the highest evaluations from residents participating in training there. Silkeborg is consistently considered a highly desirable place to do training; they have an easy time recruiting doctors and have few open positions. This is thought to be due in part to the broad general medical character of the hospital. There is a concern that if they lose this broad general character, they may lose attending staff and lose interest from residents who in the past have sought out Silkeborg as a training site.

C. PREHOSPITAL AMBULANCE SECTOR

1. 112 alarmcentral and vagtcentral

We toured the facilities at the police department where 112 alarm calls are received and spoke with the individual alarm operators and their supervisors. The computer assisted resources used by the call operators for identifying caller location and coordinating responses were truly impressive. They also had electronic access to pop up resources to facilitate giving pre-arrival ambulance instructions to the callers, i.e. CPR and other first aid instructions. These systems in both Regions appear to be legacy programs from the old county model and are very similar.

The individuals who answer the calls are experienced police officers who have undergone specific training in how to answer these calls, what information to gather and how to decide what level of response to be dispatched. The impression we received from the physicians responsible for the medical oversight of this group is that the medical content of this training is limited and does not provide the operators with enough medical knowledge to reliably make accurate judgments about the level of prehospital response necessary. We also heard anecdotal reports that there is a relatively high mis-triage rate for the physician

staffed ambulance, both over-triage and under triage. However, we did not receive any specific data showing the rate of over- or under-triage.

Based on multiple discussions with people involved with the prehospital system, we received the impression that the medical oversight function of the 112 alarm center needs to be strengthened. In principle there is medical oversight of the education and training of alarmcenter operators, but this authority does not appear to extend to monitoring their actual function. We were told, for example, that medical personnel are not allowed to systematically review the recordings of calls answered by alarm center operators. Furthermore the Region does not appear to receive performance measures from the police department on the time intervals for receiving calls and how long it takes for these calls to be processed. We were told that the reason medical authorities do not have access to this information is that there is disagreement between police authorities and medical authorities on whether the alarm center activity is a public safety or medical activity. While there is often some blurring about where to draw the line between the public safety and medical aspects of prehospital care, it must be recognized that gathering patient information from callers and making judgments about what medical resources are needed to effectively respond is fundamentally a medical activity. The actions and decisions taken by the alarmcenter operators are often the first step in a long chain of medical interventions on a patient's behalf. The actions and decisions of the alarm center personnel can therefore have profound implications for the ultimate outcome of patient care, and should therefore be subject to rigorous medical oversight. In order for there to be effective medical oversight, medical authorities clearly need to have access to the relevant operational data so that they can determine whether operators are performing at an appropriate level.

This is one of many examples that we witnessed of how relevant data gathered in one sector of the emergency care delivery system is walled off from another relevant sector of the emergency care system and thereby limits efforts to carry out quality improvement efforts.

D. PRIMARY CARE SECTOR

1. Department of Primary Care Research, Århus University

We met with the Research Unit for Primary Care at the University of Århus, which has as one of its main research focuses, the interface between primary and secondary care and in particular the vagtlæge system. Some of the leaders of this department were instrumental in organizing the vagtlæge system back in the 1990s.

We discussed the vagtlæge telephone triage system and heard that the majority of patient calls are resolved on the phone; about 25% sent to clinic for consultation, and a smaller fraction receive home visits by a mobile GP and an equally small fraction of patients are sent to the skadestuen or inpatient hospital department for further evaluation and treatment.

We asked whether there was evidence supporting the accuracy (and safety) of the telephone triage system for identifying which patients need urgent evaluation in the hospital system and which patients can be safely managed as outpatients. Several studies from other European countries supporting the safety of telephone triage were cited. There are also some Danish studies reporting on the safety of the telephone triage system, however, apart from these, there appears to be little or no ongoing monitoring of outcomes for patients who receive care through the vagtlæge system. For example, there is no

monitoring of 72 hour returns to the emergency care system with admission to the hospital. We were told that they feel there is a need for leadership and administrative training among physicians so that they can play stronger roles in healthcare administration and policy making.

2. General Practice setting work routines

We met with one of the local general practitioners in Skive who described the daily work routine of a general practitioner. One of his frustrations with the current system of admitting his patients to the hospital is that he often must make multiple phone calls to different hospital inpatient departments in order to find one that will admit his patient. His statements corroborate other later observations that due to the large number of entry points to the hospital, general practitioner time that is spent trying to find the right entry point to the hospital, could be better spent seeing other patients and reducing waiting time if there was a single portal of entry to the hospital. In discussing the mechanism by which patients are able to contact him with emergency problems during the work day (M-F, 0800-1600), he explained that his secretary usually answers these calls and decides whether the patient needs to speak with the physician or not, or whether to schedule the patient for an urgent appointment that same day or a non urgent appointment at a later date.

3. Patient experience at Lægevagt

One member of the HMFP group had the opportunity to observe the vagtlæge system firsthand as a patient during the study visit. While this occurred in Region Midtjylland we were informed that the GPs systems were similar and therefore have included this as a relevant example.

The patient developed acute right flank pain shortly after arriving in Denmark and contacted the vagtlæge telephone consultation and spoke to a general practitioner who referred the patient to be seen in the vagtlæge konsultation. On arrival at the vagtlæge konsultation on a Saturday mid-afternoon, there was no staff to meet or register patients, only a sign and a paper ticket dispenser with instructions to take a number and wait in the waiting room until called to be seen. There were approximately 10 other people waiting to be seen in the waiting room.

There were two physicians seeing patients in two exam rooms; there was no nursing or support personnel assisting the physicians. The physicians kept track of the next patient to be seen with a paper list on a clipboard hanging on the wall. Every time they brought a new patient in they crossed out the previous number and wrote the new number on the list, but there was no apparent tracking of the length of time patients spent waiting to be seen.

When called in to be seen by the physician, the physician was able to see on a computer screen that this individual had called the vagtlæge telephone visitation previously. He asked a few questions, did a brief physical exam and asked for a urine sample; while that was happening, he went to see the next patient.

On the patient's return from the bathroom with the urine sample, both physicians were preoccupied in the other exam room with what appeared to be a sick and apparently unstable child who was approximately 5-6 years old; the child and parents had been sitting in the waiting room for possibly 30 minutes prior to being seen. It appears that all patients

are seen in the order that they come in; there is no triage evaluation to determine whether someone waiting is sicker than other patients in the waiting room and needs to be seen first. While in the waiting room, the parents of this sick child had been sitting patiently with the child lying in the mother's arms (apparently asleep). In the exam room, both physicians were moving quickly around the child, apparently trying to start an intravenous line while the other one was on the phone arranging an emergent transfer; a few moments later an ambulance crew arrived to transport the child. The physician who had been taking care of the HMFP team member left with the ambulance crew and said on the way out the door that his colleague would finish up with this case.

This second physician was now in the exam room with another patient; upon finishing with that patient, the now lone physician checked the clipboard to call for a new patient when our HMFP group member interrupted saying that her colleague had not finished with him before leaving. She then brought the patient into the room and retrieved the urine sample and performed the urinalysis herself. This was positive for microscopic blood and based on this and the history, she made the diagnosis of kidney stone and prescribed diclofenac for pain. In response to questioning about diagnostic imaging to rule out other possible diagnoses and/or further characterize the size of the stone and presence or absence of urinary obstruction, she said that the earliest a scan could be arranged was two weeks hence, and that it would be necessary to come back to a different facility prior to the scan to have blood drawn and renal function studies performed; and that this blood work could not be performed today.

This encounter with the vagtlæge system raised the following issues:

- the apparent lack of a triage mechanism to identify patients that are in fact sicker than they sounded on the telephone and prevent avoidable deterioration while they wait in the waiting room,
- the apparent lack of personnel to assist the physician that can have a negative effect on physician productivity and the patient experience,
- the apparent lack of an ability to obtain diagnostic laboratory work beyond point of care, testing limits the effectiveness of the vagtlæge services and which introduces added delays and complexity to patient management; for example, if a CT scan was ordered it would have been more efficient if the blood work could have been ordered and sent at the time of the initial vagtlæge visit to save the patient having to come in again prior to going for the CT scan,
- the apparent lack of an ability to obtain diagnostic imaging through the vagtlæge system which introduces the potential for delays in diagnosis of potentially serious medical problems (abdominal aortic aneurysm, complete ureteral obstruction with hydronephrosis, etc.) that, if diagnosed early could be treated in a timely fashion thereby limiting or preventing avoidable morbidity, mortality or disability entirely.

4. Lægekreds foreningen meeting

The HMFP team had the opportunity to meet with a group of primary care leaders to discuss the role of general practitioners in emergency care delivery. We were told that there is a large geographic variation in the clinical practice of general practitioners; that

GPs in Vestjylland perform many more procedures themselves, i.e. suturing, reducing fractures, etc. and have a lower utilization of consultants, than for example GPs in Copenhagen.

In order to work in the vagtlæge telephone visitation system, one has to be a specialist in General Practice, although senior residents are also allowed to take call within the system. The vagtlæge system was started in 1992; today there are 40% too few GP's to cover the vagtlæge system. There are three different jobs in the vagtlæge system: answering telephone calls from patients, clinic konsultation, driving to patients homes to perform house calls. There is a declining interest among GP's for taking call in the vagtlæge system mainly because it is not as financially attractive as it once was. We were told that some of the lægevagt centers have nurses and secretaries (Skive, Viborg, Herning, Holstebro), all the rest have only the physician working there. Patients get a number and wait in line to be seen in the order they arrive, as has been described elsewhere. In one interview we were informed that because 50% of current annual skadestuen volume represents only 1% of the total primary care sector patient volume, the sense is that the primary care sector could easily absorb additional patients who are currently being seen in the skadestuen for minor problems. We feel the challenge to this strategy will lie in sorting out which patients who are currently being seen in the skadestuen can be effectively managed in a GP practice office setting. Many patients with minor injuries or medical complaints may still need diagnostic imaging or laboratory work to be thoroughly evaluated, services that are not routinely available in general practitioners' offices.

When asked, we were told waiting times are not tracked for patients seen in the VL konsultation. Apparently patient satisfaction surveys for the vagtlæge clinic konsultation show a high level of satisfaction among patients seen by vagtlæge in clinic konsultation and also among patients who were managed only on the phone. In general there are few patient complaints related to the vagtlæge system.

This group feels that there is a need to strengthen the primary sector ability to provide acute care in the vagtlæge consultation. They expressed the need for increased number of nurses, secretaries, and techs. A study was cited comparing the number of support personnel for physicians in the UK (2.3 per physician) and DK (0.8 per physician). They would also like to see improved support resources, such as tele- radiology and technicians to draw blood and process lab work, and space to accommodate additional patients.

E. OTHER ISSUES

1. <u>"What is the problem with emergency care delivery?"</u>

During the conference held at Rebild at the beginning of the site visit, which was attended by several hundred Danish physicians, nursing and administrative leaders, there was discussion between audience members and the HMFP members on a range of topics. HMFP group members at one point posed the question, "What problem with the emergency care system do you want to solve?" In response to this question, a number of the audience members stated that they did not think that the current emergency care system had major problems, that it worked quite well and that they did not think that there was any need for an emergency medicine specialty in the Danish emergency care system.

Despite repeated attempts to engage the audience in a discussion about what they thought the problems were with the emergency care system that needed to be solved, the majority

opinion expressed by those present appeared to be that they did not see any fundamental problems with the current model and organization of emergency care, only a need for fine tuning of that system, additional specialist physicians, resources, and training, despite the changes that must take place to comply with SST recommendations which will force re-organization and change.

We interpreted this reluctance to openly acknowledge or discuss problems in the system as a sign of the divided opinions about the current system and need for change as well as the degree to which the debate about changing the emergency care system has become highly politicized. Because of the distributed nature of the current emergency care system, there are numerous stakeholder groups who would understandably be interested in maintaining their stake in the system, and concerned that major changes in how emergency care is delivered will threaten their funding, positions and authority within the healthcare system. Many physician leaders at the clinical department level appear to oppose many of the recommendations from Sundhedsstyrelsen, such as consolidating the many current akutmodtagelse functions through the hospital into a single FAM. The HMFP group feels this resistance to the recommendations has the potential to undermine this initiative unless broad steps are taken to communicate the message that the proposed changes are in the best interests of not only the region but also patient care.

2. <u>"Who wants to work in emergency care?"</u>

In discussions with physician leaders currently involved with emergency care delivery, we encountered considerable ambivalence around the question of whether future FAM should be staffed by a dedicated group of physician specialists whose primary clinical role was to work in the FAM, or whether the FAM should be staffed by specialists from other departments, who receive some additional education and training, but maintain their clinical role and status in their "home" department and work in the FAM as an additional clinical role. While we encountered great enthusiasm generally amongst many young physicians for emergency care as a potential career option, the general view that we encountered amongst mid-career and senior physicians is that emergency care is not a desirable career option.

Our impression during the interviews was that younger physicians who expressed interest in emergency care as a career option tended to be either at the beginning of their specialty training or had not yet chosen a specialty career path and expressed the view that emergency care seemed exciting, challenging, and offered opportunities for learning about a wide variety of patient problems. The majority of older physicians with whom we interacted were already established in particular specialties and seemed skeptical about the idea of switching their primary clinical focus to emergency care delivery based in the fælles akut modtagelse (FAM). A number were openly opposed to the proposed changes in acute care delivery recommended by Sundhedsstyrelsen and the Regions. The reasons for this skepticism appear to be varied but include uncertainties about options for career advancement in this new area and a perceived low status of hospital based emergency care.

It is difficult to know how widespread this skepticism is, but our sense is that in order to attract a sufficient number of talented, ambitious physicians who want to work in this new clinical area, it will be necessary to put in place financial, professional and academic incentives adequate to make this new area a desirable career choice.

3. Physician (and nursing) involvement in the future FAM facility design planning process

   A number of the physician leaders who we spoke to from the various specialties currently involved with emergency care delivery have expressed the concern that they have not been involved with the planning process for designing the new FAM facility at Skejby that they will likely be responsible for running in the future. The design and configuration of the future FAM facility should be based on the specific model of clinical care that is envisioned for the future FAM. In our opinion the future FAM system leaders should, to the greatest extent possible, have a role in the development of the model of clinical care in the FAM as well as the FAM facility design and configuration; they will then feel invested in its success from the beginning.

4. Shortage of physicians vs. low physician productivity

   Leaders of the department of primary care research raised questions about whether there is an actual shortage of physicians in Denmark as many have suggested, or whether the actual problem is one of low work productivity. Many people commented to us that physicians (and nurses) spend much of their work time engaged in low-skilled work instead of high value added work; i.e. physicians doing the work of nurses and administrators, nurses doing the work of secretaries, etc. An editorial in Ugeskrift for Læger in October 2007 [2] echoed this observation.

   In talking with physicians about their daily work routines, many reported that they spend significant time engaged in activities that could be carried out by other, less skilled personnel. For example, physician educators reported that they had no secretarial or administrative support and had to personally carry out scheduling and organizational activities, equipment ordering, cleaning and maintenance, photocopying, etc. In the clinical setting, physicians reported that they routinely have to start peripheral IV lines, draw blood for laboratory studies, obtain 12 lead ECG's, etc.

5. Potential conflicts of interest

   In discussions with hospital leaders about the metrics by which they are evaluated and the goals they hope to accomplish with the institution of the new FAM model, we noted what appears to be a potential conflict of interest between the institutional incentives built into the current system for productivity measurement at the hospital level and the stated goal wanting to decrease "inappropriate" hospital admissions.

   According to information that we were given, hospital productivity is measured based on the DRG value of admitted patients divided by the actual budget the hospital receives for providing care. Using this metric for productivity will reward hospitals who admit many patients and discharge them quickly, using the minimum resources necessary to provide their care.

   Many individuals stated to the HMFP team that one of the goals of reforming emergency care is to reduce the number of "inappropriate" acute admissions, defined as patients who were admitted, but could have safely been managed as an outpatient. Reducing the number of inappropriate admissions would seem to have the potential effect of also lowering a

hospital's productivity score and potentially their reimbursement as well. We asked a number of people if they thought this represented a conflict of interest between the hospital's desire to increase productivity and the region's desire to reduce inappropriate admissions. Although we saw this as a potential conflict, most people we asked did not agree.

We acknowledge that we do not fully understand the intricacies of the Danish Healthcare finance system or hospital performance measures; and while these may differ in some important ways from those in the U.S. the underlying power of incentives to affect systems change (or serve as an obstacle to change) is universal. We would therefore urge the Regions to consider whether institutional incentives (such as described above) are well aligned with goals.

6. Measuring the impact of implementing the new FAM model

We met with the department of clinical epidemiology at the University of Århus to discuss strategies for implementing a research framework for evaluating the impact of implementation of the new FAM model.

The department has broad expertise and resources in the areas of epidemiology and informatics, and routinely works with all of the national Danish databases, so they are familiar with the database contents and data structures. We discussed the concept of developing a collaboration between Nord and Midt Jylland and Århus University to study the impact of implementation of the FAM concept in the Regions hospitals. The central questions that need to be clarified in order to go forward with such a research effort are a) what is the intervention, i.e. what are the specific changes in the way emergency care is being delivered by implementing the FAM, and b) what are the effects or outcomes in emergency care that can be measured.

Potential outcome measures that we proposed included the following:

- Any increase or decrease in hospital inpatient admissions (because a greater number of patients are able to be completely worked up in the FAM and sent home and can thereby avoid hospitalization altogether)
- Any increase or decrease in patient transfers between departments or between hospitals (counted as separate admissions) during the same hospitalization (because a greater number of patients will have their admitting diagnosis determined accurately at the onset of their hospitalization and be quickly stabilized in the FAM and have initial treatments started)
- Any increase or decrease in hospital length of stay for patients with unscheduled (akut) admissions (because the workup and treatment is initiated immediately in the FAM prior to the start of the admission)
- Any increase or decrease in the time to diagnosis - (for selected time sensitive disease entities)
- Any increase or decrease in time to treatment - (for selected time sensitive disease entities)

- Any increase or decrease in time to being seen by a physician (a senior physician who is able to make decisions and initiate definitive diagnostic and therapeutic plans)
- The accuracy of the initial admitting diagnosis (here we could compare the primary hospital discharge diagnosis with the department the patient was initially admitted to, looking for concordance or discordance)
- Any unscheduled returns to the emergency care system (prehospital sector, primary sector, hospital sector) within 72 hours for discharged patients.
- Any transfer from a regular inpatient floor to intensive care unit within 24 hours of admission to hospital from the FAM
- Any death within 24 hours of admission to the hospital
- Other disease-specific indicators (time to ASA/B blockers/catheterization for STEMI patients, time to head CT/neurology evaluation in stroke patients, time to antibiotics in pneumonia/meningitis/sepsis patients, etc.)

The ability to chart the progress of the changes to the healthcare system is essential to building the new model and to have robust data that supports or refutes the common wisdom. This highly motivated collaborative team should be utilized to their full potential to track progress on both quantitative and qualitative measures.

7. Regional leadership for developing the FAM and akutlæge model

A working group consisting of physician leaders from Region Midtjylland was formed to begin discussing the concept of an akutlæge figure (emergency physician) to staff the future FAM as an alternative to the multi-specialty model proposed by Sundhedsstyrelsen. Concerns were expressed within the group about the word "akut-læge"; some people were afraid that this would be perceived as being similar to the "hospitals læge," which was a concept from a generation ago referring to a physician who never completed a specialization in a particular discipline and worked in different hospital departments; they were apparently stigmatized and perceived as not being as capable as physicians who completed their specialty training. It was felt that it will be very important to explain to the medical community and the public how the future akutlæge will be different from the old sygehus /hospital læge

It was expressed by the group that there is a central need to first describe what the work of the future akutlæge is going to be in the FAM and to design an educational curriculum and training program based on that work description (competency based education). The view was expressed that it will be important to have strong role models in the FAM system in order to attract future young physicians to want to make a career in this area. We wholeheartedly agreed with this and feel it is one of the key points to consider. Some in the group were concerned about pushing the process of developing the akutlæge role too fast and thought that it should be allowed to develop more gradually. This concern seemed to be motivated to some extent by questions about the impact on other specialties that may be displaced from their current roles in emergency care delivery with the introduction of a physician whose entire clinical practice is focused on emergency care.

Others in the group expressed the view that need to push forward boldly, that a new specialty in emergency medicine is exactly what the Danish healthcare system needs to improve the quality in emergency care delivery. Others stated that "we've been talking about this for the past 10 years, if we keep talking and don't take action, we'll still be here talking in another 10 years" and don't need to be afraid of making decisions out of fear that someone will be offended

We believe that strong leadership at the Regional level will be necessary to implement the major system changes associated with the new FAM and akutlæge model. This advisory committee appears to have the necessary representation from hospital leadership, physician and nursing departmental leadership and regional administration to be able to provide this strong leadership. The majority of the individuals on this committee however have numerous competing responsibilities and time commitments; so this advisory committee would benefit from the creation of a senior level project manager position that will be able to devote their full attention to the work of coordinating the implementation of the FAM system. We comment on this more fully later in the report.

We wish to thank the many busy people who took time off from their schedules to meet with us and share their thoughts. The impressions we gleaned from these discussions are woven throughout our report, and in many respects helped shape what we felt were in the realm of possible solutions, as often times the consulting team's thoughts were in concert with at least some of the stakeholders in Denmark.

Key Findings

IV. Data Summary

A. GOALS OF DATA ANALYSIS

We believe that the process of improving emergency care delivery systems must be highly data driven. In order to accomplish this in our own system, we routinely gather and analyze extensive process and outcome data. This provides us with the kind of information which allows us to identify problems which can only be fixed at the overall system level.

At the request of the region, our initial goal was to try to carry out some of the quantitative analyses that we routinely perform in our system and based on these, to make specific recommendations to the Regions about the design and staffing of future emergency care system.

Goal #1: See the "Big Picture"

In order to truly understand the strengths and weaknesses in emergency care delivery in the current regional system, we wanted to construct a simple quantitative flow model showing how patients move in and out of the multiple sectors and departments in the current system.

Trying to see this "big picture" is crucial. If quality assessment activities were to only focus on a given sector or department (and not examine what happens before or afterwards), it is possible to overlook potentially significant quality problems. For example, consider the patient who presents on one day to the prehospital care system with chest pain, is diagnosed with a MI and undergoes a successful PCI; this would be considered a success and an example of high quality care. However, if this same patient had contacted the vagtlæge telephone triage center 12 hours prior to contacting the ambulance system, complained of vague chest symptoms and was advised to follow up with their primary care physician the following day; this would be a delay in diagnosis with important systems implications.

A mandatory quality improvement process measure in the US is the rate of patient return visits to the ED within 72 hours of the initial contact (with admission to the hospital on the second visit). Analysis of the initial visits sometimes identifies important quality issues that can be fixed. In Denmark, because the overall system of emergency care consists of many regional sectors and departments, then the only way to measure the rate of 72 hour return with admission is to analyze all patient encounters with all of these sector and departments together.

Goal #2: Determine bed and staffing requirements for future FAM using standard quantitative models

With the consolidation of the number of FAM in the future regional emergency care plan, the remaining FAM will necessarily need to manage a larger volume of patients. This will require additional space, beds, staffing and other resources. But how many and how much? If these decisions about renovations and building new facilities are made in the absence of hard data, the results will be costly. If new facilities are too small and understaffed, then quality will suffer. If new facilities are too large, then resources will

wasted that could be used more effectively in a healthcare system that is struggling to meet productivity targets (for example: 30 day treatment rule, early evaluation and treatment of cancer patients, etc.).

In listening to regional planners discuss their estimates for the anticipated facilities requirements for future FAM, we suspected that more cost effective strategies were possible and wanted to demonstrate these using standard quantitative models for estimating ED patient bed and staffing requirements. Quantitative approaches for modeling the necessary numbers of emergency department beds and nurse staffing requirements are well described [3, 4].

Data requested

Prior to our site visit we requested a broad range of operational data about emergency care delivery in the various sectors. As mentioned above, the reason for wanting to review this data was to provide quantitative insight into how the emergency care system actually works, as opposed to how the system is supposed to work.

These included a broad range of quantitative data describing the current system of emergency care delivery and its operation was requested from the Region. Examples of requested data include numbers and types of emergency care facilities, annual patient volumes seen in the various facilities, breakdown of patient volumes in terms of initial triage acuity and subsequent disposition (discharge, transfer, observation, admission); time motion metrics describing patients' course within each facility (length of stay, time until initial evaluation, time until key interventions for patients with time sensitive problems, etc.).

Data received and gathered from other sources

In response to the initial request for descriptive data on the emergency care system we received a range of information from the Region, although many elements were incomplete. We were also able to review data from other sources including:

Reports from Region Midtjylland

> "Rapport fra arbejdsgruppen vedrørende akutmodtagelser" Region Midtjylland, March 2007
> The report offers a detailed analysis of the current structure of the acute care system including staffing levels and available facilities in the region that we have examined. Furthermore, it details the plan for the future acute care system with regards to the hospitals that are foreseen to have a fælles akutmodtagelse and what the working group views as realistic staffing levels [5].
>
> Bilag til Regionsrådets møde 24. oktober 2007" and "Akutplan Region Midtjylland", october 2007
> We looked at the qualitative analysis of needs and possibilities and note that it is the plan to establish fælles akutmodtagelser at both Holstebro and Herning while a

new hospital is being built. Further we have noted the flexible approach concerning staffing of the acute care in the region [6].

”Rapport fra arbejdsgruppen vedrørende den akutte patient i den præhospitale indsats” Marts 2007
We looked at the data describing the activity of the Lægeambulance [1]

Activity reports from the hospitals in Region Midtjylland
The reports gave a good overview of the current staffing and call structure as well as numbers on acute admissions.

“Organisering af Akutmodtagelsen i det fremtidige universitetshospital i Århus 22/2/2006

We looked at the general organization of the acute care system in Århus including the pre-hospital sector and the future plans. We also look at the numbers of admissions to the different specialties, referral sources and the length of stay. We noted that a significant number of patients are discharged after a one day admission, suggesting an unnecessary hospitalization (and overuse of resources). Unfortunately it was not possible to link the referral source with the length of stay [7].

Reports from Sundhedsstyrelsen (Danish National Board of Health)

Lægeprognose
Projections for future specialists in the various specialties and overall number of specialists vs. physicians without specialty training. Among other issues we note a steady to falling number of general practitioners, a steady overall number of specialists and an increasing number of physicians without a specialty.[8, 9]

Styrket Akutberedskab (26 June 2007) [10]

Bilag til rapport om styrket akutberedskab – planlægningsgrundlag for det regional sundhedsvæsen (27 June, 2007)
We looked at number of acute admissions, the referral sources and admission rates. Further the number of patients seen by the læge ambulance in Copenhagen and Århus with a breakdown of NACA score was useful.[11]

OECD Health Data 2007 [12]

We looked at several data elements from the OECD health database that factored into many of the discussions we had during the site visit. Among other things we examined:

- Per capita number of physicians (broken down by specialists and generalists)
- Per capita number of nurses
- Gross expenditures on healthcare as percentage of GDP

- Average length of stay for acute admissions
- Overall life expectancy

October follow up meeting

At our follow up meeting in October 2007, we presented our initial analysis of data that we had received or been able to gather on our own from other Danish sources. The response to this analysis by regional project partners was positive and they asked us to work on further analysis using the data a) we already had, b) new data we could obtain and c) additional data that they were confident that they could gather for us.

It proved to be difficult and time consuming to gather this additional information. Nearly two months elapsed between our second request for data in early October and when we actually received it. Unfortunately there were still a number of critical elements that could not be obtained. We were told that the data gathering presented "a challenge as many data from different sources without direct linkages needed to be coupled". Furthermore, we were cautioned by data consultants from the region about drawing conclusions from the data as many elements were felt to be inaccurate.

Since we were not able to obtain the information that we needed, it proved in the end not to be possible to carry out most of the analyses that we had originally planned to do. We give examples below of the limited analyses that we could carry out and suggestions for how data gathering could be improved to facilitate a more data driven approach to managing the emergency care system.

This feedback from the regional data consultants supports our view that the current data systems for emergency care are not organized in a way that provides timely access to accurate systems information necessary for carrying out many administrative and planning functions. Our sense is that the current regional data systems are organized based on the idea that each emergency care sector is operated and managed independently of the others. The future model of integrated emergency care delivery requires data systems that are integrated with one another.

We reviewed healthcare data on Denmark from Sundhedsstyrelsen and Organization for Economic Cooperation and Development (OECD).

B. ANALYSES PERFORMED WITH AVAILABLE DATA AND LIMITATIONS

We reviewed all of the data that we received from the Region and attempted to use them to the greatest extent possible. Below are some examples of the analyses we were able to carry out and explanations of the limitations we encountered in the data we received. Despite the reservations about the possible inaccuracies in the data material, we did find some examples that were thought provoking:

Estimating future annual patient volume for FAM units

Many emergency department planning functions depend on having an accurate estimate of the future annual patient population that will be seen in the department. These functions

include: determining staffing levels for physicians and nurses as well as determining the optimal number of patient beds for facilities renovations and new facility construction.

In attempting to estimate the future annual patient population for the FAM units in Region Midtjylland, we used the following formula based on the description of the future visitation model for the FAM at hospitals in the region:

1) all patients who today are seen in any of the Region's skadestuer; minus those patients admitted from the skadestuen (which are accounted for later)
2) all akutte indlæggelser within the Region; minus patients who fall into one of the categories identified below as being appropriate for direct admission to an inpatient department:
    - OB/GYN patients
    - Pediatric patients (without trauma)
    - Patients with "open admissions"
    - Transfers from other hospitals
    - Admissions from ambulatory clinics
    - Patients brought in by prehospital telemedicine or ambulance physician

Arbejdsgruppen har drøftet hvilke patientgrupper, der kan være selekterede i forhold til at blive indlagt direkte på specialafdelinger. Arbejdsgruppen foreslår i tråd med planen vedr. akutmodtagelsen for Det Nye Universitetshospital på at ***følgende grupper indlægges udenom den fælles akutmodtagelse***, eller kan passere direkte videre til relevant afdeling efter modtagelsen i akutafsnittet:

- Fødende
- Øvrige gynækologiske patienter
- Børn (dog ikke skader)
- Patienter med åbne indlæggelser
- Patienter, der overflyttes fra andre hospitaler (efter aftalte principper)
- Patienter, der indlægges fra ambulatorier (efter aftalte principper)
- Patienter, der er visiteret via præhospital telemedicin eller af ambulance-læge

[5]

The Region has proposed that some percentage of patients currently seen in the skadestuen will in the future be able to be seen either in acute clinic settings at non-FAM hospitals, or in the primary sector (patients' own physician or vagtlæge system).

Based on the limited information available to us, it is difficult to make any quantitative estimate of what the potential volume of patients will be able to be seen in the urgent care clinics (skadeklinikker) that are proposed for non-FAM hospitals. In the absence of a standardized triage mechanism throughout the emergency care system, it is also unclear which patients should be appropriately referred to these centers for evaluation and treatment.

Estimates that 30% - 40% of the current skadestuen population can be shifted to the primary sector have been made; however, these estimates are limited by several factors. Since there is a limited capacity for obtaining diagnostic studies and imaging on an urgent

basis within the primary sector, it will be impractical to shift patients that may require or benefit from an urgent diagnostic evaluation to be seen initially in the primary sector.

Based on these assumptions, the resulting FAM patient volume and case mix would be relatively lower than the current volume of emergency patients seen by the hospital system, but the relative patient acuity would be higher, given the shift of lower acuity patients to the primary sector. It is unclear; however, whether these assumptions are correct and considerable evidence suggesting they are not.

Capacity of the Primary Sector for absorbing additional patient volume

The population in Region Nordjylland and Region Midtjylland is aging with the result that individuals are living longer with more chronic diseases and more acute exacerbations of these. The percent of the population age 60 years or older is projected to continue to increase over the next several decades.

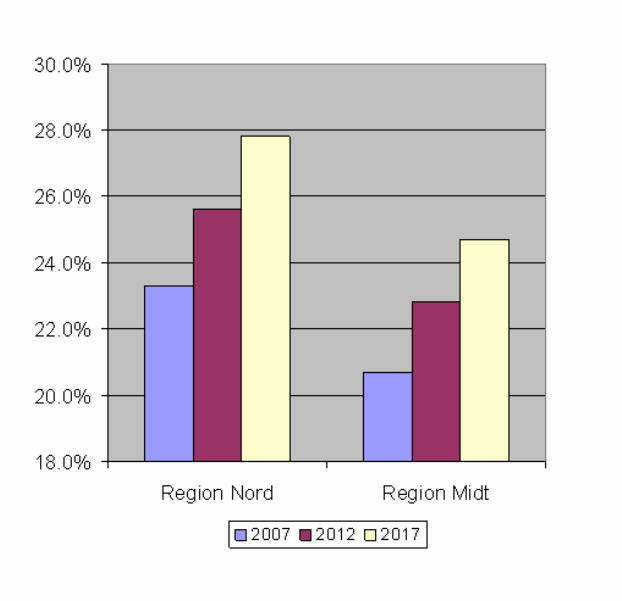


Figure 2. Percent of population aged 60 years or older, Region Nordjylland and Region Midtjylland, 2007 – 2017. Danmarks Statistik

Over the past several years, total patient contacts with GPs have been gradually increasing at a rate of 2% - 3% per year.

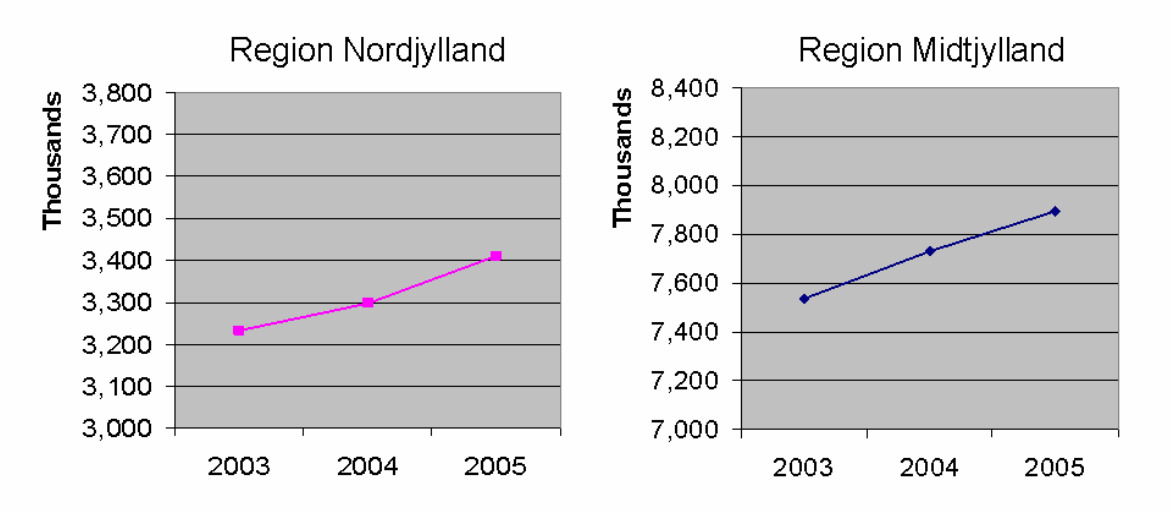


Figure 3. Total GP contacts per year, Region Nordjylland and Region Midtjylland, 2003-2005. Styrket Akutberedskab – planlægningsgrundlag for det regionale sundhedsvæsen. 2007, Sundhedsstyrelsen

The GP workforce in both Regions has an age distribution that is older than the general population with 30% of the current GP's in Region Nordjylland aged 60 years or older, and 24% in Regin Midtjylland.

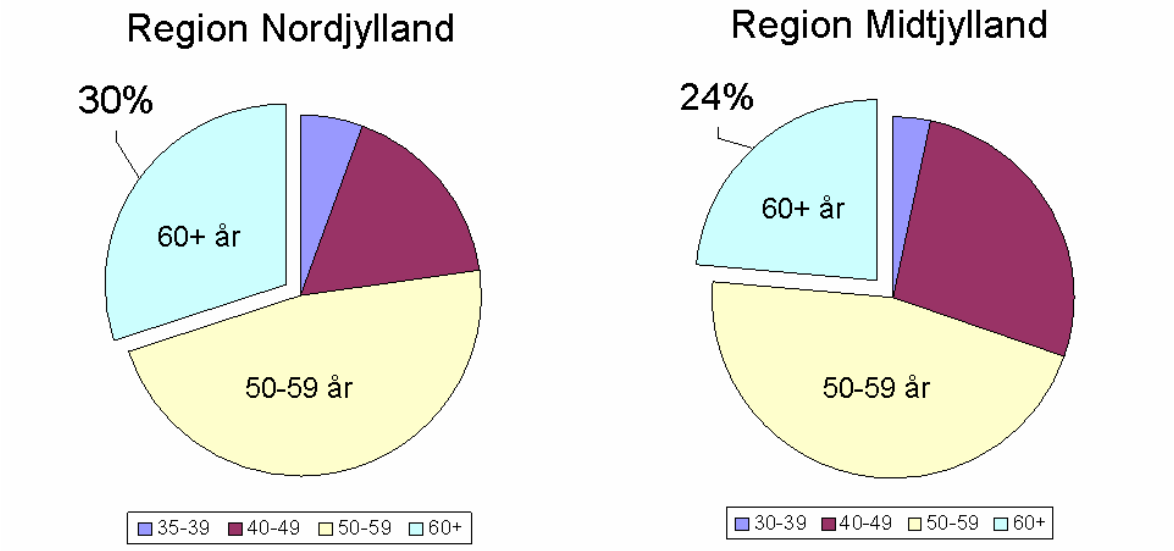


Figure 4. Age distribution of GP workforce (2007), Region Nordjylland and Region Midtjylland, Delplan - fastholdelse og rekruttering af alment praktiserende læger. Region Nordjylland. 1. april 2007. Delpraksisplan for rekruttering og fastholdelse i almen praksis. Region Midtjylland. 20. februar 2008

The Regions have estimated that 20% - 30% of currently practicing GPs will retire within the next 10 years. The numbers of new GPs who are expected to enter general practice during this period is far less than the numbers who are retiring.

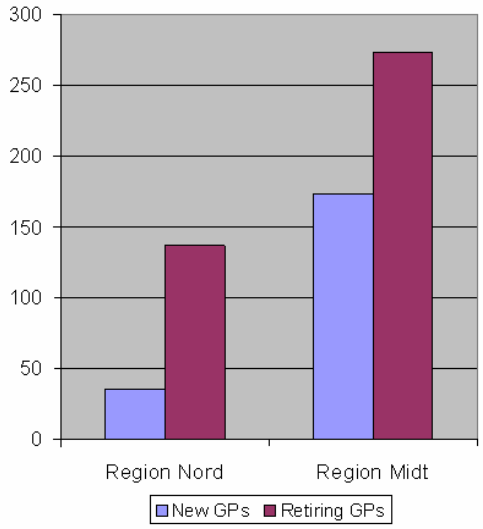


Figure 5. New GPs vs. Retiring GPs (20007-2011), Region Nordjylland and Region Midtjylland. Delplan - fastholdelse og rekruttering af alment praktiserende læger. Region Nordjylland. 1. april 2007. Delpraksisplan for rekruttering og fastholdelse i almen praksis. Region Midtjylland. 20. February 2008

Furthermore, it is likely that many of the new GPs entering practice and many of the older GPs who choose to remain in practice beyond the typical retirement age will seek increasingly flexible and reduced work hours.

5.1 De Yngre Læger

Siden 1977 er antallet af kvindelige alment praktiserende læger steget jævnt. I 1977 var kun hver tiende læge kvinde, mens dette gælder for hver tredje i 2005. Sundhedsstyrelsen forudser, at der fra 2018 vil være flere kvindelige end mandlige læger[2].

Fremover vil flertallet af almen medicinere, som ovenfor nævnt, være kvinder, hvor fleksibel arbejdstid og -mængde prioriteres højt.

5.2. De ældre læger

Motivationen til at fastholde de ældre praktiserende læger i almen praksis synes iflg. de alment praktiserende læger selv, at være:

- Fritagelse for administrative opgaver
- Nedsat arbejdstid og længere ferie. Dvs. ønske om mulighed for aftrapning
- Evt. et ansættelsesforhold i stedet for ejerforhold.
- Vikarstøtteordninger,
- Løntilskud og goodwillerstatning [4].

Figure 6. Ældre or yngre lægers ønsker og behov ved nedsættelse i almen praksis. Delplan - fastholdelse og rekruttering af alment praktiserende læger. Region Nordjylland. 1. april 2007

Region Midtjylland has projected that if the average age of GPs retirement were extended by 2 years to age 62, then there would be a deficit of 142 General practioners in Region Midtjylland by the year 2011. (deficit = retiring GPs + "ledige ydernumre" – new GPs entering general practice). Assuming that each GP carries a patient load of 1600 patients, this translates into 227,200 individuals without a GP in Region Midtjylland. In 2011, the

projected population in Region Midtjylland will be 1,252,263This would mean that 18.1% of the population or nearly 1 of every 6 people would be without a GP.

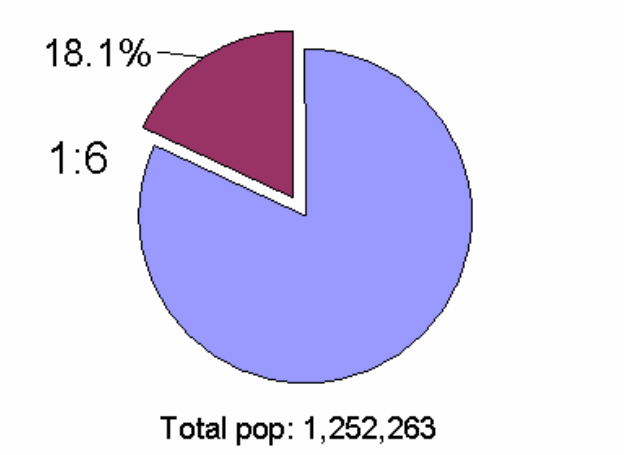


Figure 7. Population without a General Practitioner (2011), Region Midtjylland. Delpraksisplan for rekruttering og fastholdelse i almen praksis. Region Midtjylland. 20. februar 2008

These patients without their own General Practitioner will presumably go to the vagtlaege system for some percentage of their primary and urgent care needs. Normal percapita utilization of general practitioner services has averaged around 6 contacts per person per year. If one were to assume that uncovered patients went to the vagtlaege system for just 10% of their regular general practitioner contacts, this would result in an increase in the annual vagtlaege patient volume of 56% in Region Nordjylland.

Patients without GP: 227,200

Baseline rate of GP utilization: 6.5 per person

Additional vagtlaege system contacts if 10% routine visits: 147907

VL konsultation visits (2005): 264098

Percentage increase: 147907/264098 = 56.0%

With its current organization and staffing levels, it is unlikely that the vagtlaege konsultation system would be able to manage an 56% increase in its annual patient volume, let alone take on an additional 30% - 40% of the current skadestuen patient population on top of that.

In order to prevent the collapse of the vagtlaege system under these circumstances, other options for managing this excess patient volume would need to be implemented and the FAM system is an obvious solution to this impending problem.

By taking on this role of managing additional lower acuity patient volume from the vagtlaege system, the FAM patient volume would increase above the currently anticipated level and the average patient case mix would become more diverse. This scenario differs significantly from the current scenario that the Regions are anticipating for the future FAM and will have major implications on the necessary staffing levels, necessary competencies for FAM physician and nursing staffing, as well as FAM patient bed numbers and facilities configuration.

What data do we currently have?

Data from Region Midtjylland = in 2006 there were 155,000 akutte indlæggelser, and 170,000 skadestuebesøg of which 28% were admitted to hospital.

155,000 + (170,000 x 0.72) = **277,400 patients** (minus direct admissions to inpatient departments, perhaps minus some patients to be seen instead in lægevagt or other non-FAM hospital sub-acute functions)

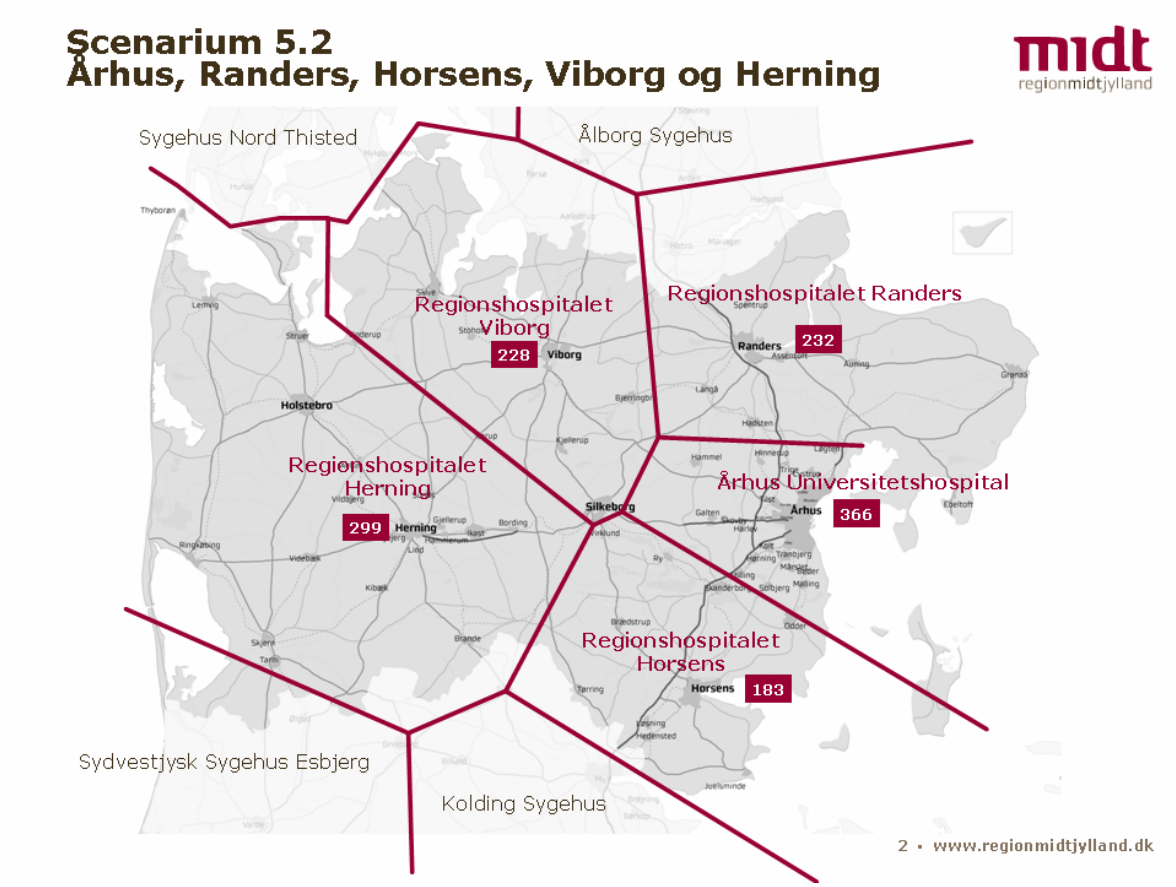
The second round of data gathering by Region Midtjylland using the above formula (via the eSundhed data system) gave a number of **115,803** patients, however this calculation appears to have only included admitted patients and did not include patients who are seen in the skadestuen and then discharged. These discharged patients must be factored into the future patient volume of the FAM. Many of the individual data in these projections do not agree with the numbers of emergency patients that were given to us by the individual hospitals. For example, in Horsens, we were told that the total number of emergency patients they see (excluding births) = 14,600; while in this projection, the total number of emergency visits seen in Horsens and Brædstrup = 8505 + 1004 = 9509.

Data we don't have

We don't know how many patients would be coming in under "open admissions", brought in via prehospital system with direct admission to cardiac or stroke units, or direct transfers from other hospitals to inpatient units that would bypass the FAM. As discussed above, we also don't have a clear basis for knowing how many of these patients could be shifted to the primary sector or other care settings.

Distribution of FAM patients by hospital

Based on the geography and population distribution in Region Midtjylland, it is probably not a reasonable assumption that this FAM patient population will be evenly distributed amongst the five FAM.



One strategy for estimating how the future FAM patient population would be distributed among the Region's FAM, would be to divide the total population of FAM patients according to the projected befolkningsgrundlag as shown in the above slide. This would give the following annual patient volumes for the five FAM:

Århus: (277,400 x 366) / 1358 = 74,763 (minus patients admitted directly to inpatient or seen in VL)

Randers: (277,400 x 232) / 1358 = 47,391 (minus patients admitted directly to inpatient or seen in VL)

Horsens: (277,400 x 183) / 1358 = 37,382 (minus patients admitted directly to inpatient or seen in VL)

Viborg: (277,400 x 228) / 1358 = 46,574 (minus patients admitted directly to inpatient or seen in VL)

Herning: 277,400 x 299) / 1358 = 61,077 (minus patients admitted directly to inpatient or seen in VL)

The problem with this methodology for estimating the future FAM patient volume is that it doesn't take into account the fact that Århus is a regional specialty center serving a broader

geographic area for certain types of patients and therefore will receive a somewhat larger proportion of these patients than the basic geographic uptake area would reflect.

In order to more accurately estimate the local FAM patient population at each of the five FAM hospitals, we need to get the number of skadestue patients seen at each facility during 2006 as well as the number of akut indlæggelser at each akutmodtagende hospital in 2006.

Estimating number of FAM beds and staffing levels

Based on a projection of the total annual patient population, one can estimate the optimal number of beds for the FAM and numbers of nurses needed to care for patients, using various quantitative models [3, 4]. Unfortunately we were not able to obtain the additional necessary data to carry out these analyses such as average length of stay in the department or numbers of new patients arriving per hour.

Other proposed analyses that could not be carried out

The other analyses that we proposed, but could not complete due to insufficient data included looking at 72 hour returns to the overall emergency care system (unable to cross reference data between primary sector, ambulance sector and hospital sector), potential delays in diagnosis and treatment for time-critical diagnoses.

Our overall conclusion is that while there is an enormous amount of healthcare data gathered in Denmark, it has proven difficult to gather sufficient data to form a clear, quantitative representation of the overall flow of patients through all of the sectors that comprise the emergency care system and to be able to perform analyses for calculating basic quality improvement metrics and carrying out administrative planning functions such as determining bed and staffing numbers. Furthermore, there appears to be significant mistrust on the part of our Danish project partners in the accuracy of many of the data elements that we reviewed. Efforts to establish healthcare data integrity standards would be a useful step towards building a more data-driven system.

C. SUGGESTIONS FOR FUTURE DATA GATHERING

Regional integrated database for all emergency patient encounters

In order for the Regions to carry out more data-driven planning and have a clearer understanding of the quality of emergency care, we would recommend that data on emergency patient encounters be gathered and maintained in a centralized regional data registry. While we recognize that the Danish "register tilsynslov" may place restrictions on such a registration, we would encourage that the issue be debated to weigh the pros and cons of developing this capability.

If specific standardized emergency patient encounter data were collected and tracked in a central database (regardless of where in the emergency care system the patient presents) it could be used for several purposes:

- Measures of quality of care provided, such as 72 hours return visits

- Follow "patient forløb" to better understand the quality of care for the individual patient across sectoral boundaries rather than understand the quality of the care delivered within the individual sectors
- To establish whether the model including the triage system currently employed is effective with regards to time sensitive diagnosis, delay of care, appropriateness of care etc.

Suggested Emergency Patient Encounter Basic Data Set

Each patient encounter with the emergency system should be defined by the following data points:

1. Date of encounter start
2. Time of encounter start
3. Patient CPR number
4. Unit / department where patient encounter occurred
    a. ambulance system
    b. egen læge
    c. vagtlæge telefonkonsultation
    d. vagtlæge konsultation
    e. vagtlæge mobile
    f. fælles akut modtagelse
    g. Skadestuen
    h. akut modtagelse / visitations afsnit
    i. hospital inpatient department
5. Date of encounter finish
6. Time of encounter finish

The following descriptive indicators would be useful to understand patient movement between sectors and departments:

1. Referral source (henvisningsmåde)
    a. self-referral
    b. 112
    c. vagtlæge mobile
    d. vagtlæge telefonvisitation
    e. vagtlæge konsultation
    f. egen læge
    g. speciallæge referral

h. within hospital system (internal transfer)

2. Mode of arrival
    a. Ambulance
        i. kørsel 1
        ii. kørsel 2
    b. walk in - private transportation
    c. internal transfer within hospital
3. Initial or presenting signs, symptoms or diagnosis (sometimes patients present with the diagnosis already known, though rarely)
    a. primary (chief) complaint
    b. secondary complaint(s)
4. Initial triage score or patient condition on arrival (ideally using standardized triage scale)
5. Discharge diagnosis (using standardized ICD-10 codes for either complaints (i.e. abdominal pain) when the actual diagnosis is not known, or a firm diagnosis (i.e. pancreatitis) when this is known)
    a. primary discharge diagnosis
    b. secondary discharge diagnosis(es)
6. Disposition
    a. patient discharged to home
    b. patient transferred to FAM for further evaluation / management
    c. admit to inpatient acute care hospital
    d. transfer to other acute care hospital (higher or more specialized level of care)
    e. patient left without being seen (LWBS)
    f. patient left against medical advice (LAMA)
    g. patient died

Assessment

Strengths, Limitations, Opportunities and Threats

General Analysis

ASSESSMENT

In the assessment section, we first present a high level overview of the strengths, limitations, opportunities and threats (SLOT analysis) that were noted by the members of the HMFP team, listing individual points in each category, followed by a brief description. Following this, we present a more detailed discussion of major issues from the SLOT analysis in the general analysis section.

I. Strengths, Limitations, Opportunities and Threats (SLOT)

Strengths:

1. Universal Health Insurance Coverage

   One of the fundamental principles underlying the Danish healthcare system is universal health insurance coverage that is funded through public taxation. This insures that everyone in the country can afford emergency medical care should they have a need for it.

2. Limited malpractice liability

   Medical malpractice liability is considerably less in Denmark than in the U.S. and physician malpractice lawsuits are relatively infrequent, although several individuals told us that this is increasing. This is in part due to differences in the medico-legal culture and in part due to the fact that physicians are employed by the government. As a result, physicians are able to practice medicine according to their best professional judgment without fear of excessive scrutiny or worry about missed, inaccurate or delayed diagnoses and treatment. This limited scrutiny can however be a potential limitation with regard to insuring quality of care. *See section on limitations.*

3. The Primary Care System

   The primary care system is the cornerstone of the overall Danish health care system, and is viewed as by the majority of individuals we spoke to as being a major strength within the emergency care system. The primary care sector operates the "vagtlæge" system of on-call general practitioners that anyone can call and get advice from during off-hours, weekends and holidays. They also operate a network of urgent care clinics staffed by general practitioners that can see and evaluate patients referred by the vagtlæge telephone triage system.

   The GPs are well liked by patients and seem to be very well positioned to be a part of any changes that will be made. This system must be kept largely intact and supported. The aging GP workforce and increasing workload creates the potential threat that more GP's may choose early retirement instead of continuing in a work environment that many described as becoming increasingly stressful and

undesirable. Providing additional support to the primary care system in terms of added nursing and support personnel in the vagtlæge konsultations, and improved informatics tools may improve the GP work situation. There are areas that we see for potential improvement with respect to how acute patients coming to the hospital are triaged to either the vagtlæge or the FAM. The vagtlæge is paid on a fee for service basis, and is thus motivated to see as many patients as possible. The role of the primary care physician should be maintained and supported in the Danish healthcare system.

4. Physician Staffed Advanced Prehospital Care

The physician-staffed advance prehospital care (mobile intensive care unit - MICU) system is impressive in terms of the high level of expertise and scope of care able to be provided by senior anesthesiologists outside the hospital. This system is highly regarded by everyone we spoke to and will play an increasingly important role in the future emergency care system, which will be characterized by larger, but fewer hospitals able to receive acute patients. Under this new model, the MICU system will assume a greater responsibility for responding to patients in need of urgent intervention by a physician in parts of the region with greater distance to the nearest FAM hospital.

5. Hospital-Based Inpatient Specialty Care

Each of the hospital-based inpatient specialty components of the Emergency care system appears to function very well for patients with clearly defined problems. Patients taken to the cardiology service, for example for treatment of STEMI, appear to receive excellent care. Traditional medical, surgical and pediatric specialists function at a high level and provide high-quality care in Denmark. This observation is based on the reputation and research productivity of specialists in the country and supported by our interactions and discussions with specialty care providers in Denmark; however we had not access to specific patient care outcome data to further support this observation.

6. Hospital Facility Space

Availability of facility space does not appear to be a limitation to the provision of quality care in emergency departments, intensive care units and other inpatient departments in Danish hospitals. In fact, many of the emergency patient care areas we visited are twice the size of equivalent space in the US. This is particularly true of emergency department resuscitation areas where stretchers are narrow but the floor space is enormous. New hospitals are being built with generously dimensioned hallways and rooms that would accommodate two patients – rather than only one – in the US. How this new construction, utilities and maintenance costs of healthcare facilities are financed is of interest but beyond the purpose of our mission. There appears to be an opportunity for cost-savings here although the government and health care administrators we spoke with do not seem to think that facilities costs are an issue of concern.

7. Healthcare data gathering and analysis at the hospital level

   A number of the individual hospitals that we visited in Region Midtjylland demonstrated sophisticated electronic data gathering and analytic capabilities used by hospital leadership for tracking compliance with mandated performance indicators, quality improvement and planning purposes. These capabilities for data gathering and analysis at the individual hospital level appeared to far exceed the equivalent capabilities at the Regional level.

8. Healthcare quality standards at hospital level

   The Danish Quality Model developed by IKAS is an impressive framework for the development of healthcare quality standards at the hospital level. Standards and indicators are being established for general aspects of patient care, disease specific standards and organizational standards, all built up using a systematic structure that details specific guidelines, implementation and application of guidelines, strategy for quality monitoring and quality improvement. The Danish Quality Model is not yet complete, and the current version focuses primarily on inpatient care, with only very limited focus on emergency care. Subsequent versions of the Danish Quality Model will need to expand the scope and detail of standards for emergency care delivery, both for care provided through the faelles akutmodtagelse, but also develop interlocking standards for the other elements of the emergency care system (prehospital ambulance system and vagtlaege system). See below under Limitations.

Limitations:

1. Limited malpractice liability

   The limited medical malpractice liability is both a strength and a potential weakness in the Danish healthcare system. While physicians, other medical professionals and healthcare institutions do not welcome increased scrutiny of the patient care they provide, medical legal liability can be a powerful incentive for avoiding missed, inaccurate or delayed diagnoses and treatments. While increased medical legal liability can increase healthcare costs resulting from increased diagnostic testing and therapeutic interventions, it can also spur the development of system changes to reduce opportunities for error and improve efficiencies in healthcare delivery.

2. Alarm / Dispatch Accuracy

   Due to problems with inaccurate dispatch of advanced prehospital units by the 112 alarmcentral, a large majority of the patients the laegebil is sent to, turn out not to require immediate intervention by a physician (as measured by the NACA score). Given the limited number of senior anesthesiologists in the system and the significant value they could add by providing patient care and supervision of junior

doctors in the future FAM units, we would question the value of putting additional MICU units into service for the purpose of responding to patients who don't require urgent intervention from a physician and who could either be appropriately managed in the prehospital setting by other providers (paramedics, nurses, general practitioners) or be transported to the nearest FAM hospital for evaluation and management.

3. Ambiguity in access to emergency care

   Ambiguity exists in terms of points of entry for emergency patients entering the system; whereby patients have to decide themselves whether to enter through the 112 route or the primary care route, and the evaluation algorithms appear to be very different in each of these pathways. Although we were repeatedly told that this was not a problem, it is hard for us to believe this, especially inasmuch as there were little or no data to prove this assertion and many anecdotal accounts of patients inappropriately accessing both of these routes. Even in the best situations, with the best doctors, there will be "missed" triage by 112, the GP or the patient; for example, a "kidney stone" patient who ends up having an abdominal aortic aneurysm. As one nurse put it, "there are too many doors."

   Access via the primary care route varies depending on the time of the day and many anecdotal accounts suggest that accessibility to ones own primary care physician during regular working hours is more difficult that accessing the vagtlæge during off hours.

4. Transitions of care between sectors

   While the specialty care provided to in-patients is high quality, the patient access to quality emergency care in the pre-hospital arena and upon presentation to the ED is fragmented and lacking in administrative oversight and design. Simply stated, the "hand-off" between the pre-hospital and in-patient providers is poorly structured. Several people we interacted with acknowledged that there is a decrease in level of care between 112 lægeambulance and the level of care that is available in the akutmodtagelse where these patients are delivered to at the hospital (see above problem with junior physician and medical student staffing of emergency care areas). Many hours can go by from the time a patient is dropped off by the ambulance læge until the time they are seen by a senior physician in the hospital, except in cases where there are clear diagnoses and the patient goes directly to an inpatient service that has on-call staffing by senior physicians (Cardiology, Obstetrics/Gynecology, etc.)

5. Insufficient System-Wide Quality Standards for Emergency Care

   We noted that there is a widespread public commitment to improving healthcare quality in general in Denmark and a number of powerful, well-conceived programs such as the Danish Quality Model and the National Indicator Project, that are increasing the development of standards, patient care guidelines based on standards, indicators for measuring compliance and outcomes, and monitoring

strategies for tracking indicators. While these efforts are impressive, however, we were told by many individuals and also noted in our own review that emergency care delivery has received limited, if any attention by these national initiatives. The DQM standards that do relate to emergency care delivery only appear to target the hospital based emergency care system and not the prehospital or primary care elements of emergency care delivery. Establishing comprehensive standards for emergency care based on a "one system" view would be a powerful tool for driving the development of a more integrated emergency care delivery system.

6. Data gathering and analysis at regional level

   At the regional level there does not appear to be a hard-core data-driven culture of tracking process measures or measuring clinical outcomes related to emergency care. Many individuals we spoke to refer to past studies and reports showing good quality care in particular clinical areas. There did not appear to be any capability at the regional level for routine tracking of clinical performance or quality indicators across emergency care sector lines.

   There is also a registry for adverse events, but several individuals stated that reporting of cases with adverse events was voluntary, and suspected that there is significant under-reporting of cases with adverse events. We did hear a number of anecdotal cases involving significant adverse patient outcomes that revealed significant systems problems, which in most cases appeared due to lack of standardized patient management guidelines.

   We did observe a strong data-driven approach to management at some of the individual hospitals we visited. But in general, there were surprisingly few sites we visited where senior clinical leaders tracked quality indicators related to emergency care such as negative laparotomy rate for appendicitis, transfer within 24 hours from the floor to the ICU, mis- or delayed diagnosis rates, rate of patients returning to emergency care system within 72 hours with admission on second visit, etc.

7. Multiple Entry Points to Hospital Based Emergency Care

   When patients are referred into the hospital based emergency care system there are numerous entry points via different units and departments (skadestuen, AMA, KVA, multiple inpatient departments). The number and type of these entry points varies by hospital and region. The one thing that all seem to have in common is that the initial physician responsible for managing emergency patients arriving to the hospital based emergency care system is typically a junior physician or medical student, who has little experience or direct supervision by senior physicians, unless the patient is clearly hemodynamically unstable or has an obvious problem requiring immediate specialty intervention (multi-trauma, STEMI, etc.).

8. Hospital based emergency care provided by unsupervised junior physicians and students

   In part because of shortages, but mainly as a traditional element of training, most initial emergency care within the hospital is provided by the most junior physicians

and students, who are not capable of delivering quality care. Although they have telephone back-up by senior physicians, we heard that there is clearly discomfort or resistance toward calling the senior attending physician with questions during off hour. Furthermore, there is no substitute for hands-on, in-person care provided by senior physicians. Also, junior physicians tend to be overly focused on the obvious – the wrist fracture when the bigger issue is why did the patient fall in the first place. Medical students were observed functioning as the sole personnel providing emergency care for patients, both at university hospitals such as Aalborg and regional hospitals such as Holstebro. Placing a medical student in a role for which he was not properly prepared reveals a significant weakness in the system.

A number of nurses that we spoke to noted difficulties with getting physicians to come to akutmodtagelse to evaluate and manage patients, as well as uncertainties about which physicians were responsible for the care of which patients in the akutmodtagelse.

9. Personnel shortages

A major weakness that we noted is the personnel shortages the Danish medical system is currently facing. Nurses are in short supply. Doctors of all types are in short supply although this seemed to be less true in the Northern region for anesthesiologists.

Many expressed the view that the problem of too few physicians is a result of overly aggressive measures to deal with the previous over supply of physicians several decades ago. Other individuals expressed the view that there are similar numbers of physicians on a per capita basis in Denmark as in other countries of a similar socio-economic level, but that physicians in Denmark are less productive for a variety of reasons (37 hour work week limits, many low value-added duties, etc.). Regardless of the true underlying cause, this shortage is projected to become worse over the next 5-10 years. Also, an increasing number of Danish medical students are female, which we were told will likely cut into their actual professional "life-span" because of life style choices. All these factors will impact any solutions to the current problem.

Current strategies for staffing the future FAM call for a significant increase in the use of senior physician specialist time at a point where their availability is limited and they have increasing competing demands on their time to reduce waiting times for elective surgeries and other specialty care.

Staffing the future FAM primarily with an emergency physician specifically trained to manage the scope of patient care provided in the FAM would allow other specialists to perform the functions for which they are trained and provide optimal added value in a system that is struggling to meet patient demands.

10. Resource Allocation for Operational Costs vs. Capital Costs

We were impressed with the scope of planned new hospital construction and hospital renovation projects in conjunction with the development of the emergency care system.

However, at the same time we heard concerns expressed by many hospital administrators, department heads and others that they face challenges in meeting productivity quotas, and that the availability of personnel time (physician, nursing, etc.) is one of the main factors limiting increased productivity, but that there is only limited funding to pay staff for hours worked above the 37.5 hour per week maximum. Hospital administrators at hospitals located in rural areas with physician staff vacancies reported that they were unable to offer adequate financial incentives to attract Danish physicians to work in these areas and instead are choosing to hire physicians from developing countries to fill open positions.

11. Hospital emergency care facility configurations

While hospital emergency care facilities that we visited appeared in general to be quite spacious by U.S. standards, most appeared to be organized and equipped to care for the particular types of emergency patients that tended to be seen in each facility. For example, the majority of the rooms in the skadestuer were set up to manage patients with minor injuries, with an additional one or more rooms for receiving patients with major trauma or complex medical issues. Akut modtage afsnit (AMA) units were typically organized and equipped in a similar fashion to medical inpatient wards where patients receive on-going evaluation and care during multi-day admissions. While these configurations are completely appropriate for the way emergency care delivery was organized in the past, they will not meet the patient management needs under the future organizational model of care in the FAM. This will require facilities with multi-functional patient rooms to accommodate the wide variety of patient types that will be cared for. These should ideally be segregated by acuity instead of by physician specialty, as the patient management requirements in the initial phases of emergency care are more similar among patients of similar acuity, than among patients with similar specialty problems but differing acuity.

12. Changes in post-graduate specialty training

Another issue with important ramifications for emergency care delivery is that Danish authorities in charge of post graduate medical education are pushing for earlier specialization and more narrow training for physician specialists. For example, general internal medicine is being phased out as a specialty and in the future there will be only medical subspecialty training without the prior “common trunk” of general internal medicine training. One consequence of eliminating general internal medicine as a hospital based specialty is that the hospital based physician workforce in the future will become increasingly narrow in their knowledge and skill set, as physicians narrow their specialty focus. This presents a problem of who will take responsibility for sorting out the significant number of patients who are referred to the hospital system with unclear diagnoses or multiple problems that cross traditional specialty lines. General practitioners functioning outside the hospital system cannot be counted on to carry out this role, as the process of sorting these patients requires the physicians presence in the hospital environment where diagnostic evaluations can be rapidly undertaken and therapeutic interventions initiated to stabilize patients with significant

hemodynamic disturbances. Expecting that large teams of multiple senior physicians from multiple specialties will be on hand at all times and that they will work smoothly together to manage large numbers of patients in the FAM does not seem to be a realistic possibility for a variety of reasons.

Opportunities:

1. Increase coordination between prehospital emergency care sector activities

   Because the heathcare system is a single payer model, managed by the Regional government, it is possible to increase coordination of emergency care activities across emergency care sector lines. This will make it easier to insure that all patients receive appropriate care and that resources are used as intended. For example, the AMK, alarmcentral and vagtlaege visitation systems could be closely integrated through the use of integrated guidelines and patient care pathways. The 112 ambulance system and the mobile vagtlæge system could coordinate their activities with a coordinated dispatch system, common electronic patient medical record system as well as communication systems for consultation and backup in the field.

2. Merge multiple hospital entry points for acute, undifferentiated patients

   Given the current ambiguity and duplicative staffing and structures, there are potentially significant benefits that will be realized in terms of efficiency and quality of care as well as cost savings by merging the multiple "akutmodtagelser" into a single "fælles akutmodtagelse" at each designated hospital.

   Care needs to be taken to do this in a way that is medically and politically acceptable to the multiple stakeholders in the current, highly distributed system. The concept of the fælles akutmodtagelse (FAM) serving as a single portal of entry to the hospital for a majority of emergency patient categories is an important step in the direction of simplifying access to emergency care for patients.

3. Increase coordination between the FAM and vagtlaege konsultation

   Given the current and likely ongoing overlap in patient populations seen by the vagtlæge konsultation and the fælles akutmodtagelse there are clear logistical and operational benefits for both entities and the emergency patient population that they serve, if they coordinate their efforts and share resources.

   By locating the vagtlaege konsultation adjacent to the future FAM, the patient rooms used by the vagtlaege could be supported by FAM personnel including housekeeping functions, stocking of supplies and resources. FAM nursing and support personnel could assist with patient registration, nursing care functions, obtaining EKG and laboratory testing. All of these measures would improve the productivity of the vagtlaege, quality of care and patient satisfaction.

4. Common triage point for all acute patients arriving at the hospital

   At the risk of stating the obvious, hospital-based emergency care would be improved by the common triage of ALL acute patients by a skilled nurse using standardized algorithms, in order to insure that the appropriate patients are seen in the FAM and vagtlæge konsultation. This will increase patient safety, quality of care and productivity for both the FAM and vagtlæge konsultation.

   The coordination of care between skadestuen, modtagelse and primary care physician is imperative and can be achieved given the political will and leadership.

5. Extend access to the Vagtlæge System

   By extending the hours of coverage of the vagtlæge system from the current 16 hours per day to 24 hours per day, access to the system would become uniform and standardized regardless of the time of day. In addition to improving patient access to emergency care, this would also decrease interruptions to general practitioners during their regularly scheduled office hours and potentially allow them to increase their own productivity, by not having to deal with sorting out potentially time-consuming patient emergencies in the middle of their work day.

6. Emergency physician and nurse roles for primary staffing of the future FAM

   By having an emergency physician ("akutlæge") manage the FAM, surgeons, orthopedists, anesthesiologists, internists and other specialists will be used less at night, making these specialists more efficient during the day. This will likely decrease waiting times for elective work, which aligns with the government's new law to decrease waiting times for elective specialty care from 8 to 4 weeks. Additionally, this would maximally use the skills of these specialists where they are best needed, which would help to some extent with the shortage of physicians in Denmark.

   Having a single type of doctor in the FAM, should reduce variability and therefore costs. The opportunity to develop evidence- based guidelines for algorithmic care would be an important part of this development process. In general, this kind of standardized care produces better outcomes at less cost. The expectation that an anesthesiologist, internist, general surgeon and orthopedic surgeon will combine efforts to care for the sickest surgical and medical patients is wasteful and unnecessary.

   As with physicians, the knowledge base and skill set of nurses varies considerably at the present time depending on the department the nurse works in (skadestuen, AMA, inpatient departments, intensive care units, etc.). As with physicians, variability in care and costs should be reduced by having a single type of nurse working in the FAM with a standardized knowledge base and skill set that matches the clinical work being carried out in the FAM.

7. Target female physicians for future emergency care roles

   In the U.S. emergency medicine specialty training tends to appeal to women

physicians since its shift work is more flexible to doctors who wish to have and spend time with family. Many women emergency physicians like to work during evenings or at night, (when their children are very young) or days (when the children are in school). To the extent that women make up 75% of Danish medical school classes, this could help, to some extent, ease the shortage in physician hours that might otherwise occur if these women were to work in more traditional specialties.

8. Educational programs for training emergency physicians and emergency nurses

   By establishing a standardized body of knowledge and skills that define the practice of emergency medicine for physicians and nurses, and developing training programs to teach that body of knowledge and skill, it will be possible to develop over time an emergency physician and nursing workforce with a uniform knowledge base and skill set. This is an important requirement for building a system that delivers uniformly high quality emergency care across the region.

   Establishing a fagområde in akutmedicin will be an important step forward towards legitimizing this new area of clinical practice in the minds of physicians considering this area as a future career choice.

9. Advanced Nursing Practice

   Expansion of the role of nurses to become mid-level providers (behandlersygeplejersker) in the care of patients presenting to the ED is a great opportunity at a time when specialty physicians are in increasing demand. Mid-level providers can handle much of the back-log that Lægevagten currently experiences. Nurse practitioners can competently and efficiently manage many of the simpler primary-care problems as is currently the case in the US. Danish nurses seem eager to contribute to improving and stream-lining the provision of care to non-acute patients. They also seem to welcome the opportunity to seek further training in the triage of acute as well non-acute patients.

10. Quality standards & evidence based guidelines

    By establishing regional standards for emergency care as well as evidence based guidelines that apply across the entire spectrum of emergency care delivery, it will be possible to develop a conceptual framework that everyone care refer to, which describes in concrete terms a) what “high quality” emergency care means, and b) how it is delivered.

11. Informatics tools to improve emergency care safety, quality and productivity

    Implementing electronic patient data management and medical decision support tools that facilitate access to electronic medical records, and new diagnostic data can improve productivity by decreasing the time spent searching for patient information, and improve safety and quality by automatically flagging abnormal lab values, allergies to medications, and other potential opportunities for error.

12. Begin to measure processes and outcomes better and more accurately

    Once a conceptual framework of quality standards and evidence based guidelines have been established to define what high quality emergency care means and how it should be delivered, a regional level system of emergency care data gathering and analysis can be developed to measure compliance with these. This will provide opportunities for more sophisticated and powerful strategies for system management, quality improvement and future planning.

    If a new system of providing emergency care is developed, this will be an exciting opportunity to study the impact of the changes that are made. Establishing a research framework now will provide an opportunity to gather baseline data against which to measure future changes.

Threats:

1. "What is the problem?"

    One of the biggest threats to this entire process of transforming the emergency care system is that the majority of mid-career and senior physicians don't seem to think that there are problems with the current system and if there are, they are small and of little consequence.

    Most seem quite content with the current system for delivering emergency care and do not wish to see the status quo change. Many of the senior physician leaders at the departmental level that we met with are openly opposed to the proposed consolidation of the various akutmodtagelse units currently based in their own departments.

    The majority of the non-medical professionals we spoke with felt that the current emergency care system works well; none reported an extremely bad experience with the emergency care system either for themselves or their family members, although long waiting times to be seen in the vagtlæge konsultation were reported by several individuals.

2. Resistance to a new akutlæge role among other specialists

    Most doctors (and all the nurses) think that there is room for this new "akutlæge" figure, however, most of the doctors we interacted with seemed very skeptical that anyone other than themselves would be able to manage the initial evaluation and management of emergency patients that they currently manage. For example, the cardiologists felt that, in general, they should still manage all patients with chest pain; general surgeons should still manage patients with abdominal pain; anesthesiologists feel they should manage all of the airways and hemodynamically unstable patients. While the vast majority of the specialist physicians we spoke to only wanted to be involved with the care of "their own specialty patients," there was no attention as to how to get these patients sorted to the correct specialist from the point of hospital entry.

The concept of an emergency physician who has the knowledge and skill to effectively manage the initial course of all types of emergency patients seems to be foreign to many specialty physicians in Denmark

3. Dominance of emergency care by other specialties

   In Region Nordjylland, the Anesthesia sector is in charge of all of the Regions emergency departments and in Region Midtjylland, the majority of the emergency departments are under the administrative control of Orthopedic Surgery

   In order for a strong emergency physician group to take hold and develop in the future, they will need to be free from dominance by other specialty organizations which have their own clinical and professional agendas. This is something that these other specialties are most likely to resist. Right now, managing the skadestuen gives them funding, staff positions and power and they certainly cannot be counted on to give this up easily.

4. Lack of interest among mid-career and senior physicians in emergency care as a career choice

   Based on the multiple interviews and conversations, most mid-career and senior physician specialists related little interest in emergency care duties (especially during off-hours, weekends and holidays), and that few would be interested in switching from their current specialty areas of practice to emergency care delivery. Many seem to feel that working in the akutmodtagelse and taking overnight call are "low status" activities that they had to do during their "turnus" and do not feel they should have to do as senior physicians. Others seem uncertain about switching from established, recognized areas of clinical medicine where the pathways for career advancement are clearly known, to an area where these are largely unknown.

   In order to convince adequate numbers of competent senior doctors to work in the Regions' future FAM, they will need to be persuaded that this is a desirable career choice, and not merely something that they are being required to do.

   "Will I be a respected member of the specialty that I originally trained in? Will I have to work under a different specialty than the one that I originally trained in (such as Anaesthesia)? Will I be a part of a new specialty? Will my services be financially remunerated and professionally respected? These issues, ideally, will need to be discussed and plans made out in the open, from the beginning.

5. Too Broad Scope of the FAM clinical model

   The scope of care provided in the FAM needs to be broad enough to accomplish the goal of serving as the primary portal of entry to the hospital for the majority of acute, undifferentiated patients and managing the initial evaluation, diagnosis and treatment of these patients. With adequate additional resources, the FAM can also be used to observe and provide extended management of selected patient groups beyond their initial phase of diagnostic evaluation, stabilization and treatment.

   However, it will be a significant challenge for the emergency physician group to

manage and run the FAM if the scope of care becomes too broad and incorporates aspects of patient care that fall completely outside the scope of practice of the emergency physician, such as major surgical procedures, interventional radiology, etc. It is important for the emergency physician group to be experts in the patient care that is provided in the FAM and to develop a sense of ownership of the emergency department and the care provided there, in order for them to provide effective leadership and management of this potentially chaotic environment.

The processes and work culture associated with safe and effective extended management of admitted patients with established diagnoses on an inpatient department are in many ways different from those associated with safe and effective initial management of undifferentiated patients in the emergency department or FAM. While it is desirable from an efficiency standpoint to observe and provide extended management of patients in the FAM, the longer patients remain in the FAM the more signouts and handoffs of patients between providers will occur. Many studies have shown that these transitions of care between providers increase opportunities for errors in communication and patient management. The optimal length of extended stay in the FAM that balances these competing goals of efficiency and safety is unknown; however our experience suggests that patient stays in the emergency department beyond 24 hours are associated with an increase in management errors associated with longitudinal care needs, as well as a decrease in patient satisfaction.

6. Aging Population

The population in both Region Nordjylland and Region Midtjylland is aging and projected to continue this trend beyond the next decade. As the population ages, individuals will be living longer with more chronic diseases and more exacerbations of those chronic diseases. This will translate into a higher utilization of both primary care services as well as emergency services in the hospital sector. Planning efforts for the emergency services sectors need to factor in this likely rise in utilization due to the aging population.

7. General Practitioner Workforce

Many GPs are approaching retirement age and it is projected that 20% - 30% of current practicing GPs will retire over the next 5-10 years. At the same time, the number of new GPs expected to enter general practice is projected to fall short of the number necessary to meet future needs by a significant margin.

As a result of this shortfall in the number of GPs, there will be a significant number of patients with no primary care physician in the next 5 – 10 years, who will likely turn to the vagtlaege system for primary care services. Unless steps are taken to address this issue proactively, it could result in the vagtlaege system being overwhelmed and collapsing. The future FAM should be organized and staffed in a way that will allow it to support and backup the vagtlaege konsultationer.

8. Inaccurate assumptions about the future FAM patient volume & case mix

   The Regional plans for developing the new emergency care delivery system are based on an assumption that a significant percentage of existing skadestue patient volume will, in the future, be able to be shifted to the primary sector. This would result in a relatively lower patient volume and relatively higher acuity case mix in the FAM than is currently seen in the hospital-based emergency care system. Because of the likely future shortfall in numbers of GPs and significant numbers of patients with no primary care physician, there will likely not be the capacity in the primary care sector to absorb additional patients from the hospital sector. In fact the opposite will likely be true; that the vagtlaege system and the hospital sector (FAM) will have to absorb additional patients not covered by the primary sector. This will result in a relatively higher patient volume with more diverse case mix and acuity in the FAM than is currently seen in the hospital emergency sector.

   This will have significant implications, both for how the future FAM is organized and staffed, and even more importantly, for how the future akutlaeger and nurses who will work in the FAM, are educated and trained.

9. Fagområde vs. specialty in emergency medicine

   While it is likely that establishing a fagområde in akutmedicin will make this area of clinical practice more appealing to mid-career and senior physicians who already have completed specialty training in other areas, it is less clear that young physicians and medical students will, in the long term, find it appealing to first complete specialty training in one specialty that they will not end up working in so that they can go on to complete additional training in akutmedicin, the area that they want to work in.

   This approach would also effectively reduce the number of specialist physicians produced in other disciplines for every emergency physician produced because each emergency physician would use a specialty training position in another discipline before completing emergency medicine training.

   Establishing a primary specialty in emergency medicine at some point in the future with its own specialty training programs would alleviate this problem and result in numerous other professional and academic benefits, thereby enhancing the desirability and professionalism of this area of clinical medicine.

Assessment

Strengths, Limitations, Opportunities and Threats

General Analysis

II. General Analysis

In its 2007 report, "Styrket Akutberedskab", Sundhedsstyrelsen uses the expression "øvelse gør mester" ("practice makes perfect") to describe its view that healthcare quality is fundamentally dependent upon insuring that individual healthcare providers routinely manage a sufficient volume of sufficiently diverse patients in order to acquire and maintain their knowledge, skills and experience.

> *"Et væsentligt formål i den nye Sundhedslov er at højne kvaliteten i sundhedsvæsenet. Dette bringer blandt mange initiativer specialeplanlægningen i fokus. En grundlæggende tanke heri er, at "øvelse gør mester", dvs. sammenhæng mellem volumen, erfaring og kvalitet. I vurderingen af kvalitet indgår forekomst, kompleksitet og ressourceforbrug".*[10]

While we agree that there is an important relationship between healthcare quality and the experience of healthcare providers, we disagree with the notion that "practice can make perfect" in the absence of an organized emergency care system that supports high quality care. Having competent, well-trained physicians and nurses, who manage large numbers of high acuity patients, is necessary but not sufficient. Excellent emergency care also depends on having a system that places an equal or greater responsibility for insuring quality on healthcare system planners and managers. These individuals must design and manage an emergency care delivery system that facilitates the delivery of care with the desired level of quality. The planning concept of "practice makes perfect" places a disproportionate burden of responsibility for quality on the shoulders of healthcare providers.

We believe that providing uniformly excellent care across the region(s) is a complex process that will require some fundamental changes in the culture and practice across the whole system. Improving quality of care is not simply a question of clinician training, a component of obvious importance. However it is equally, if not more important to create an integrated framework that facilitates the delivery of emergency care regardless of when or where the patient accesses the system. Emergency clinicians must understand a clear set of standards and guidelines that define their roles and responsibilities. Lastly a reliable, efficient and robust system of quality monitoring is critical to insure ongoing compliance with these standards and identification of further areas for improvement and efficiencies.

The elements of a robust integrated system include:

- Model of care delivery (integrates all three sectors; process oriented definitions for patients flow through the system based on their condition and acuity; what should happen at different steps; goal is to limit preventable variations in care)

- System of interlocking standards and guidelines (includes all sectors; specify how that care should ideally be delivered, with defined standards)

- Measurable indicators for healthcare quality (process measures, outcome measures, based on above guidelines)

- Mechanisms for efficient data gathering (insure data integrity; reduce administrative burden; i.e. electronic, automated, whenever possible)

- Data analysis and process improvement (feedback loop for continuously refining the model of care delivery)

In the following assessment section, we have identified five central themes that emerged in the course of our evaluations and discuss them in detail.

A. WORKFORCE, SCOPE OF PRACTICE, COMPETENCIES, EDUCATION AND CERTIFICATION

Initial evaluation and management of emergency patients in the hospital sector is now carried out by unsupervised junior physician trainees with limited experience and limited supervision by senior physicians. Sundhedsstyrelsen has recommended that all emergency care be provided by specialist physicians in the future. We believe that junior physicians should remain involved with emergency care as in the past, which offers significant educational value, but that they should be directly supervised by senior physicians who are responsible in a clear and unambiguous way for patient care and the education of the junior physicians.

A study published in Ugeskrift for Læger in 2002 looking at the prehospital treatment of patients with acute exacerbations of chronic pulmonary disease showed that when a senior physician (ambulance læge) was involved in the initial management of these patients, a significantly lower percentage needed to be admitted to the hospital as a result of the emergency care provided by the senior physician. In the pre-intervention phase of the study, all patients with acute exacerbations of chronic pulmonary disease were brought to the skadestuen where their initial care is provided by junior physician trainees, who admitted significantly higher percentage of these patients. There was no difference in mortality between the before and after phases of the study. Having a senior physician involved with the initial care of all of these patients would presumably result in an even greater percentage being able to be safely discharged home [13].

Interviews with junior physicians, as well as reports from those involved in physician education support, reveal that most junior physicians believe their experience in the FAM is very valuable. However, they also said that they sometimes feel overwhelmed and unqualified due to insufficient real-time senior support.

"Den Kliniske Basisuddannelse" will replace the current "Turnus Ordning" (internship) and will consist of 12 months employment as "Reservelæge". The new training will consist of either 12 months hospital rotation or 6 months hospital rotation and 6 months rotation in a GP office. In order to ensure exposure to acute patient complaints of all types, the FAM would be an ideal location for a supervised 3-month course during the "Klinisk Basisuddannelse".

At this time there is no single group of specialist physicians with the scope of practice or competencies necessary for providing high quality emergency care under a consolidated emergency department model as it is proposed. We do not believe that the national Board of Health proposal for multi-specialty model of physician staffing for the future Fælles Akut Modtagelse (FAM) is compatible with the long-term goal of efficient, quality

emergency care delivery. Furthermore, it is also highly uncertain whether the Regions will be able to recruit sufficient physicians to staff under this model.

A key concern in this multi-specialty model is the issue of authority over patient care. An Emergency Medicine trained specialist is able to decide whether a specialist is needed and when. They can determine if the patient can be admitted safely to a floor service with reservelæger on call. Specialist availability for rapid consultation is still necessary; however, we believe that daytime operations will suffer from such an approach and we find it doubtful whether the Regions will be able to recruit a sufficient number of physicians to staff this model, though the evidence here is confusing. We have been told repeatedly by many individuals that there are shortages of physicians, yet the data from OECD and DADL suggests otherwise [14] If there is a shortage of physicians as "Stillings og vakancetællingen" from Sundhedsstyrelsens suggest [15], it would be expected that a multi-specialty staffing model for the FAM would increase the need, not decrease it, especially if the goal is to always have multiple specialists available in the FAM without delay to treat time sensitive problems like stroke, STEMI, etc.

There is a clear need to develop an emergency physician (and nurse) role to staff the future FAM primarily, so that other specialists can be involved selectively on an as needed basis, by protocol, etc. This is a more efficient strategy for staffing the FAM, a more efficient use of specialists' time and is consistent with worldwide trends in developed countries for emergency care delivery. Importantly, this is a significant departure from established culture and career pathways. This departure necessitates attracting and retaining talented and ambitious physicians and nurses who are willing to give up other more traditional opportunities and stake their future careers on a specialty that presently does not exist in Denmark. If the Regions are not able to attract talented individuals to run and develop this new system, there is a high likelihood that this experiment will fail. Therefore, if this plan is selected, there is an implicit need to make the position attractive, using not only financial incentives but academic ones. We believe that establishing a new specialty is important to attaining this goal.

The specific clinical roles and responsibilities, scope of practice, for the emergency physician and nurse need to be fully defined. At present there is great debate, often mentioned in our interviews by clinicians of many specialties about who should provide emergency care. We have been told it should be provided by Primary Care Physicians, as they believe they already provide the bulk of emergency care. We have been told it should be provided by anesthesia. We have also been told it should be provided by orthopedists, as they are also under the notion they are providing the majority of emergency care. Either way, there is currently much overlap and redundancy, creating an expensive and inefficient system. Developing a single scope of practice is essential. This is also true for other healthcare provider with roles in emergency care delivery (ambulance læge, vagtlæge, etc.). These definitions of provider scope of practice need to be integrated with one another, specifically with the goal of insuring that patients receive uniform emergency care.

The emergency medicine trained physician and nurse provide an efficient and effective strategy for staffing the FAM that is consistent with worldwide trends in developed countries. We recognize this is a significant departure from established culture and career pathways in the current Danish medical practice. This departure necessitates attracting and retaining talented and ambitious physicians and nurses who are willing to stake their future careers on a specialty that presently does not exist in Denmark. Emergency Medicine as a

unique specialty has been adopted by more than 40 countries that Denmark routinely compares itself to, including 9 European Union countries [16]. The ability of the Regions to attract talented and ambitious individuals to run and develop this new system is critical to the success of the new plan. There is an implicit need to make the position attractive, using both financial but also academic and professional incentive. We strongly believe that establishing a new specialty is crucial and should be a long-term goal of the changes proposed to the system. We have been told by both young doctors and those already practicing as specialists they would be interested in a career in emergency medicine if it were a recognized specialty. Developing emergency medicine as a specialty will promote higher standards for education, clinical practice and research. The plan of initially establishing a fagområde represents a strategic transition step to establishing a specialty in the longer term. Maintaining a long term requirement for future emergency physicians to complete training in two specialties (i.e. a primary specialty and emergency medicine) we feel is a waste of scarce post-graduate medical education resources. This strategy may also make emergency medicine less attractive as a career choice for some, as has been suggested to us by observers of the Lund experience.

Training programs need to be developed to provide the necessary knowledge, skills and medical decision making as well as administrative competencies for future emergency physicians and nurses. The initial participants in these training programs will necessarily be experienced individuals with prior specialty training who will eventually become leaders and instructors for future trainees. There will be a transitional period during which sufficient numbers of physicians and nurses receive training and certification in emergency medicine to fully staff the region's FAMs. As with other graduate medical programs, a robust system for certification, which verifies the knowledge and skills of graduating specialist physicians, will need to be developed and implemented to insure a uniform standard of knowledge and skill attainment. Such a certification process would typically involve written and oral examinations that trainees sit for following completion of the training program. Without a vigorous certification process, it will be difficult to establish and verify the standard knowledge base and skill set among the community of emergency care providers in the region and thus difficult to insure high quality of care. Establishment of a certification process will also improve acceptance by other medical specialties, as this establishes a minimum standard and lends credibility to the clinical practice.

B. OPERATIONAL INTEGRATION & COORDINATION

The current model of emergency care delivery is complex, and decentralized. Many provider groups from different sectors (primary sector, ambulance, hospital sector) and departments within sectors (for example in hospital sector: orthopedics, internal medicine, general surgery, cardiology, pediatrics, etc.) provide emergency care in a variety of settings.

In our observations, and in discussions with key stakeholders from these sectors, we were told that different provider groups from different sectors and departments within sectors (for example orthopedics, internal medicine, general surgery, cardiology, pediatrics, etc.) have overlapping scopes of practice, despite having very different knowledge and skill sets.

For example, we were told that the anesthesiologist-manned ambulance often is dispatched to patients that do not require intervention by a physician (NACA score 4-6) whereas the

mobile vagtlæge will on occasion be sent to patients that turn out to be unstable. While some degree of mis-triage is unavoidable, efforts to integrate the triage, dispatch and field operations of the ambulance system and the primary sector would likely reduce the mis-triage rate, improve care and efficiencies.

These overlapping scopes of practice mean that patients with moderately severe, vague or with multiple complaints or disease processes are managed in different settings by different providers with different skill sets. Examples include a diabetic ketoacidosis patient with abdominal pain and vomiting being seen by a surgeon, or a patient with an aortic aneurysm with back pain being triaged to an orthopedist. Management of care in this model can vary widely. These various sectors and provider groups operate largely independently of one another with limited integration or coordination of efforts to insure quality care. Access to emergency care via several paths (112 system, private sector emergency system/Vagtlæge) increases the potential for inconsistency. Implementation of system-wide quality standards, operational and clinical guidelines and quality monitoring activities will improve quality of care.

The development of a more unified, integrated emergency care delivery system will require strong, effective leadership to manage the resources required for change and transition. The Regions will need to put in place the necessary leadership with the responsibility, authority and resources (including supporting personnel) to carry out and oversee this transition.

The FAM concept proposed by Sundhedsstyrelsen is based on the notion of a single common entry point to the hospital for patients with emergencies, while other clearly defined patient groups bypass the FAM to go directly to inpatient services. Organizationally, the creation of the FAM involves the merger of the function of the many existing “akut modtage afsnit” plus the “skadestue” currently operated by various departments within the hospital system.

The HMFP team suggests that the Regions adopt a similar organizational and operational concept for the FAM, so that a similar scope of practice for the emergency physician and nurses can be developed and collaborative inter-Regional training programs for emergency clinicians can be developed. Failure to adopt similar approaches to FAM increases the possibility of failure because of incompatibility issues.

The clinical model of care in the future FAM needs to be clearly defined in terms of the other, interfacing clinical services (inpatient hospital, ambulatory hospital, prehospital ambulance, vagtlæge systems, and the general practitioners in daytime practice, etc.). There must be a system wide understanding of what types of patients and patient care activities will take place in the FAM and what takes place elsewhere.

In order for the FAM to delivery consistently high quality care, it needs to develop into a robust, smoothly functioning department with a clear mission. Many factors are required to carry out this mission. These include an efficient operational model, adequate resources and personnel, and cooperation from other hospital departments. The FAM will need to have strong leadership and internal administration to accomplish this (employ and manage its own staff – physicians and nurses; manage own budget, etc.). It is important to note that this implies budgetary changes and redistribution of resources. For example, some percentage of DRG-related reimbursement to inpatient hospital departments for patients admitted in the past for short diagnostic evaluations and courses of treatment might need to be re-directed to the FAM if the care of those patients is shifted to the FAM.

We heard many comments from physicians that they spend significant amounts of work time performing low-skill, low-value added activities. Some of these (starting peripheral intravenous lines, drawing routine blood samples, performing EKGs, transporting patients) can be done by nurses or other personnel. Others (basic administrative functions like scheduling, photocopying, cleaning and maintaining teaching equipment) can be done by secretaries or lower skilled assistants. Off loading these tasks from physicians allows them to spend more time on high-skill, high-value added tasks for which they were trained and thereby increase their productivity. This point is also made in two editorials in Ugeskriftet for Læger [2, 17].

The accessibility of the Vagtlæge system is by all indications uniformly good during its hours of operation, although the accessibility to the patient's own General Practitioner (GP) during routine office hours can be highly variable, according to anecdotal reports. Extending the system from 16 hours per day to 24 hours per day would result in uniformly good access to emergency care via the GP route and would likely lighten the burden on GPs during their office practice. The additional staffing of the daytime Vagtlæge telephone system could be alternatively staffed by GPs or specifically trained nurses who use algorithms developed by GPs.

C. STANDARDS & GUIDELINES

We did not encounter any system-wide standards for emergency care delivery that link the primary sector, ambulance sector and hospital sectors of the regional emergency care system. The Danish Quality Model (DQM) has created an excellent approach to healthcare standards development and has begun to address emergency care. Thus far, the few standards that apply to emergency care appear to be limited to the hospital-based aspects of emergency care. In order to achieve uniform quality across the entire system, interlocking standards need to be developed for each of the emergency care sectors (primary care, ambulance, hospital) that apply regardless of where or when the patient presents for emergency care.

Our general impression is that the format and approach taken by IKAS for development and implementation of healthcare quality standards and indicators is excellent. The main problem with regard to emergency care is that it is currently distributed across multiple healthcare sectors, but IKAS standards appear to focus mainly on the hospital sector and do not directly target out of hospital care. An important step towards developing an integrated emergency care system would be to develop a system of interlocking quality standards.

The problem with a number of the indicators for monitoring is that they seem to be vague in terms of defining specific standards so that auditors will be able to easily determine whether individual cases have met the standard or not. (for example; IKAS Modtagelse standard 1.3.3 - Indicator 3 [18]); we would suggest developing more explicit definitions for how it will be determined whether a specific indicator is met or not.

There seems to be an underlying assumption in some of the IKAS standards that the target issue is limiting the inappropriate utilization of hospital care services (for example, IKAS Visitation standard 1.2.1 – indicator 3 – 5 [18]) We would suggest that this be balanced by an equal focus on identifying patients with preventable delays in diagnosis and treatment of medical emergencies.

The primary focus of the current IKAS standards for emergency care seems to be on the hospital phase of emergency care, with little or no focus on the prehospital phase. We grouped all of the "target groups" and "areas of intended use" for each of the emergency quality standards and only one mentions primary care physicians; none mention alarm center personnel, dispatch personnel or ambulance personnel. See figure below

Standard	Target group	Areas of use
Henvisning standard 1.1.1 "Guidance regarding referrals"	Clinical and administrative personnel who evaluate and receive referrals for emergency patients and advise general practitioners	Clinical departments
Visitation standard 1.2.1 "Appropriate emergency admissions"	Clinical personnel; general practitioners, specialist physicians	Clinical departments that receive emergency patients
Visitation standard 1.2.3 "Prioritization of patients with emergency needs"	Clinical personnel	Hospital clinical and other supporting departments involved with visitation of emergency patients
Visitation standard 1.2.4 "Admission of emergency patients to the correct inpatient department"	Clinical personnel	Hospital clinical departments involved with visitation of emergency patients
Modtagelse standard 1.3.1 "FAM – fælles akutmodtagelse"	Perosnnel with leadeship responsibilities	Fælles akutmodtagelser
Modtagelse standard 1.3.2 "Use of clinical guidelines"	Clinical and administrative personnel	All clinical departments receiving emergency patients
Modtagelse standard 1.3.3 "Effective and professionally defensible arrangement of the intake (initial management) of emergently referred patients"	Clinical and administrative personnel	All clinical departments receiving emergency patients
Modtagelse standard 1.3.5 "Special attention to patient allergies and sensitivities"	All personnel with patient contact	All departments

Figure 8. Target groups and areas of use for IKAS emergency care quality standards

We were very impressed with the focus on the in-hospital transfer of patients between departments. This is an example of specific targeted review of a focused area of activity rather than just sampling all emergency patient charts.

Developing an automatic electronic data gathering tools and overall system strategy for informatics to gather and pre-screen quality trigger data would lead to obvious efficiencies. This will also allow analysis of the entire emergency care system data, rather than studying only small random samples.

A number of the indicators propose audits consisting of a random sampling of 30 patient charts from all emergency patients. This small number of randomly selected charts is probably insufficient to identify problems unless they are extremely common, in which case they are probably well know to personnel and administrators alike. Adopting this approach to audits will likely yield a false sense of reassurance that the system is functioning smoothly. We would instead suggest the use of "screening markers" to

identify cases where there is higher potential for errors in management or adverse events. Examples of these include:

- return or repeat emergency encounter of a patient within 72 hours of the initial visit, with hospital admission on the second visit,
- unexpected deterioration of patients admitted from the FAM within 24 hours of admission to non-intensive care unit (including patients requiring intubation, central venous access, patients requiring transfer to intensive care unit from non-intensive care unit, and patient death on non-intensive care unit).

There are numerous additional quality process indicators that could potentially be adopted for use in the FAM:

- time from arrival to registration of arrival (should be less than one minute),
- time from registration to triage evaluation,
- time from triage evaluation to senior physician evaluation,
- time from arrival to key actions (diagnosis, treatment) for selected patient categories (for example: EKG for chest pain patients, antibiotics with 6 hours for pneumonia patients),
- time until disposition decision (admission, transfer, discharge),
- time from disposition decision until disposition carried out (patient leaves the department),
- total length of stay in department,
- patient left without being seen,
- patient left against medical advice.

There appear to be few examples of system-wide guidelines for the management of particular types of patients (where they should be managed, who should manage their care, or the time frames for critical interventions). One example that we observed of a well functioning system-wide approach exists for STEMI patients who present to the prehospital system.

During the course of this assessment, we observed that healthcare data from public sources were in a number of cases found to be inaccurate or to contain significant misleading errors. On other occasions, they were not available at all or took a very long time to produce, making it difficult to establish a clear, objective picture of emergency care activity. Quality standards for healthcare delivery are essential, but there also must be quality standards for healthcare data registration so that healthcare planners and administrators responsible for monitoring healthcare quality are able to confidently use the medical records and system data to plan, make decisions, and perform quality improvement activities.

While we did observe many excellent examples of emergency care provider education and training at individual hospitals (for example, trauma care team training); we did not encounter uniform standards for education and training of emergency care providers that spans all of the emergency care sectors and institutions (for example, a standard that all physicians and nurses involved with emergency care in any sector need to be certified in

basic or advanced cardiac life support). This lack makes it virtually impossible to insure a uniform standard of care delivery across the system and across the region.

D. QUALITY MONITORING & ACCOUNTABILITY

In the course of our assessment we did not encounter system-wide approaches for on-going quality monitoring at the regional level. The majority of efforts at examining quality of emergency care consist of a) isolated studies which have reported generally good quality, but are limited in their scope / time, and b) monitoring the frequency and type of patient complaints and assuming that the absence of complaints is equivalent to the presence of quality care.

Quality assurance efforts will benefit from the implementation of an on-going quality monitoring system that measures process indicators such as adherence to system-wide standards and 72-hour returns, as well as patient outcomes in an on-going basis.

An individual patient's movement through the system, either retrospectively or in real time, is difficult to reconstruct due to a lack of system-wide registration. For example, there is no single source of information to determine whether an emergency department patient was recently seen in the primary care system, by an ambulance physician, or discharged from the hospital. Patient data centrally aggregated can be reviewed in real-time to provide better care. The current inability to aggregate data across the system complicates efforts to understand and manage patients moving from sector to sector, which the evidence suggests happens regularly. This not only delays care, but it also prevents the treating physician from understanding the full clinical picture.

Some good examples of robust electronic patient care documentation and patient data tracking systems were seen, both in the prehospital and hospital sectors; however these systems are in mostly single-institution (or sector) applications. This limits the ability to aggregate data across the system and to understand the full picture. Investment in electronic data acquisition tools (electronic medical records) and data tracking tools (dashboard) will reduce errors in data entry and registration, reduce the associated cost (human time involved with data entry and management), and increase opportunities for automating quality monitoring and other administrative activities.

Similarly, the lack of standardized data sets for patient registration (administrative, demographic data) and clinical documentation (history and physical, diagnostic data, medical decision making, treatments and interventions, disposition, etc.) makes it difficult to track and monitor variability in patient care across the system.

E. FACILITIES & RESOURCES

Anticipated patient volumes and scope of care to be provided in the FAM of the future appear to be greater than the current facilities will be able to accommodate. Planning for future FAM facilities renovations and new construction should be based on quantitative analysis using established methodologies for estimating the number of beds, staffing based on projected annual patient volumes, distribution of patient acuity and types, scope of care provided in ED, etc. Current facilities are designed using the model of patient delivery care based on patient segregation by presumed admitting specialty. New facility and renovation design will need to be based on the future combined model: multi-functional rooms,

patients segregated by acuity, efficiencies of space, equipment proximity and ease of use by personnel. Additional thought must also be given to surge capacity, or the ability to handle unexpectedly large volumes of patients for short periods of time, i.e., disaster situations.

The potential overlap between the patient populations seen in FAM and vagtlæge clinics can be turned to an advantage by co-locating the future FAM and vagtlæge facilities. We appreciate the fact that there are 2 separate business and operational models at work here, one in the privatized VL system and the other the public FAM model but public/private partnerships are very common throughout the world and can work well. At present there is no standardized triage of arriving patients nor are waiting room patients monitored in either the FAM or vagtlæge. Additionally, anecdotal reports and observations suggest that the vagtlæge has inadequate support personnel, which likely reduces their productivity level and job satisfaction. In our observations, vagtlæge physicians were often tasked with doing housekeeping or other low value tasks that might be more efficiently done by support personnel. Creating a common triage entry and monitoring patients waiting to be seen in either FAM or vagtlæge has the potential to improve long wait times, improve patient safety through observation and generally increase satisfaction levels overall. The vagtlæge could be further assisted by shared nursing, secretarial and support staff to improve their throughput of lower acuity patients, which would improve efficiency in the FAM and allowing them to devote more resources and time to spend on higher acuity patients.

Recommendations

Strategies for Future Training of Emergency Care Providers

Recommendations for Improving the Emergency Care Delivery System

RECOMMENDATIONS

I. Strategies for Future Training of Emergency Care Providers

A. INTRODUCTION

One of the goals of this assessment project is to describe an approach for developing a training and certification process for emergency physicians and nurses who will work in the future fælles akut modtagelse (FAM) in Danish hospitals.

Although we have included extensive, detailed examples in this report of emergency medicine training curricula, training program elements and explanations of our approach to developing training programs, the development of actual training programs is beyond the scope of this assessment project as this requires clarification of the specific scope of clinical practice of these provider groups within the specific model of clinical care in the future FAM, neither of which have been specified in detail by the Regions as of this writing.

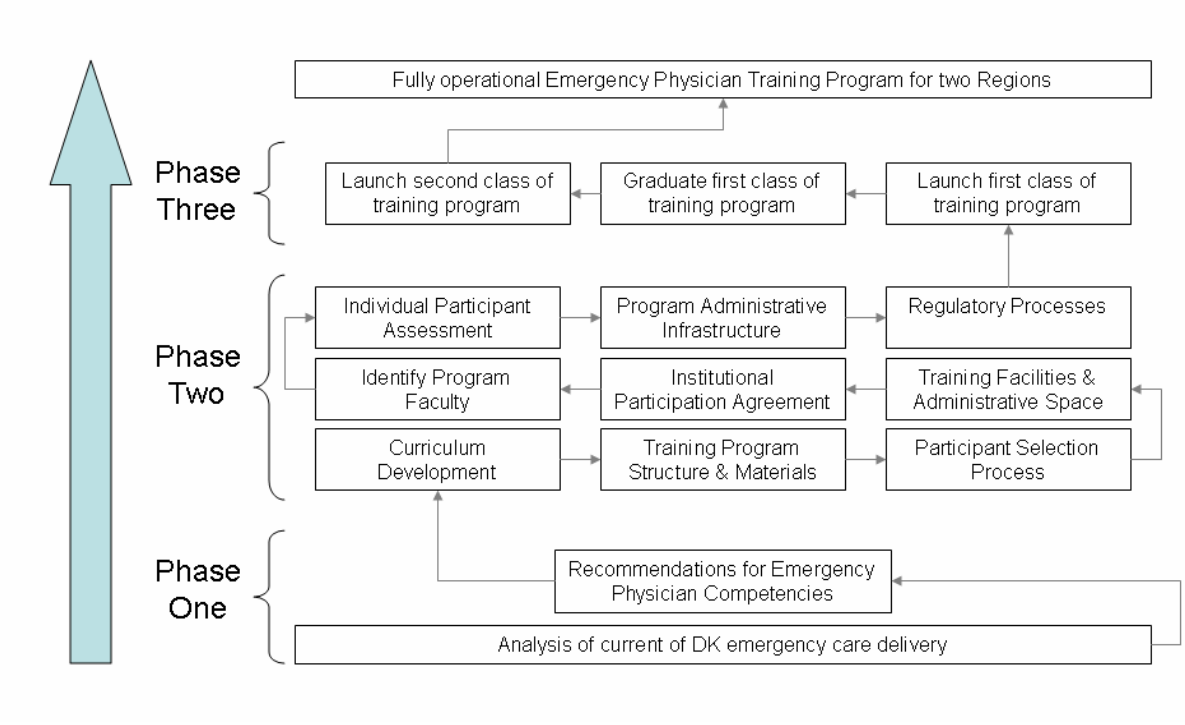


Figure 9. Project phases for developing emergency physician training program

Once the Regions determine the clinical model of care for the FAM and the scope of practice for FAM physicians and nurses, specific training programs for these provider groups can then be developed.

B. WHAT IS EMERGENCY MEDICINE?

"The defining problems of our specialty are the life- and limb-threatened patients. They represent a smaller percentage of our workload than do the noncritical patients, but without the ability to respond to those life and limb threats, our specialty looses its focus. The competence and willingness to act within time constraints without the luxury of more information or time… is what distinguishes the emergency physician.

It is precisely the facility to quickly and accurately acquire clinical information and own the confidence to act upon it that defines our specialty of emergency medicine."

> *- From preface to: Rosen P, Barkin R (ed.). Emergency medicine: concepts and clinical practice. [19]*

The ability of a healthcare system to deliver uniform, consistently high quality emergency care requires that the emergency care providers within the system have a uniform, high level of expertise in emergency care delivery. The body of knowledge, skills and approach to clinical decision making necessary for managing the initial care of the broad scope of acutely ill and injured patients who present to the healthcare system has been well described in many countries for many decades; this constitutes the clinical discipline of Emergency Medicine.

The specialty of Emergency Medicine is distinct and different from the clinical discipline and refers to the specific medical specialty that is devoted to the full time clinical practice of emergency care, quality improvement, emergency medical education, and research to advance the clinical practice of emergency medicine. The single-specialty approach to emergency medical care has been adopted in a growing number of countries around the world, replacing earlier multi-specialty approaches to emergency medical care delivery. Three examples of EM training curricula from outside the U.S. are included in the appendix. HMFP believes that the single-specialty approach to emergency care delivery with an independent specialty of Emergency Medicine represents the optimal strategy for delivering the highest quality emergency care delivery at the healthcare system level.

While Emergency Medicine is a broad discipline and the Emergency Medicine trained physician can appropriately be thought of as an "acute generalist", the defining focus of Emergency Medicine is the ability to rapidly and independently recognize, resuscitate and stabilize all types of acutely ill and injured patients, while initiating their diagnosis and treatment. A listing of typical emergency physician tasks is included in Table 3. [20]

TABLE 3. Emergency Physician Task Definitions

Pre-hospital care	Participate actively in pre-hospital care; provide direct patient care or online or offline medical direction or interact with pre-hospital medical providers; assimilate information from pre-hospital care into the assessment and management of the patient.
Emergency stabilization	Conduct primary assessment and take appropriate steps to stabilize and treat patients.
Performance of focused history and	Communicate effectively to interpret and evaluate the patient's symptoms and history; identify pertinent risk factors in the patient's history; provide a focused

physical examination	evaluation; interpret the patient's appearance, vital signs, and condition; recognize pertinent physical findings; perform techniques required for conducting the exam.
Modifying factors	Recognize age, gender, ethnicity, barriers to communication, socioeconomic status, underlying disease, and other factors that may affect patient management.
Professional and legal issues	Understand and apply principles of professionalism, ethics, and legal concepts pertinent to patient management.
Diagnostic studies	Select and perform the most appropriate diagnostic studies and interpret the results.
Diagnosis	Develop a differential diagnosis and establish the most likely diagnoses in light of the history, physical, interventions, and test results.
Therapeutic interventions	Perform procedures and nonpharmacologic therapies and counsel.
Pharmacotherapy	Select appropriate pharmacotherapy, recognize pharmacokinetic properties, and anticipate drug interactions and adverse effects.
Observation and reassessment	Evaluate and reevaluate the effectiveness of a patient's treatment or therapy, including addressing complications and potential errors; monitor, observe, manage, and maintain the stability of 1 or more patients who are at different stages in their work-ups.
Consultation and disposition	Collaborate with physicians and other professionals to evaluate and treat patients, arrange appropriate placement and transfer if necessary, formulate a follow-up plan, and communicate effectively with patients, family, and involved health care members.
Prevention and education	Apply epidemiologic information to patients at risk; conduct patient education; select appropriate disease-and injury-prevention techniques.
Documentation	Communicate patient care information in a concise manner that facilitates quality care and coding.
Multitasking and team management	Prioritize multiple patients in the emergency department in order to provide optimal patient care; interact, coordinate, educate, and supervise all members of the patient management team; utilize appropriate hospital resources; have familiarity with disaster management

The ability to competently function as an emergency physician requires expertise in a range of procedural skills associated with carrying out the above clinical roles. A list of procedures and skills integral to the practice of emergency medicine from the 2005 Model of the Clinical Practice of Emergency Medicine is included below.

Procedures and Skills Integral to the Practice of Emergency Medicine

1. Airway Techniques
    a. Airway adjuncts
    b. Cricothyrotomy
    c. Heimlich maneuver
    d. Intubation
        i. Nasotracheal
        ii. Orotracheal
        iii. Rapid sequence
    e. Mechanical ventilation
    f. Percutaneous transtracheal ventilation
2. Anesthesia
    a. Local
    b. Regional nerve block
    c. Sedation: analgesia for procedures
3. Blood and component therapy administration
4. Diagnostic procedures
    a. Anoscopy
    b. Arthrocentesis
    c. Bedside ultrasonography
    d. Cystourethrogram
    e. Lumbar puncture
    f. Nasogastric tube
    g. Paracentesis
    h. Pericardiocentesis
    i. Peritoneal lavage
    j. Slit lamp examination
    k. Thoracentesis
    l. Tonometry
5. Genital/urinary
    a. Bladder catheterization
        i. Foley catheter
        ii. Suprapubic
    b. Testicular detorsion
6. Head and neck
    a. Control of epistaxis
        i. Anterior packing
        ii. Cautery
        iii. Posterior packing/balloon placement
    b. Laryngoscopy
    c. Needle aspiration of peritonsillar abscess
    d. Removal of corneal rust ring
    e. Tooth replacement
7. Hemodynamic techniques
    a. Arterial catheter insertion
    b. Central venous access
        i. Femoral
        ii. Jugular
        iii. Subclavian
        iv. Umbilical
        v. Venous cutdown
    c. Intraosseous infusion
    d. Peripheral venous cutdown
8. Obstetrics
    a. Delivery of newborn
        i. Abnormal delivery
        ii. Normal delivery
9. Other techniques
    a. Excision of thrombosed hemorrhoids
    b. Foreign body removal
    c. Gastric lavage
    d. Gastrostomy tube replacement
    e. Incision/drainage
    f. Pain management (See Anesthesia)
    g. Physical restraints
    h. Sexual assault examination
    i. Trephination, nails
    j. Wound closure techniques
    k. Wound management
10. Resuscitation
    a. Cardiopulmonary resuscitation (CPR)
    b. Neonatal resuscitation
11. Skeletal procedures
    a. Fracture/dislocation immobilization techniques
    b. Fracture/dislocation reduction techniques
    c. Spine immobilization techniques
12. Thoracic
    a. Cardiac pacing
        i. Cutaneous
        ii. Transvenous
    b. Defibrillation/cardioversion
    c. Thoracostomy
    d. Thoracotomy
13. Universal Precautions

C. HARVARD APPROACH TO EMERGENCY MEDICINE TRAINING

The model for physician specialty training in Emergency Medicine used within the Harvard Medical School system by HMFP is the residency training model of post graduate medical education. A description of this approach to the education and certification of emergency physicians was recently published in Tidsskrift for Dansk Sundhedsvæsen [21].

A model training curriculum for emergency medicine has been developed by the Society for Academic Emergency Medicine (SAEM) and the Council of Emergency Medicine Residency Program Directors (CORD) that describes specific educational goals and objectives for each content area. Each residency training program uses a version of this as a template for developing a combination of educational experiences to meet these goals and objectives. The SAEM/CORD model curriculum for emergency medicine training is included in the appendix as an example of the scope and level of detail necessary for planning an emergency physician training program.

This method for training physician specialists is based on the apprenticeship concept whereby trainees develop mastery of necessary knowledge, skills and decision making through clinical practice under the direct supervision of experts in their field. Trainees are given graduated responsibility in proportion to their level of experience in order to insure patient safety and quality of care, as well as to insure a productive educational experience.

Emergency physicians need to have expertise equal to that of other specialists in a number of clinical areas including resuscitation. [22, 23] In order to achieve this, emergency medicine trainees learn key procedural and other skills in the same manner as physician trainees in other specialties. For example, EM physician trainees learn intubation and other airway management skills alongside anaesthesiology trainees during clinical rotations in the operating theaters and intensive care units.

An abbreviated list of the suggested minimum number of selected procedures and types of resuscitations that emergency physicians should carry out under supervision during their training period is listed in Table 4.

In order for clinical rotations to provide a beneficial educational experience for trainees, the educational goals and objectives of the rotation need to be carefully formulated and agreed to by all parties. Several examples of emergency medicine off service clinical rotation descriptions from the BIDMC system are included in the appendix as examples for how this can be accomplished.

We believe that the acquisition of clinical expertise through clinical practice under the supervision of experts is an essential component of any emergency physician training program, regardless of whether the physician is at the beginning of their initial specialty training, or they are moving into emergency medicine practice as a mid-career change in clinical focus.

Table 4. Suggested Numbers of Procedures and Resuscitations to be Performed during EM Residency Training [24]

Type of procedure	Minimum no. of procedures
Adult Medical Resuscitation	45
Adult Trauma Resuscitation	35
ED Bedside Ultrasound	*
Cardiac Pacing	06
Central Venous Access	20
Chest Tubes	10
Procedural Sedation	15
Cricothyrotomy	03
Disclocation Reduction	10
Intubations	35
Lumbar Puncture	15
Pediatric Medical Resuscitation	15
Pediatric Trauma Resuscitation	10
Pericardiocentesis	03
Vaginal Delivery	10

* Competency determined by each residency program Numbers include both patient care and laboratory simulations

The length of emergency medicine residency training within the Harvard system is 3-4 years based on a roughly 60-80 hour work week depending on the clinical rotation. A typical example of the distribution of clinical rotations for emergency medicine trainees in a 3 year program is shown in the following figure:

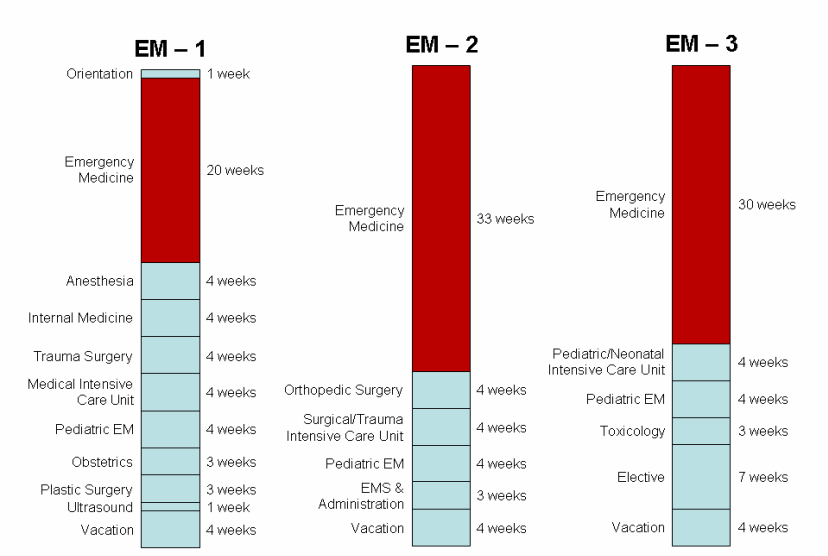


Figure 10. Example of distribution of clinical rotations during 36 month emergency medicine residency training

While clinical rotations constitute the core of the educational experience for emergency physician trainees, these are supplemented by additional didactic and other educational experiences, including lectures, small group sessions, conferences, skills workshops, medical simulation, etc. *(see figure –clinical rotations below).*

Figure 11. Spectrum of didactic elements of emergency physician training

Emergency Medicine physician trainees at Harvard affiliated emergency medicine residency programs are required to participate in at least 180 hours of these structured non-clinical educational activities per year during their training period. (5 hours per week times 52 weeks per year; required attendance at 70% of that total)

Emergency Medicine Training Around the World

Formal emergency medicine physician training programs can be found in over 35 countries around the world [16]. European countries with established EM training programs include England, Ireland, Belgium, Sweden, Netherlands, Italy, Poland, Estonia, and the Czech Republic. There are numerous examples of emergency medicine training curricula from countries that have established emergency medicine specialty training. Several of these are available in English and are attached as appendices to this report including: the European Society for Emergency Medicine, England, and Australia.

The experience with developing a regional emergency medicine training program in Italy has been well described [25]. Important observations from this experience include the necessity of high level political support and involvement in the process, the need for adequate medical and financial resources, and the value of starting with a small group of trainees vs. trying to implement a full scale training program initially at multiple institutions. Important challenges that needed to be overcome included resistance from existing specialties that perceived the introduction of an emergency medicine physician as a threat, resolving conflicts between regional partner institutions participating in the training, and managing the complexity of multiple institutions.

Future Emergency Medicine Training in Denmark

D. EXISTING COMPETENCIES AMONG SPECIALTIES PROPOSED TO STAFF THE FUTURE FAM

It has been proposed by Sundhedsstyrelsen that the future FAM in Denmark should be staffed by senior physicians from the following four specialties: anaesthesiology, internal medicine, general surgery and orthopedic surgery. The thinking behind this proposal is that senior physicians from these four specialties will, collectively, possess the spectrum of knowledge and skills to manage the vast majority of patients with acute illness and injury who present to the hospital system. In order for all patients to benefit from this collective expertise, all of these specialists would need to be present in the FAM at all times and be directly involved in patient care. Junior physician staff would continue to be assigned to the FAM as is currently the case, but would have direct supervision by the senior physician staff.

The competencies of these four specialty areas overlap to a considerable degree with the competencies of the Emergency Medicine specialist as described above, [see figure 17 below] however there are a number of significant gaps with the four-specialty model that are worthy of note, including Pediatrics, Gynecology / Obstetrics, and Psychiatry. To the extent that these patient groups bypass the FAM in the future, these gaps in expertise may not compromise the quality of care in the FAM, but if circumstances change and these patient groups do come to the FAM, additional specialists in these areas would also need to be present in the FAM in order to provide safe and effective care for these patients.

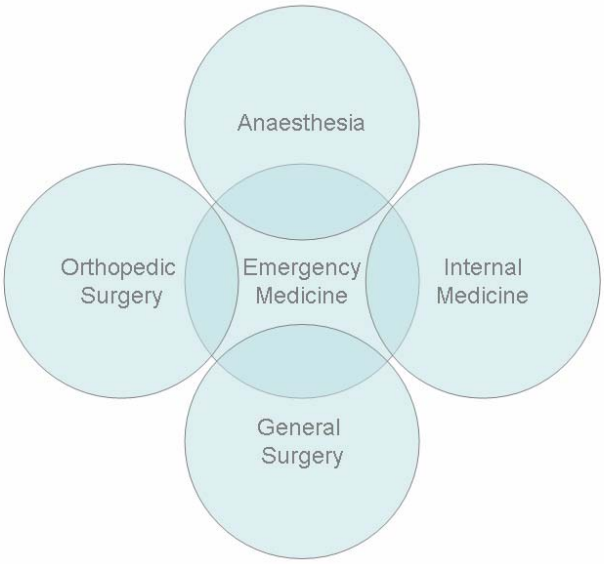


Figure 12. Overlapping competencies between specialties

There are a number of dilemmas associated with this multi-specialty model of physician staffing for the future FAM.

- Interaction and coordination of efforts between the various specialists in the care of individual patients. It is unclear how the various specialists will work together

effectively in the care of individual patients, many of whom will have unclear diagnoses or multiple diagnoses that cross traditional specialty boundries.

- Efficient utilization of scarce specialist physician time. There will be inevitable fluctuations in the number and type of patients with problems in the area of expertise of each of the specialists, such that on some days there will be predominantly patients with medical problems and on other days patients with predominantly surgical problems, etc. What will specialist physicians do in the FAM when they are not seeing patients with problems in their area of expertise? If they leave the FAM and return to their home departments, they will not be immediately available if a patient does come in with a problem requiring their expertise. This may lead to quality of care problems (delays in diagnosis and treatment), and/or patient flow problems (prolonged patient lengths of stay in the department).

- Traditional general surgery and internal medicine specialty training has been discontinued in Denmark. Going forward, only medical and surgical sub-specialists are being produced, with a "common trunk" component in their post graduate medical training. This will mean that the breath of expertise traditionally held by these "general" specialties will be significantly less. This will, for example, mean that the "internal medicine" specialist staffing the FAM on any given day will in reality be a cardiologist, gastroenterologist, pulmonologist, endocrinologist or other internal medicine sub-specialist. The varying expertise between these various subspecialties will increase the risk of variability in the care provided to patients in the FAM.

- Are there enough specialist physicians available to provide multi-specialty staffing in the FAM and also meet productivity targets for elective specialty care? Specialty physician shortages are blamed for current difficulties with meeting productivity targets for elective specialty care. Projections from Sundhedsstyrelsen indicate that these shortages will continue or worsen for the next 10 years or longer. Physicians on call in the FAM during the evenings and at night will not be available for elective specialty care activities the following day. It requires approximately 9 physicians to provide 24 / 7 coverage for a single FAM. If four different specialties must be present, that would require a minimum of 36 specialist physicians per FAM and potentially more at larger hospitals. If there are currently insufficient specialist physicians to cover existing functions, the only way to cover additional functions if for physicians to work additional hours, or use the existing physicians in a more effective way.

E. NECESSARY COMPETENCIES FOR PHYSICIANS AND NURSES WORKING IN THE FUTURE FAM

Region Nordjylland and Region Midtjylland have proposed an alternative approach to that put forward by Sundhedsstyrelsen for staffing the FAM.

Under the proposal from Region Nordjylland and Region Midtjylland, selected individuals from each of the four specialty areas would be hired to work primarily in the FAM and would receive additional education and training related to Emergency Medicine to supplement their existing training and expertise. This additional education

and training would be described as a "fagomraade" in akutmedicin. These physicians would be recognized as akutlaeger and would staff the FAM primarily with support from other specialists in the hospital. The goal of this approach is that over time, the akutlaeger would be able to provide safe and effective care in the FAM with limited involvement from other specialists.

The basic competencies necessary for the future akutlaeger depend heavily on the future model of clinical care in the FAM.

FAM clinical scenario anticipated by Regions

Both Regions are anticipating a clinical scenario in the FAM that is based on a number of assumptions that may or may not prove to be valid. They are assuming that approximately 30% - 40% of the current skadestuen patient volume will, in the future, be able to be shifted to the primary sector (egen laege or vagtlaege system) with the result that the future FAM patient volume will be significantly lower than the present combined acute patient volume seen in the skadestuer + other akutmodtagelses afsnit. Under this assumption the FAM patient case mix would be relatively higher acuity than today.

It is envisioned that the FAM will be able to manage acute patients for up to 48 hours, after which the majority will be able to be discharged. Patients for whom inpatient care lasting longer than 48 hours is anticipated will be admitted from the FAM. Under this clinical care model it is envisioned that the akutlaege will be responsible for managing the care delivered in the department, with particular focus on the initial triage evaluation of patients, but that other specialists (for example, anaesthesiology) will be responsible for invasive procedures associated with the initial resusciation and stabilization of patients, such as airway management, and that other specialists (for example, medical subspecialties) will be responsible for the extended management of patients in the FAM once their initial diagnosis has been established.

Under this clinical care model for the FAM the akutlaege would have to manage relatively fewer patients overall, but those patients would have a relatively higher acuity compared to the current acute patient population seen by the hospital system. These patients would need to be managed for a relatively long period following the initial stabilization and diagnostic evaluation (up to 48 hours), which will increase the number of sign-outs and handoffs of individual patients from one akutlaege to the next. The akutlaeger will be relatively dependent on other specialists, both for carrying out essential procedural interventions related to resuscitation, stabilization and diagnostic evaluations, as well as formulating the extended patient management plans with the various specialties responsible for those patients care.

This akutlaege role is very different from the Emergency Medicine physician role in the U.S. and other countries with a single-specialty emergency care model.

The Regions envision that the initial training for akutlaeger coming from different specialty backgrounds will NOT have the goal of achieving uniform knowledge and skills among the participants, but will instead strive to achieve a uniform minimum basic level of competencies among akutlaeger, recognizing that individuals will have different additional competencies related to their previous specialty training and experience.

There are a number of dilemmas associated with this plan:

- Akutlaeger coming from 4 different specialty background with very different prior training and expertise with only a basic minimum common knowledge base and skill set will result in significant day-to-day variability in how patient care is provided in the FAM, depending on which akutlaege is working. For example, on days when an akutlaege with prior specialty training in anaesthesiology is working, they will be able to manage resuscitations, intubations and many other critical care tasks themselves, while on days when akutlaege with prior internal medicine training are working, they will have to call other specialists to perform these procedures. This may result in significant delays in stabilizing acute patients.
- Managing patients for significantly longer periods of time in the FAM beyond the initial stabilization, diagnostic evaluation and treatment may increase the risk of errors in management and decreased quality. The longer patients remain in the FAM; the greater the number of times that an individual patient will be signed out and handed off to a new provider. Numerous studies have shown that this increases the opportunities for errors in communication and patient management. Patients selected for extended management in the FAM will need to be carefully screened and limited to those with clearly defined, uncomplicated problems and management plans, in order to limit the potential for errors in management.
- As discussed earlier in this report, the validity of the assumptions upon which this clinical model for the FAM is based, is uncertain. It is highly possible that instead of a low volume, high acuity patient population, the future FAM could be faced with a high volume, mixed acuity patient population if current trends in the primary sector continue, resulting in a significant number of patients without primary care physicians, who need to turn to the hospital system for primary and urgent care needs. Furthermore, it is highly possible that given the current shortage of specialist physicians and inability to meet productivity targets for elective specialty care, that it will not be possible to have the level of specialty physician presence in the FAM necessary for providing the scope and quality of care that is envisioned.

Potential alternative FAM clinical scenario

Under this alternative scenario, the akutlaege would need to manage a higher number of patients per hour and these patients would be of a much more diverse acuity ranging from patients with immediate life threats, to those with minor injuries and illnesses. Under these circumstances, the akutlaege would need to move quickly and function largely independently of other specialists. Managing and maintaining high volume patient flow through the department would dictate that there would not be time to call on other specialists every time a patient was in need of an invasive intervention; they would need to be able to recognize when critical resuscitation and stabilization procedures were indicated and perform them quickly and accurately. They would not have the luxury of time for extensive “group” decision making about extended patient management plans with other specialists.

This akutlaege role is very similar to the Emergency Medicine physician role in the U.S. and other countries with a single-specialty emergency care model.

The two different scenarios described above require a very different akutlaege role in order to function effectively. Under the first scenario, the akutlaege role is limited and variable depending on the individual physician's prior specialty training. It depends on a low patient volume and the presence of many other specialists in order to work. There is much evidence to suggest that neither of these assumptions are certain or even likely to be valid.

The second scenario requires the akutlaege to manage a higher patient volume in the absence of many other specialists. There is considerable evidence to suggest that this scenario is likely to occur within the next 5-10 years.

If the education and training of akutlaeger is organized with the goal of being able to manage the second scenario, they would also be well equipped to manage the first scenario as well. However, the opposite would not be true. It is therefore the recommendation of HMFP that the Regions adopt the goal of training akutlaeger to be able to independently manage a high volume, mixed acuity patient population as described above.

F. GENERAL FRAMEWORK FOR THE DEVELOPMENT AND IMPLEMENTATION OF TRAINING PROGRAMS

It will likely take many years and several training cycles to develop an akutlaege training program that produces akutlaeger with the uniform knowledge and skills necessary to deliver uniform emergency care at all of the Regions FAM hospitals.

The initial phase of emergency medicine training in Denmark will target physicians with prior specialty training and experience in a number of different clinical specialties and settings who choose to switch from their primary specialty to emergency care delivery.

Because they will come from different specialty backgrounds, there will be a need for developing customized education and training programs for each individual or specialty group. This fact will significantly increase the complexity of designing a training program, and is an argument for starting with a small group of participants in the first stage of the training program.

Because the implementation of the akutlaege role represents a major shift in the approach to emergency care delivery, the initial goals for training akutlaeger should target a basic uniform level of knowledge and skills for all akutlaeger. But due to the likely clinical demands on the akutlaege in the future, combined with the likely shortages of specialist physicians to staff the FAM side by side with the akutlaeger, plans should be made to rapidly move to an akutlaege training program that prepares physicians to function as emergency medicine physicians capable of independently managing the initial care of the full range of acutely ill and injured patients.

It is our belief that the ability of the Regions to achieve their stated goal of providing uniformly high quality emergency care ("*høj kvalitet uanset tid og sted*") is heavily dependent on having an akutlaege workforce with uniform knowledge and skills encompassed by the discipline of emergency medicine. Until this is accomplished, the likelihood of significant variability in emergency care delivery is so high that it is doubtful the Regions will be able to achieve their emergency care quality goals.

Fagomraade vs. Specialty

The Regions have proposed that the new akutlaege training program be developed as a "fagomraade", or area of additional competency that physicians with prior specialty training would be eligible to achieve recognition in through a part-time supplemental training program lasting two years in combination with work experience in the FAM. The area of clinical practice defined by the "fagomraade" is not recognized as a new medical specialty, but rather as an extension of the physician's existing specialty.

The "fagomraade" concept has the advantage of being an accepted pathway within the Danish medical system for recognizing new areas of expertise; however there is no precedent for a multi-disciplinary "fagomraade" that physicians from multiple specialties can enter. It is also desirable in that it is considerably less difficult to develop a fagomraade than it would be to establish a new medical specialty. Furthermore, the target audience that the Regions are seeking to attract to this new area of clinical practice is mid-career physicians who have already completed specialty training in another area. Presumably it would be less attractive for this physician group to have to go through an entire specialty training program in order to qualify for working in this area of clinical practice.

However there are some disadvantages associated with the "fagomraade" strategy.

- The "fagomraade" concept is only a supplemental education and training program and therefore limited in scope. The pre-existing scope of knowledge and skills among the various physician groups who would be entering the akutlaege prorgram differs widely from each other, and in some cases from the discipline of Emergency Medicine. It is therefore unlikely that a limited supplemental training program will be able to produce akutlaeger with uniform knowledge and skills adequate to independently provide uniformly high quality emergency care.
- A "fagomraade" does not have the associated academic or professional opportunities for career advancement and prestige associated with a medical specialty. This may limit the desirability for entering this new area of clinical practice. For example, there are no academic positions in Emergency Medicine within the university system.
- The "fagomraade" strategy will likely make entering this area of clinical practice less appealing to medical students and younger physicians who have not yet begun their specialty training. This will be perceived as having to complete two specialty training programs as opposed to one. Experience from Swedish emergency medicine training programs, where Emergency Medicine is offered as a subspecialty training suggests that many individuals who begin the combined training program, end up leaving after completing the basic specialty training and do not go on to complete the advanced emergency medicine component of the training.

Our view is that with regard to the content of the akutlaege training program, it makes no difference whether this is called a "fagomraade" or a specialty. What matters is that the future akutlaeger become experts in the discipline of emergency medicine.

While there are clear advantages to starting the process with the "fagomraade" strategy, it is unlikely that this strategy will prove to be sustainable in the longer term. It is also

unlikely that this strategy alone will create the necessary incentives to attract the number and calibre of physicians necessary for this new area of clinical practice to develop into the robust system for clinical care, medical education and research that it must be in order meet the healthcare quality and productivity expectations the Regions have established.

Therefore, our recommendation is that the akutlaege training program be developed initially based on the "fagomraade" concept, but that work also begins simultaneously on laying the groundwork for establishing a medical specialty in Emergency Medicine, with the goal of launching a primary specialty training program in Emergency Medicine for young physicians within the next 5 years.

Below are a number of central questions and issues that need to be addressed in order to proceed with the development of emergency medicine training programs in the Regions.

What will the future model of care be in the FAM?

The clinical care model should include a description of the intended patient population, the scope of clinical problems that the FAM will deal with, the scope of care that will be provided in the FAM with sufficient detail to define the boundaries between what care is supposed to be provided in the FAM and what care is supposed to be provided in other clinical areas/departments (prehospital, vagtlæge konsultation, inpatient departments, outpatient departments, etc.); should also provide an overall sense of the processes of care delivery (triage, resuscitation, stabilization, initial diagnosis/treatment, observation, consultation, disposition)

What is the future role of the emergency physician in the FAM?

The future akutlaege role should be clearly defined in relation to the clinical model in the FAM with a level of detail that allows for planning a competency based curriculum. This should include a description of the types of clinical entities that the akutlaege will be responsible for managing, the types of procedures they are expected to perform, as well as other tasks.

HMFP's recommendation is that the akutlaeger should be able to independently and effectively manage the initial care of all emergency patients arriving in the FAM for the first hour(s). This includes the ability to expertly perform all necessary procedures associated with the core functions of the emergency physician, including resuscitation, and relevant diagnostic and therapeutic procedures.

During the transition period while the first emergency physicians are being trained (train-the-trainers), other specialists, such as anaesthesiologists, will of course need to continue to play a significant role in many aspects of emergency care delivery in the FAM. However, we would recommend that goal of the akutlaege training program be for akutlaeger to as soon as possible be trained to assume an independent patient care role in the FAM. This will insure a uniform body of knowledge of expertise among akutlaeger and insure that the Region is able to achieve is emergency care delivery goals ("*høj kvalitet uanset tid og sted*").

What should the emergency physician training curriculum contain?

The akutlaege training curriculum should be based on the competencies outlined in the description of the clinical role described above.

HMFP's recommendation is that this training curriculum should closely follow existing emergency medicine training curricula. Examples from four countries including the U.S. are included in the appendix to this report. The details of the curriculum content should be fine tuned with input from relevant Danish medical professional and academic organizations.

Because of the significant differences in prior knowledge and skill among the different physician specialty groups who will be entering the akutlaege training program, there will be a need to individualize the specific training programs for different specialty physician groups and individuals. The goal for each individual's training will be to fill in the gaps so that upon completion, they will have met all of the goals and objectives of the EM curriculum.

How should this material be taught?

The educational approach that HMFP has used with success in developing other training programs is based on adult learning theory and concepts. Adult learners are most readily engaged by activating their intellect, prior knowledge and experience, which requires an emphasis on active versus passive learning strategies. Examples of active learning strategies include bedside teaching during clinical rotations, high fidelity medical simulation exercises, goal directed projects, structured small group sessions and practical skill workshops. Passive approaches to learning, such as classroom lectures and individual reading, also play a role, but are by themselves not sufficient to provide the range of educational experiences necessary for training competent emergency physicians.

HMFP recommends that the initial emergency medicine training program for physicians with prior specialty training be based on the following elements:

- Part time employment in the FAM (with adequate protected time to participate in the other elements of the training program); this will involve the need to hire substitute physicians to provide coverage for the program participants and should be factored into program budgets,
- A series of clinical rotations (under supervision) outside the FAM in specialty areas where the individual lacks key clinical expertise integral to the practice of emergency medicine. For example; internal medicine and orthopedic surgeons will likely need training in airway management, ventilator management and other critical care techniques; these are learned best through a focused clinical rotations on anaesthesia and critical care services,
- A variety of complementary educational elements including lectures, small group sessions, conferences, skills workshops, medical simulation, etc..

Different models for organizing the programs didactic educational activities can be considered; each has their own advantages and disadvantages.

- continuous model – educational programming is scheduled at a fixed time every week (f.ex. every Wednesday morning); this requires that program faculty be available to teach every week; advantages include a continuous focus on education; frequent sessions mean that if busy participants miss a few sessions, the miss relatively little of the overall content
- episodic model – educational programming is scheduled in a series of mini-conferences of several days duration at intervals throughout the year; this approach does not require faculty to teach on a weekly basis; there is less of a continuous focus on education within the department with this model; and it becomes more crucial that program participants attend every mini-conference, as missing one of these would result in missing a significant portion of program content; this may present scheduling problems for staffing the FAM. [see figure below]
- combinations of both models are also possible.

How should clinical rotations be set up?

HMFP's view is that the best way for physician trainees to acquire targeted expertise in a range of clinical areas is through participation in selected clinical rotations under direct supervision from local experts; these rotations are supplemented with targeted readings, skills workshops, seminars, etc.

In order for clinical rotations to accomplish their intended educational goals and objectives, it is necessary to develop explicit agreements with participating departments and institutions where the specific educational goals and objectives for the trainee are described in detail.

In many cases, clinical rotations of 4 weeks in duration will be sufficient to achieve the rotation goals and objectives, assuming that the rotation is well organized and that all parties comply with the participation agreement.

It is important to describe how the program participants will function in the host department, to articulate the expectations about the teaching they will receive and numbers of procedures they will get to perform under supervision, and the mechanism for insuring compliance with this agreement and remedies for non-compliance.

Examples of participation agreements used by the emergency medicine training programs within the Harvard Medical School system have been included with this report to show how this can be accomplished.

How should program participants be evaluated?

In order to insure that program participants receive a high quality educational experience, and to verify that program participants acquire the knowledge and skill that is intended, it is necessary to incorporate mechanisms for both formative and summative evaluation.

Formative evaluation is used to provide feedback to program participants on their progress during the course of the training program in order for them to identify areas of

strength and weakness, with the purpose of helping them target their efforts to best achieve the goals and objectives of the training program

Summative evaluation is used to provide an assessment of the program participant's level of achievement at the end of the program.

Multiple examples of evaluation methods used in post graduate medical education are included in the attached appendix.

A certification process is a formalized method of summative evaluation that typically consists of a written and oral examination developed to measure participants' acquisition of a specified body of knowledge and skill.

Successful completion of the program and the ability to sit for the certification exams would require satisfactory evaluations in all clinical rotations and participation in all required program educational activities.

How should the training program be evaluated?

A framework for evaluating the success and impact of the program will need to be developed early on so that relevant baseline data can be obtained. With proper planning from the onset it should be feasible to conduct valid, publishable educational research about the outcome and impact of the training program, which said outcomes will expedite the roll out process to other facilities, regions, etc. once "best practices" have been described and bad practices have been eliminated.

Possible strategies for program evaluation include: administration of survey tools to program participants, 360 degree evaluations of program graduates in their subsequent clinical roles (by colleagues, supervisors, patients, themselves), process and outcome measures of FAM operations.

G. TIME FRAMES FOR DEVELOPING AND IMPLEMENTING TRAINING PROGRAMS

The actual duration of an emergency physician training program based on the assumptions described above including part-time clinical work in the FAM, clinical rotations in other hospital departments, plus ongoing educational activities based in the FAM, will depend on the scope of expertise that the training needs to cover. This still needs to be decided by the Regions.

Given adequate resources and cooperation from relevant departments, we believe it would be possible over a two year period to adequately cover a modified version of the curriculum described above for emergency physicians.

It would most likely require at least 8-12 months to fully develop such a training program, however educational activities could potentially begin sooner than that.

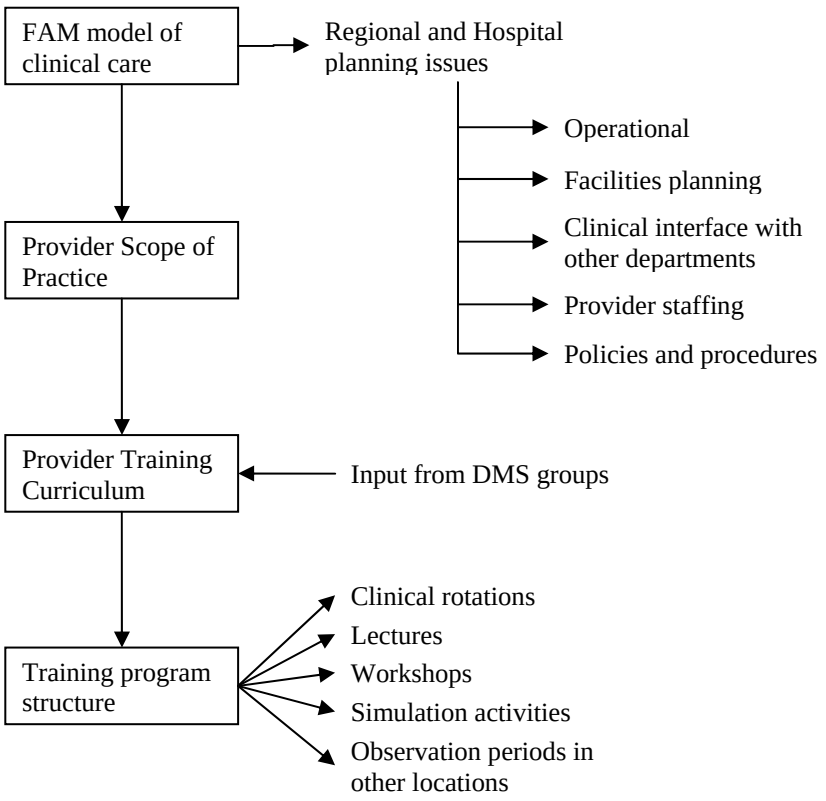


Figure 13. Development of competency-based Emergency Provider training programs is dependent upon the FAM model of clinical care and the provider scope of practice.

Training subsequent generations of emergency physicians

The first phase of emergency physician training (train-the-trainers) may continue for multiple cycles depending on a variety of factors including the size of each class, attrition rates, etc.

Because of the inherent difficulties associated with creating customized educational programs for each physician participant in the program, and the potential longer term problems with developing uniform standards of care within emergency physician groups comprised of individuals with a wide variety of primary specialty backgrounds, consideration should be given to developing a longer term strategy for specialty training in emergency medicine.

As discussed elsewhere in this report, we have observed what appears to be a notable lack of interest in emergency care delivery as a career choice among mid-career and senior physicians in Denmark. While the establishment of a “fagområde” in akutmedicin may provide suitable incentive for some physicians who have already completed their specialty training to pursue additional training in order to work in this new clinical area, it is not clear that this will be an attractive option to younger physicians still contemplating their choice for specialization. Some have suggested that this approach of “double specialization” has proven to be less popular than originally anticipated in Lund, with a large percentage of program participants there choosing not to continue with the

emergency medicine component following internal medicine specialization. Requiring "double specialization" to be recognized as an emergency physician uses two specialty training positions (primary specialization plus fagområde training) to produce one specialist at a time of increased pressure to produce more specialists in all areas.

Although emergency medicine is not currently recognized as a primary specialty in Denmark, the benefits in terms of increased professionalization of emergency care delivery and improving its attractiveness among physicians would seem to significantly outweigh any perceived disadvantages.

Emergency Medicine training for Turnus Læger

Under the new reform of the "turnus" training program, all Danish medical school graduates will in the future be required to complete 12 months of clinical rotations, of which a significant portion must be in acute care.

Once the FAM system, and an emergency physician workforce, has been established, there will be a unique and robust opportunity for providing uniform emergency medicine educational experiences for all Danish physicians.

A standardized clinical educational experience of several months duration could be developed in which physician trainees would receive a standardized orientation in FAM operations, a series of conferences with lectures, small group sessions and skills workshops including for example, advanced cardiac life support certification. The turnus læger would also work clinically in the FAM under the direct supervision of the FAM physicians.

Nation wide implementation of such a program would have the long term effect of providing all Danish physicians with a uniform, standardized body of knowledge and skills related to emergency care of patients and the appropriate use and function of the emergency care system.

H. DEVELOPMENT OF EMERGENCY NURSING TRAINING

Emergency department nursing practice has evolved in parallel with emergency physician practice over the past several decades. The scope of emergency department nursing practice defined by the Emergency Nursing Association for its emergency nursing certification program (CEN) has been adopted in a number of countries around the world [26, 27].

This scope of practice description can serve as a useful starting point for developing a relevant Danish curriculum for emergency nursing. *see appendix (scope of practice document for the CEN knowledge base and skills).*

Training and certification for emergency nurses working in the future FAM should ideally occur in coordination with FAM physician training. Although the roles and curricula for physicians and nurses differ widely, there are a number of important areas where training should be coordinated, such as team training, and resuscitation algorithms for various patient groups.

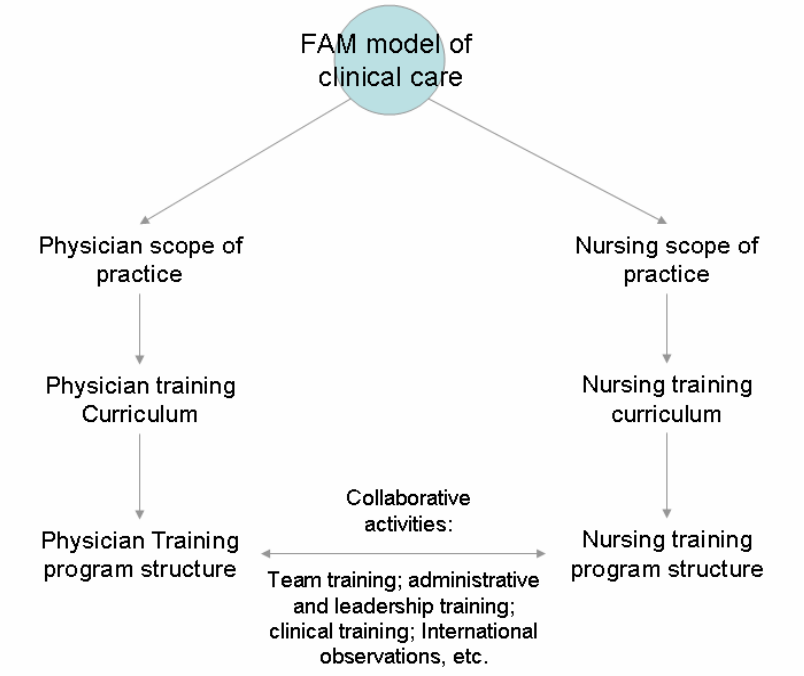


Figure 14. Parallel development and coordination between emergency physician and nursing training programs

As with future FAM physicians, the future nurses who will work in the FAM will also likely come with a variety of prior clinical backgrounds and experience levels, depending on the clinical setting they worked in (skadestuen, AMA, inpatient department, ICU, etc.). Therefore emergency nursing training will also require some degree of customization to insure that all program participants end up with uniform expertise.

Many of the same questions and issues related to determining the model of care in the FAM and the scope of practice of the FAM nurses will need to be addressed in order to develop an emergency nursing training program.

The nursing training program would ideally be structured in a similar way and contain similar elements as the physician program:

- Employment in the FAM with adequate protected time for participation in training program educational activities.
- Additional educational elements including lectures, small group sessions, conferences, skills workshops, medical simulation, etc.

As with the physician training program, didactic content can be organized using continuous, episodic or combined models.

Although much of the nursing and physician program content will be specific to each group's scope of practice, there is also a need for joint educational activities between nurses and physicians involving topics such as team training, resuscitation, leadership and administration, etc.

In addition to the team training with physicians, a range of short courses leading to specific certifications can be included in the training program such as: the Trauma Nursing Core Course (TNCC) [28], Advanced Cardiac Life Support (ACLS) [29, 30] and Pediatric Advanced Life Support (PALS) [30, 31].

At the conclusion of the program, a certification exam will be administered to verify that participants have acquired the requisite knowledge and skills and will be recognized as certified emergency nurses.

Recommendations

Strategies for Future Training of Emergency Care Providers

Recommendations for Improving the Emergency Care Delivery System

II. Recommendations for Improving the Emergency Care System

The recommendations are divided into three categories. Educational recommendations relate to establishing training programs for a physician and nursing workforce in the future FAM. FAM recommendations relate to the implementation of the FAM at individual hospitals and the integration of this network at the Regional level. Other recommendations relate to issues outside the FAM that nonetheless impact on the quality of care delivered in the FAM.

A. EDUCATIONAL RECOMMENDATIONS

1. Coordinated Inter-Regional Training Programs for FAM Physicians and Nurses

   HMFP recommends that the Regions collaborate on the development of coordinated training programs for physicians and nurses who will staff the future FAM.

   An inter-regional training program with a standardized curriculum leading to certification that is recognized within both Regions, will increase the number of potential job opportunities and be more attractive to applicants than if the education and certification were limited to only one Region. A successful inter-regional training program will also become a clear candidate for a future national model in this new area of clinical practice.

   An inter-regional committee (or two regional committees that coordinate their work closely) should be appointed as soon as possible to begin the work of developing these training programs.

   These programs should be developed and implemented in close coordination with the university hospital system to insure appropriate access, both to academic resources and faculty capable of teaching in the program, as well as to a patient population with sufficient diversity and complexity to provide a beneficial clinical learning experience.

   Despite the different specialty backgrounds of the targeted participants of these training programs, the educational goals of their training should be to acquire a uniform, minimum standard knowledge base and skill set that is clearly defined and based on the discipline of Emergency Medicine.

2. Recognition of Emergency Medicine ("Akutmedicin")

   HMFP recommends that the Regions initially seek recognition of a "fagområde" in emergency medicine ("akutmedicin") and simultaneously start the process for establishing a specialty in emergency medicine within five years.

   Much discussion in Denmark has focused on whether the educational and professional scope of future emergency physician practice in the FAM should be defined as a "fagområde" or as a new medical specialty, with the majority of opinion seeming to favor the "fagområde" option. We view the establishment of a fagområde as a positive step in the right direction, but are nonetheless concerned about the potential difficulties associated with attracting sufficient numbers of talented physicians who want to work clinically in hospital based emergency care, both now

and in the future. We encountered a disturbing lack of interest in switching clinical practice to emergency care in the future FAM among mid-career and senior physicians with clinical specialties in other areas.

The apparent lack of interest in emergency care as a mid-career choice among these physicians appears to be related to the perception of hospital-based emergency care as having a "low status" within the medical community. This may be due in part to the fact that emergency departments have traditionally been staffed primarily by "interns" (turnuslæger), the need to work nights and weekends, and the absence of specialty recognition.

Establishing an independent specialty of emergency medicine in Denmark, in parallel with worldwide trends, would elevate the status of emergency care delivery and create numerous incentives for attracting talented individuals to this vitally important, yet underserved area of clinical medicine in Denmark.

3. Certification Mechanism for FAM Physicians and Nurses

HMFP recommends that the Regions develop a certification mechanism in parallel with the training programs for emergency physicians and nurses that will serve to verify the acquisition of new knowledge and skills as well as reinforce and demarcate the scope of practice of the emergency physician and nurse for the entire medical community.

We feel that such a process is needed in order to address the wide spread skepticism we encountered within the medical community about the future "akutlæge."

A certification process consisting of written and oral examinations developed and administered by an independent board of examiners would establish the credibility of training program participants as well as this emerging area of clinical practice.

B. FAM RECOMMENDATIONS

Political and Administrative

4. Coordination and Standardization of Efforts Between Regions

HMFP recommends that both Regions commit to a common vision for the FAM organization and operation with parallel regional and hospital leadership structures that coordinate their activities; furthermore we encourage the Regions to develop coordinated FAM physician / nurse training programs that support inter-regional standards of care.

The key issue for developing inter-regional training programs is that the emergency physicians and nurses in both Regions' FAM units need to have similar scopes of practice. Establishing different models of clinical care for the FAM in the two Regions with different scopes of practice for emergency physicians and nurses will complicate the development of standardized curricula and training programs, complicate attempts to create a unified standard of care, and limit the potential job opportunities for training program participants, if they are only be able to work within a single region upon completion.

The preliminary plans for the FAM operational model in each Region that we were able to review at the time of our site visit appeared to contain some significant differences. We understand that subsequent discussions have addressed these differences, but we have not seen revised models from both Regions.

We understand that the Regions may have different priorities in the redesign of their healthcare programs and would suggest that the regional coordinators communicate often to insure progress towards a common model.

5. Regional Leadership for FAM Development

HMFP recommends that the Region appoint a dedicated leader or coordinator for regional FAM development whose primary role is to oversee the development of the network of FAM at designated hospitals and insure that this moves forward in accordance with the expectations of Regional healthcare and political leaders.

This individual should report at a high level in the regional healthcare administration in order to have the necessary authority to mobilize resources and implement change. Together with relevant regional healthcare and planning leaders, this regional FAM leader should sit on a regional FAM Steering committee that meets regularly to provide feedback to regional leaders, discuss planning and implementations issues, insure adequate resource availability and monitor progress. The Steering Committee should consist of the senior representatives from each hospital but should have no more than 3 members from each hospital.

The Region should also consider appointing a Regional FAM Advisory Committee with representation from stakeholder groups that are impacted by implementation of the FAM concept; this advisory committee would serve as a formal means for the Steering Committee to receive input from important stakeholder groups and also a means for disseminating information back to those groups.

During the months of our involvement with this project, we observed that many of the individuals from the Regions who worked with us on this evaluation of the emergency care system were also tasked with many other competing responsibilities, often not allowing the necessary focus required to have it come to fruition. We have been impressed with the ability of the regional leadership to come this far without dedicated individuals to the effort, but feel these next steps will be hard to implement without visionary leadership with the time to make everything happen.

6. Resource Allocation for Emergency Care System Development

HMFP recommends that the Region invest sufficient resources to insure the development of the emergency care delivery system as described in this report.

It will likely require significant investment of personnel, resources and funding in the short term to achieve this major transformation of the emergency care system. However, the longer term dividends in terms of higher quality care and more efficient resource utilization will more than offset the initial investment. Inadequate resource allocation could not only delay the implementation but quite possibly result in a failure of the project. Success depends on building a functional clinical /

administrative / educational system and to attracting a critical mass of qualified personnel who want to work in the future FAM system and train the next generation of emergency physicians.

During the site visits and interviews we heard concerns expressed from administrative leaders in all of the emergency care sectors that they lacked the resources to make necessary investments in productivity enhancing technology. Many hospital leaders lacked resources to purchase diagnostic resources such as CT / MRI scanners for their emergency areas. Inadequate staffing was a near universal complaint as evidenced by the numerous vacancies in physicians' posts. Many hospital administrators stated that they did not have the resources to pay physicians overtime to allow them to work additional hours, despite the pressure to bring down waiting lists for elective procedures and other specialty care. There were also concerns expressed about how to attract senior physicians to work in the new FAM system, which will require that they take off-hours calls. Adequate funding from the Regions will be an important step towards solving many of these issues.

FAM Implementation Agenda

7. Single Pilot FAM Project for Each Region

HMFP recommends that each Region select a single designated FAM hospital to serve as a pilot project for FAM implementation, and that within 4-6 months, the hospital leadership at this designated FAM hospital appoints or hires a senior physician and nursing leadership team to head the future FAM at their hospital.

The hospital leadership should also consider establishing a FAM Advisory Committee for the hospital with representation from professional groups and departments that will be affected by the transition to the FAM model. This advisory committee would serve as a formal structure for receiving input from relevant stakeholder groups within the hospital community, and for communicating decisions made by the Hospital and FAM leadership.

Carrying out a pilot project at one hospital first will provide valuable experience and insights into the initial challenges and problems associated with a major transformation of services in the hospital emergency care delivery system. This experience will provide the opportunity for other regional hospitals to adjust their strategies accordingly, avoid repeating mistakes, accelerate their implementation schedules, and potentially save resources.

We understand that the Regions are in favor of starting the FAM units at all of the designated hospitals as quickly as possible. However, there are a number of challenges associated with going forward with implementation at all designated FAM hospitals simultaneously.

The widely discussed shortages of specialist physicians needed to staff the future FAM initially, according to the multi-specialty model, may make it impossible to adequately staff all of the region's FAM at the present time. Furthermore, as we have noted in several places in this report, we are concerned that it may prove difficult for the Regions to attract sufficient specialist physicians to work in the FAM, given the apparent widespread lack of interest in taking on active emergency care duties by

these physicians. Adequate incentives will need to be put in place to insure appropriate staffing by qualified individuals.

The current plans for implementing changes to the emergency care systems in both Regions include an ambitious array of new initiatives in addition to starting the new FAM units including; development of training programs for emergency physicians and nurses, adding advanced prehospital units, developing new models for "sub-akutmodtagelse" at non-FAM hospitals, major construction of new hospitals and renovation of emergency care facilities at many existing hospitals.

While we strongly support the overall vision and direction of these plans, we are also aware of the complexity and scope of work that they involve. We heard comments from a number of individuals in both regions who are involved with managing aspects of the current emergency care system and planning the new system, that they have insufficient staffing and resources to carry out existing work responsibilities and projects. If the Region goes forward with plans to start all of the FAM simultaneously with launching training programs for emergency physicians and nurses, as well as other emergency care initiatives, it will likely require significant resources.

8. Organizational Model of the FAM within the Hospital

HMFP favors the organizational model for the FAM proposed by Sundhedsstyrelsen, whereby all of the existing "akutmodtagelse" functions for the hospital patients be merged into one department that functions as the single portal of entry to the hospital for acute and undifferentiated patients (except for specific well defined patient groups with clear indications for definitive care that is available on an inpatient department).

We believe that this approach is most consistent with the long term goals of improving quality of care through standardization of emergency care delivery, and also utilizing existing senior physician resources most efficiently, which is necessary in order to achieve the desired quality of care. If hospital based emergency care delivery remains fragmented, as is currently the case, the more challenging it will be to achieve the desired standardization and improvement in quality of care.

We would also recommend that the FAM be organized as an independent clinical department within the hospital organizational structure with its own leadership, staff and budget in order to allow the FAM to evolve into a cohesive and effective department, to develop a sense of ownership over its clinical practice, and to negotiate from a position of strength with other hospital departments that it must interact with.

9. Model of Clinical Care within the FAM

HMFP recommends that the model of clinical care provided in the future FAM be clearly defined in order to demarcate the extent of patient care provided in the FAM by FAM personnel and what patient care will be provided in other departments and services that interface with the FAM, such as the inpatient specialty admitting services, the prehospital ambulance services, and the vagtlæge konsultation.

The FAM concept represents a radical departure from the traditional method of delivering emergency care in Danish hospitals that had been in place for generations. Many of the individuals we interacted with during our meetings and site visits did not clearly understand this new concept and many had conflicting views about how this new concept would work. Much of this confusion appeared to revolve around questions of which patients would be seen in the future FAM, what care would they receive in the FAM and who would this care be provided by.

We would suggest that the formal description of the model of clinical care in the FAM describe the types of patients and patient problems and their acuity levels; as well as a general overview of the scope of care that is intended to be provided.

We recommend that this model of clinical care in the FAM be limited to the initial management of acute patients associated with the triage, resuscitation and stabilization, initial diagnosis and treatment, observation, specialty consultation, and disposition. Definitive care beyond the initial resusciation and stabilization that falls within the scope of other specialists, such as major surgical procedures (for example, exploratory laparotomy), should be carried out in the home departments of these specialties.

Observation and extended management of selected patient groups in the FAM will allow for the possibility of completing the necessary diagnostic evaluation and treatment and discharging patients who in the past would have been admitted to the hospital. The longer that patients are kept in the FAM, however, the greater the number of signouts and handoffs of patients between providers, and the greater the potential for errors in communication and management. We recommend therefore that specific criteria be established for which patient groups are suitable for observation and extended management in the FAM and that the target timeframe for observation and extended management in the FAM be 24 hours.

10. Defined Scope of Practice of FAM Physicians and Nurses

HMFP recommends that the roles and scopes of clinical practice of FAM physicians and nurses be clearly defined in the context of the model of clinical care in the FAM described above and based on the discipline of Emergency Medicine.

Descriptions of the future role of emergency physicians and nurses will help clarify for the rest of the medical community what they can expect from FAM providers in the future, and also what will be expected of them in the future management of patients in the FAM.

FAM physicians and nurses should receive specific education, training and certification based on these defined scopes of practice; quality and performance metrics should also be based on the defined scope of practice.

11. Standardized Approach to Triage

HMFP recommends that the Region implement a standardized triage algorithm for the initial evaluation of all akut and undifferentiated patients arriving at FAM hospitals.

Some akutmodtagelse units are currently assigning triage scores to new patients on arrival, while others are not. Different triage scoring systems are being used by different akutmodtagelser. The use of a standardized triage algorithm at all of the Region's hospitals will provide an important metric for describing and understanding the acuity of patients presenting to the emergency care system that will be useful for management, quality improvement and planning purposes.

Numerous evidence-based triage algorithms exist and are in use across Europe and North America. Selected sections from the Emergency Severity Index (ESI) implementation handbook are included in the Appendix as an example.

12. Coordination between FAM and Vagtlæge Konsultation

HMFP recommends that the vagtlæge konsultation at each designated FAM hospital in the region be located adjacent to the FAM and that its operation be closely coordinated with the FAM, so that patient care, patient satisfaction, vagtlæge productivity and satisfaction as well as resource utilization is optimized.

There are currently many patients seen in the skadestuen, who could appropriately be cared for in the vagtlaege konsultation, as well as patients referred to the vagtlaege konsultation who turn out to be of a higher acuity than initially thought and who must be transferred to the skadestuen. Because of this overlapping patient population, there are clear advantages to having these services located adjacent to one another.

In most cases, the general practitioners working in the vagtlaege konsultationer have no nursing staff or support personnel whatsoever to assist with patient registration, patient flow, obtaining lab work or EKGs, housekeeping, etc. Productivity of GPs in the vagtlaege konsultation would be enhanced significantly with assistance from the FAM.

Projections by both Regions suggest that potentially large numbers of patients may, in the near future, not have primary care physicians, and would presumably turn to the vagtlaege system for care previously provided by their own GP. If this were to happen, it could potentially overwhelm the vagtlaege system and precipitate its collapse. By integrating and coordinating efforts with the FAM, the vagtlaege konsultation would be able to more easily shunt excess patients to the FAM during periods of high patient volume.

For these and many other reasons, we believe that the overall efficiency and quality of patient care would benefit from a close cooperation between the FAM and vagtlæge konsultation including the following specific suggestions:

- A single patient entry point and waiting room for both the FAM and VL where patients are registered, undergo a standardized triage evaluation by a nurse with specific training, and are monitored using standard protocols if their condition warrants.
- Exam rooms used by VL should be nearby or even potentially within the FAM, so that they can be managed, staffed, cleaned and stocked by FAM personnel, thereby freeing the vagtlæge from these low value-added tasks.

- FAM nursing staff and support personnel should support the vagtlæge konsultation when it is in operation, and carry out whatever nursing and support functions are needed to insure high quality, efficient patient care.
- The vagtlæge should have the same function and scope of practice as in the past; evaluating and treating patients referred through the vagtlæge telefon visitation.
- Future contracts between the Regions and the vagtlæge system should reflect these organizational and operational changes, which will benefit the patients and staff alike.

13. Coordination between Psychiatric and Somatic Akutmodtagelse

HMFP recommends that the medical screening of patients with psychiatric complaints be carried out in coordination between the FAM and the psychiatric akut modtagelse.

Medical clearance in the FAM of patients with psychiatric presentations will allow for the detection and stabilization of medical co-morbidities among patients with true psychiatric disease, as well as identification of patients whose psychiatric symptoms are in fact caused by non-psychiatric causes (intoxication, poisoning, trauma, hypoxia, infection, etc.)

14. FAM Facilities Planning

HMFP recommends that the FAM leadership at the hospital level play a central role with the planning process for renovation and new construction of FAM facilities.

In our observations some facilities seemed to be ideally suited for a quick conversion to the new FAM model while others were not so well suited, (for example, due to the long distance from vital supporting services such as radiology, the ICU and operating theaters).

Within the next 6-8 months the FAM leadership should carry out a readiness audit of facilities available for emergency care delivery in the designated FAM hospitals focusing on key resources and configuration issues. Based on this assessment, short term (2-5 years) and long term (5-10 years) plans for facilities improvements should be developed based on anticipated patient volumes and acuity. Each Hospital FAM committee should develop an estimate of short term facilities improvements or upgrades necessary to start operation of a FAM at the facility. A facility readiness audit should focus on key facilities resources and configuration issues such as:

- Proximity to other specialty services in the hospital (radiology, surgical theaters, intensive care units, cardiac catheterization labs, labor and delivery,)
- Number of beds
- Decontamination facilities
- Respiratory isolation rooms (positive and negative pressure)

- Emergency radiology suite adjacent to FAM
- Patient care area layout based on concept of segregating patients by acuity vs. organ system/admitting physician specialty
- Vacuum tube system for transporting specimens to dedicated stat lab serving FAM

It is important that the patient care space in the future FAM be designed to support the model of clinical care that is envisioned. Emergency departments in the past were built to accommodate a multi-specialty model of care that usually segregated patients by the specialist providing their care (f.ex. internal medicine, general surgery, orthopedics, etc.). The current consolidated approach to emergency care where all patients are seen initially by the emergency physician depends on a facility model where patients are segregated by acuity and the majority of patients rooms are equipped to allow management of nearly any type of patient.

It is essential that the FAM facility be organized and equipped to support carrying out the specific surgical interventions that fall within the scope of practice of emergency physicians including: minor surgical procedures, such as suture repair of lacerations, closed reduction of fractures and dislocations, drainage of abscesses, central venous access, tube thoracostomy, and also selected emergency surgical procedures associated with resuscitation of critical patients that must be performed immediately, i.e. cricothyroidotomy and thoracotomy.

Major surgical procedures (exploratory laparotomy, intra-abdominal control of hemorrhage, open reduction and internal fixation of fractures, etc.) are beyond the scope of practice of the emergency physician and should not be carried out in the FAM.

The operational requirements, organization and culture of surgical departments and emergency departments are significantly different, and if you try to combine these in the same physical space, you gain nothing in terms of patient benefit assuming that the operating theaters are located nearby (i.e. in the same building, 1-2 floor above) and potentially lose much in terms of the higher quality that is achieved when each of these distinct disciplines are able to refine their operations and do what they know how to do best in their own clinical environments.

C. OTHER RECOMMENDATIONS

Healthcare Data & Informatics

15. Office for Healthcare Informatics

HMFP recommends that the Region establish or designate an Office for Healthcare Informatics with responsibility for developing a central registry for tracking all emergency patient encounter activity within the Region.

As we have noted throughout this report, one of the main obstacles we faced in trying to understand and analyze the current Danish emergency care system is the widespread lack of sufficient reliable data to form a clear overall picture of emergency care activities and patient movement through the many sectors and

departments that comprise the emergency care system. In the absence of sufficient reliable data, it is impossible to carry out many essential administrative functions, such as quality assurance and planning.

In the course of our attempts to work with regional personnel to gather data on the emergency care system, we were often told that data we were seeking exists, but is located in multiple different sources that are not linked together. Our view is that efforts by the Region to consolidate and link these disparate data sources would yield great benefits in terms of easier access to data, which would allow for easier analysis and use of data in administrative and planning activities.

16. Standardized Set of Basic Emergency Patient Encounter Registration Data

HMFP recommends that the Regions adopt a standardized set of information that is gathered on all emergency patient encounters regardless of sector (hospital, prehospital, primary sector) and including all patient contacts as well as telephone contacts.

Despite the assistance of regional data consultants, it was not possible for HMFP to carry out any analyses of emergency patient care involving patient transfers from the primary sector to the hospital sector. So despite the fact that the primary sector plays a major role in emergency patient screening and referral for further care in the hospital sector, there proved to be no easy way to monitor whether that system functions well or poorly by tracking the downstream outcomes of emergency patients in the hospital system whose care began with contact to the primary sector.

By systematically gathering and aggregating basic emergency patient encounter data at the regional level, one could easily track emergency patient flow through the healthcare system and automatically identify cases where the standard of care was potentially not met using standard screening markers.

An example of a basic emergency patient encounter data set is included in the data summary section of the report.

17. Standardized documentation of patient care in the FAM

HMFP recommends that the Regions adopt a standardized set of patient medical data and move toward the use of standardized forms for documenting the care provided during FAM patient visits at all FAM hospital.

We observed that patient care documentation forms were not standardized throughout the Regions and appeared to vary from hospital to hospital. This variation complicates efforts gather and aggregate data for understanding trends within the Region's emergency care system.

FAM patient care documentation forms should at a minimum include information describing:

- Presenting (chief) complaint
- Triage acuity

- Triage vital signs
- History of Present Illness
- Past Medical History, medications, allergies
- Physical exam
- Diagnostic data
- Medical decision making,
- Treatments / interventions and patient response
- Disposition, and follow up plans

18. Electronic Patient Medical Record For the FAM

HMFP recommends that the Regions develop a standardized electronic patient medical record that is compatible with electronic medical records in the other emergency services that interface with the FAM (prehospital, hospital-based and primary sector).

We observed a number of different electronic medical record systems in different sectors and departments, but were routinely told that it was not possible to easily access electronic patient data from other sectors or departments. For example, if a patient arrived in the skadestuen, it is not possible for personnel to look up electronically whether the patient had been seen recently in the vagtlæge konsultation. Establishing electronic registration and medical record systems that are inter-compatible will provide tremendous advantages for both patients and providers and administrators.

19. Electronic Patient Data Tracking Systems for the FAM

HMFP recommends that the Regions develop patient data tracking and decision support tools to facilitate the delivery of high quality emergency care in the region's FAM.

Although we observed a number of patient data tracking systems in various hospital inpatient departments, we did not see any examples of these in the Regions' skadestuer, which are the likely initial homes of the future FAM units. It is our belief that with the increased volume expected in the future FAMs, and the increasing acuity of patients it is an essential tool to maintaining and overview of the departments and ensuring an efficient throughput of patients.

Quality Improvement Recommendation

20. Quality Standards related to FAM Operations

HMFP recommends that regional and hospital FAM leadership work with IKAS to develop an expanded set of quality standards and indicators for the FAM that build on the existing IKAS / DQM framework.

Many of the existing IKAS / DQM standards for emergency care recommend audit strategies for compliance with standards that involve random sampling of relatively small numbers (30) of patient charts. We suspect that this strategy is not likely to identify systems problems that result in only intermittent errors or adverse events. We would instead suggest the use of quality improvement "triggers" or screening markers to identify cases for routine review. Examples could include:

- The unintended transfer of a patient from initial "home department" ("stam afdeling") to another "home department"
- The unintended transfers from one inpatient home department (stamme afdeling) to another within a specific time frame (within 72 hours, within 1 week)
- The unintended, unforeseen deterioration of emergency patient within 24 hours of admission to non-intensive care unit
- Patients requiring intubation, central venous access, on the non-intensive care unit
- Patients requiring transfer to intensive care unit from non-intensive care unit
- Patient death on non-intensive care unit
- Patients sent home from the FAM that have unintended returns to the emergency care system (ambulance system, primary care emergency system, hospital emergency system) within 72 hours of discharge from the FAM

21. Clinical Guidelines

HMFP recommends that specific clinical guidelines should be developed along with indicators for tracking implementation and methodology for monitoring results, within 8-12 months of start of the FAM.

Examples of potential target areas for clinical guidelines include areas where there is wide variety in clinician management with potential significant gains in patient outcome through standardization:

- Sepsis
- Abdominal pain
- Chest pain / myocardial infarction
- Pneumonia
- Stroke
- Trauma

Research Recommendations

22. Research framework for studying impact of implementation of FAM model

HMFP recommends that within 2-4 months the Regions should fund the establishment of an independent research effort to study the impact of implementation of the FAM model.

This research effort should establish a framework of measurable indicators that define the aspects of the emergency care system that the Region is seeking to change (structures, processes and outcomes) related to patient care, patient satisfaction, resource utilization, etc. Baseline measures should be made before significant changes are implemented to the clinical system.

Data gathered over time will be able to show the impact of implemented changes, provide opportunities for evidence based modifications in strategies, if necessary, and make the case for adopting this model as a national strategy if it is successful.

Prehospital Ambulance Services

23. Lead Regional Agency for Prehospital care

HMFP recommends that the Regions expand the role of the AMK to become the Lead Regional Agency for coordinating and managing daily prehospital emergency care activities and operations within the Region and between Regions.

These expanded responsibilities and functions should include medical supervision and oversight of:

- 112 alarmcenter operations; including establishing quality standards, guidelines, education of personnel, and quality monitoring,
- dispatch functions at the vagtcentral,
- prehospital care via the ambulance services,
- emergency medical communications and coordination for routine medical emergencies as well as extraordinary regional emergencies.

Integrated guidelines should be developed for the 112 alarmcentral system and the vagtlaege telephone visitation system to insure that patients receive the most appropriate medical response regardless of which pathway they choose to access the emergency care system through.

This expanded AMK entity should be led by the Regional Medical Director for Prehospital Care, and given adequate resources and personnel to carry out this expanded role.

Under the current system of prehospital care there is a lack of recognition of the need for medical leadership, decision making and oversight of the alarm and dispatch phases of patient care. Although there is involvement by the regional medical director in the development of dispatch protocols and education of alarmcenter operators, the medical director does not have the authority to carry out quality review of alarmcenter operations, which severely limits quality assurance efforts. We also

have concerns that the regional medical directors have insufficient staff and resources to carry out their medical oversight, administrative, educational and other responsibilities effectively.

In our opinion, dispatch decisions about what type of call warrants what kind of ambulance response is solely the purview of medical leadership as long as the resources exist to provide different levels of response, which is the case at the regional level.

24. Improved Dispatch of Advanced Prehospital Ambulance Resources

HMFP recommends that the Region improve dispatch strategies for the physician ambulance to more accurately target patient calls that require immmediate physician assistance.

Under the current system, fewer than 20% of emergency calls to which an ambulance laege is sent are judged to have a condition requiring the immediate intervention by a physician (NACA score 4-6). [11] As a result, the vast majority of patients that the laegebil is being sent to could appropriately be cared for by other, less skilled providers, or in other venues such as a FAM or within the vagtlaege system. Two Danish studies have described the problems with dispatching the appropriate level of ambulance [32, 33] Some of this mis-triage may be a function of the fact that patients themselves decide whether to access the emergency care system by contacting the 112 system or the vagtlæge system. There is an implied assumption that if patients choose to contact the 112 system they do so because they are more acutely ill or injured and are in need of more urgent medical attention than if they choose to contact the vagtlaege system or their own physician, and vice versa. Patients may potentially under- and over-estimate the severity of their condition and may choose to access the emergency care system via the wrong route (112 vs. vagtlaege/egen laege).

More accurate dispatch guidelines and strategies will allow for more effective utilization of the senior anaesthesiologists who staff the laegebil. Interlocking telephone triage guidelines for the 112 system and vagtlaege system will insure that all emergency patients receive the medical response that is appropropriate for their condition, regardless of which access system they initially contact.

25. First Responder initiatives

HMFP recommends that the Region explore the development of First Responder initiatives where Police, Fire or other public safety personnel receive training in basic first aid, CPR and the use of semi-automatic external defibrillators (SAED), and are equipped with the basic equipment to perform these simple, proven, life-saving interventions that require only minimal training to perform effectively.

Ambulance response time data from both Regions reveal that more than 25% of all priority 1 (kørsel 1) ambulance runs have response times greater than 10 minutes. In cases of cardiac arrest, survival decreases by 10% per minute in the absence of effective CPR. A trained first responder who is able to arrive on scene before the

ambulance will be able to assess the patient and initiate simple, but potentially life saving interventions such as CPR and semi-automatic defibrillation. In cases where the patient proves not to require immediate intervention from a physician, the laegebil can be waived off and redirected to patients where their intervention is required.

The use of First Responders to provide initial out-of-hospital care is a well documented, cost-effective strategy for improving survival rates in out of hospital cardiac arrest.

Primary Sector-Based Emergency Care

26. Vagtlæge Telephone Visitation and Konsultation System

HMFP recommends that the Region explore possibilities for extending the hours of operation for the vagtlæge telefonvisitation and konsultation system from 16 hours per day to 24 hours per day and discontinue the mobile vagtlaege service.

The vagtlaege telefonvisitation and konsultation systems both have excellent accessibility and see large volumes of patients during their current hours of operation. The mobile vagtlaege service is able to provide care for a very limited number of patients per hour, primarily due to the fact that the physician spends considerable time in transport between patients and their base of operations.

Anecdotal reports suggest that it can be significantly more difficult to contact one's own GP with an urgent problem during regular working hours than it is to contact the vagtlæge system during off-hours. GPs told us that they routinely have their secretaries triage these phone calls during office hours.

A 24-hour vagtlæge solution would provide more uniform accessibility for patients to physician advice and consultation at all hours. It would also decrease interruptions to GPs during their scheduled office hours and potentially allow them to increase their productivity by not having to deal with as many unscheduled patient contacts.

The additional hours of physician coverage for the vagtlæge telefonvisitation and konsultationer could be covered in part by discontinuing the mobile vagtlaege service, which sees relatively few patients, and using those physician hours to expand the telefonvisitation and konsultation hours of operation. If there are insufficiant GP's to staff the vagtlaege system functions 24 hours per day, options could be explored for implementing nurses and nurse practitioners to work under the supervision of GP's in both the telefonvisitation and konsultationer.

III. NEXT STEPS

The recommendations described above represent an overall framework of related action items that HMFP recommends the Regions implement to rapidly move towards their stated goal of improving and standardizing emergency care delivery across the emergency care delivery system.

HMFP proposes the implementation of these recommendations proceed in the order listed, with the goal of seeing concrete short term deliverables as well as clear progress towards development of longer term programs and initiatives during the next year of the project.

Political / Administrative Implementation

1. Hire / appoint leadership at regional and designated FAM hospital level for developing FAM system, training programs
2. Identify one hospital per region to serve as a demonstration project for FAM implementation
3. Commit to inter-regional cooperation on a combined training effort for FAM personnel and leadership
4. Establish FAM steering and advisory committees
5. Allocate necessary funding to support activities in Phase Two

FAM Implementation

6. Draft versions of organizational, operational plans (3 months)
7. Facility audit to determine readiness; necessary changes prior to launch
8. Develop plans for migration, merger of services

Education & Training Implementation

9. Establish training program steering Committee with curriculum working group
10. Identify relevant guidelines, other required inputs; establish framework, process, timeline for completing curriculum for physician and nurse training programs
11. Leadership administrative workshop for regional and 2 pilot hospital leadership – fall 2008? focus on actual organizational challenges, concrete solutions
12. Clinical immersion course(s) for FAM leadership
13. Hire / appoint physician / nurse clinical educators

Healthcare Data & Informatics Implementation

15. Establish Office of Healthcare informatics
16. Appoint healthcare data, informatics committee for each region; develop/adopt initial agenda for first 6 months
17. System audit of regional informatics framework, capabilities, needs

Quality Improvement Implementation

18. Establish Regional and hospital FAM QI committee with liaison to IKAS; develop / adopt agenda for first 6 months
19. Identify specific target areas for developing clinical pathways within first 6-12 months

Research Agenda Implementation

20. Establish research framework (proposal) with Dept of Clinical Epidemiology at Aarhus University to study impact of FAM implementation
21. Submit proposal to Regions for approval (3 months)

IV. REFERENCES

1. *Rapport fra arbejdsgruppen vedrørende den akutte patient i den præhospitale indsats*. 2007, Region Midtjylland: Viborg.
2. Jensen, J.W., *Ja tak til opgaveglidning* Ugeskr Læger, 2007. **169**(44).
3. Carl, E.R., et al., *ENA's new guidelines for determining emergency department nurse staffing.* J Emerg Nurs, 2003. **29**(3): p. 245-53.
4. Huddy, J., *Emergency Department Design: A Practical Guide to Planning for the Future*. 2002: ACEP.
5. *Rapport fra arbejdsgruppen vedrørende akutmodtagelser*. 2007, Region Midtjylland: Viborg.
6. *Bilag til Regionsrådets møde "Akutplan Region Midtjylland"*. 2007, Region Midtjylland: Viborg.
7. *Organisering af Akutmodtagelsen i det fremtidige universitetshospital i Århus.* 2006, Århus Amt: Århus.
8. *Lægeprognose 2000-2025*. 2003, Sundhedsstyrelsen: København.
9. *Lægeprognose 2004-2025*. 2006, Sundhedsstyrelsen: København.
10. *Styrket Akutberedskab – planlægningsgrundlag for det regionale sundhedsvæsen.* 2007, Sundhedsstyrelsen: København.
11. *Bilag til rapport om styrket akutberedskab – planlægningsgrundlag for det regional sundhedsvaesen*. 2007, Sundhedsstyrelsen: København.
12. *OECD Health Data 2007: Statistics and Indicators for 30 Countries*. 2007, Organization for Economic Cooperation and Development.
13. Bjerre, S.K., et al., *Præhospital behandling af patienter med akut forværring af kronisk lungesygdom før og efter indførelse af lægeambulance* Ugeskr Læger, 2002. **164**(10).
14. Jensen, J.W., *Something Rotten in the State of Denmark* Ugeskr Læger, 2007. **169**(46): p. 3925.
15. *Stillings- og vakancetælling pr. 15. december 2005*. 2005, Sundhedsstyrelsen: København.
16. Anderson, P., et al., *The globalization of emergency medicine and its importance for public health* Bulletin of the World Health Organization, 2006. **84**(10).
17. Jensen, J.W., *En afbureaukratiseringsreform* Ugeskr Læger, 2007. **169**(47): p. 4027.
18. *Den Dansk Kvalitetsmodel, Standarder og indikatorer for sygehuse, Høringsmateriale*. 2007, Institut for Kvalitet og Akkreditering i Sundhedsvæsenet.
19. *Emergency medicine: concepts and clinical practice*. 4th ed, ed. P. Rosen and R. Barkin. 1998, St. Louis, Missouri: Mosby - Year Book, Inc.
20. Hockberger, R., et al., *The Model of the Clinical Practice of Emergency Medicine: A Two-Year Update.* ACAD EMERG MED, 2005. **12**(6).
21. Anderson, P. and J. Fisher, *Education and Certification of Emergency Medicine Physicians.* Tidsskrift for Dansk Sundhedsvæsen, 2007. **September**(7).
22. Bushra, J.S., et al., *A comparison of trauma intubations managed by anesthesiologists and emergency physicians.* Acad Emerg Med, 2004. **11**(1): p. 66-70.

23. Levitan, R.M., et al., *Alternating day emergency medicine and anesthesia resident responsibility for management of the trauma airway: a study of laryngoscopy performance and intubation success.* Ann Emerg Med, 2004. **43**(1): p. 48-53.
24. *Emergency Medicine Guidelines*. 2007 August 15 2007 Accreditation Council for Graduate Medical Education (ACGME) [cited January 15, 2008]; Available from: http://www.acgme.org/acWebsite/RRC_110/110_guidelines.asp#res.
25. Kevin, M.B., et al., *The Tuscan Emergency Medicine Initiative.* Annals of Emergency Medicine, 2007. **50**(6): p. 726-732.
26. *Certification Examination for Emergency Nurses*. [website document] 2007 Emergency Nurses Association [cited january 15, 2007]; Available from: http://www.ena.org/bcen/cen/.
27. *Scope of practice of emergency nursing*. 1999, Emergency Nursing Association.
28. *Trauma Nursing Core Course (TNCC)*. [website document] 2007 Emergency Nurses Association [cited January 15, 2007]; Available from: http://www.ena.org/catn_enpc_tncc/tncc/aboutcourse.asp.
29. *Advanced Cardiac LIfe Support*. [website document] 2007 American Heart Association [cited January 15, 2008]; Available from: http://www.americanheart.org/presenter.jhtml?identifier=10000015&q=acls.
30. *2005 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care.* Circulation, 2005. **112**(24 Supplement).
31. *Pediatric Advanced Life Support*. 2007 American Heart Association [cited January 15, 2008]; Available from: www.heart.org/presenter.jhtml?identifier=3012001
32. Bach, A. and E.F. Christensen, *Accuracy in identifying patients with loss of consciousness in a police-operated emergency call centre - first step in the chain of survival.* Acta Anaesthesiologica Scandinavica, 2007. **51**(6): p. 742-746.
33. Andersen, M.S., T.T. Nielsen, and E.F. Christensen, *A study of police operated dispatch to acute coronary syndrome cases arising from 112 emergency calls in Aarhus county, Denmark.* Emerg Med J, 2006. **23**(9): p. 705-706.