

Balancing Machine Work, Comfort Work, and Sentimental Work

A field study of patient care in the ambulance

Pedersen, Maria Ie; Hansen, Magnus; Hertzum, Morten

Published in:
SHI2011 Proceedings

Publication date:
2011

Document Version
Publisher's PDF, also known as Version of record

Citation for published version (APA):
Pedersen, M. I., Hansen, M., & Hertzum, M. (2011). Balancing Machine Work, Comfort Work, and Sentimental Work: A field study of patient care in the ambulance. In R. W. Fensli, & J. G. Dale (Eds.), *SHI2011 Proceedings: 9th Scandinavian Conference on Health Informatics* (pp. 36-40). TAPIR Akademisk Forlag.

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain.
- You may freely distribute the URL identifying the publication in the public portal.

Take down policy

If you believe that this document breaches copyright please contact rucforsk@kb.dk providing details, and we will remove access to the work immediately and investigate your claim.

Balancing Machine Work, Comfort Work, and Sentimental Work: A Field Study of Patient Care in the Ambulance

Maria Ie Pedersen, Magnus Hansen, Morten Hertzum

Computer Science, Roskilde University, Universitetsvej 1, Bldg 43.2, DK-4000 Roskilde, Denmark
mariaie@ruc.dk, magnuha@ruc.dk, mhz@ruc.dk

Abstract

To improve prehospital care ambulances carry increasingly sophisticated equipment aimed at initiating patient care already at the scene of injury. The competent use of this equipment is central to prehospital care but it also competes for increasing amounts of the ambulance crew's time and attention. We investigate ambulance care in three of Denmark's five healthcare regions, which staff ambulances with emergency medical technicians, paramedics, and physicians. Using the concept of illness trajectory we analyse how the ambulance crews balance machine work, which involves continuously monitoring the equipment, comfort work, which is actions taken to relieve the pain or discomfort of the patient, and sentimental work, which is care for the patient's physical and mental well-being, often verbal in nature. The analysis shows that comfort and sentimental work often takes priority over machine work, but also that this has negative consequences. Equipment for use in ambulances should aim at supporting the ambulance crews in competently and dynamically balancing the different types of work and should, consequently, avoid binding the crew's attention for unbroken periods of time.

Keywords:

Prehospital care, medical response, paramedic work, illness trajectory

Introduction

Prehospital care is essential to the successful treatment of patients, especially those seriously injured [1-3]. Starting treatment within the first hour after an injury is so important that this period is often referred to as 'the golden hour' [3]; for some injuries the critical period is even shorter and the concept of 'the platinum ten minutes' [4] is sometimes used to indicate an upper limit for the time spent stabilizing the patient at the scene prior to transport. This puts severe pressure on the police officers, fire fighters, and ambulance crews who are normally the responders first on the scene [1]. And, it has led to equipping ambulances with still more devices, such as equipment for defibrillating the patient, monitoring the patient's vital signs, communicating with emergency department (ED) clinicians, and so forth. The competent use of this equipment is a core element of prehospital care but it also occupies a substantial part of the ambulance crew's

attention. That is, it takes time away from other activities such as talking with the patients to calm them down, get information about the course of events, explain what is going to happen, reassure the patients that their relatives are being informed, and so forth.

This study investigates the balance that ambulance crews are continually striking between attending to their equipment and attending directly to the patient. Obviously, these two kinds of work are blended in that ambulance crews can, for example, attend primarily to the patient while at the same time monitoring some of their equipment. There are, however, limits to this blending, and the increasing amounts of equipment in the ambulances tend to shift the balance toward attending still more to equipment.

In Denmark the next piece of equipment in the ambulances will be an electronic ambulance record (EAR) that will provide better documentation of the prehospital care and enable closer collaboration between ambulance crews and ED clinicians. Closer collaboration with ED clinicians while en route to the hospital is, at least in some of Denmark's five healthcare regions, part of a decision to abandon sending physicians to the scene and, instead, staff ambulances with paramedics that are in close contact with physicians at the ambulance control center. A similar goal is pursued in, for example, Germany [5] and the UK [6]. Our research into the possibilities for and consequences of IT support in prehospital care is conducted in the context of the ongoing preparations for a nationwide EAR tender. In this context, we aim to study the work of the ambulance crews; that is, how they manage and shape prehospital patient care.

Illness Trajectory

To analyse the work in the ambulance, we employ the concept of *illness trajectory* devised by Strauss et al. [7]. Illness trajectory is an analytic term used by Strauss et al. [7] to describe and order the various events of health work as it unfolds at hospitals. Their interest is on describing the work in itself and not, for example, from a process perspective.

An illness trajectory embraces the *course of illness* itself as well as the work organised around this course and its impact on patient, kin and medical staff. Strauss et al. [7] identify six types of such work: (a) machine work which is work on and around machines, for example monitoring; (b) safety work which concerns the management of risks related to the illness

and the medical interventions; (c) comfort work which is work that relieves the patient from the discomforts caused by machine work, medical interventions, the illness itself, or the organisation of work; (d) sentimental work which revolves around the patient's physical and mental well-being, mostly expressed verbally; (e) articulation work to ensure the collaborative shaping of the trajectory; and (f) the work of patients.

In this paper we will look at machine, comfort, and sentimental work, which are the dominant types of work in the ambulance. The relative prominence of these types of work changes dynamically. For sentimental work, Strauss et al. specifically write [7, p. 140]: "...they are actions done during the medical scenes; sometimes they are front and center, more often they are at the margins of the main line (medical-nursing, technical) of action." We contend that this is true for all three types of work.

There are two striking features in the management of trajectories. First, a trajectory often faces *contingencies*. In routine cases the trajectory most likely proceeds as anticipated but in more complex cases unexpected incidents, such as the cancellation of an x-ray or the worsening of the disease, affect the course of the trajectory. Thus, the management of the trajectory is an interplay between control and unexpected contingencies. Second, the work done is *people work* in the sense that it is work *with* the patient – as opposed to work done *on* the patient. Contingencies and the patient's actions can affect the course of the trajectory in unexpected ways. Thus, managing the illness trajectory is not simply to organize anticipated actions. It is equally a matter of shaping the course of the illness coping with contingencies and the actions of the patient. This makes each trajectory unique.

In prehospital care the setting is a bit different from that of hospital care. The ambulance crew carries out treatment on the basis of symptoms (called a prehospital diagnosis) rather than a diagnosis, since they do not have the professional authority to make diagnoses. In addition, ambulance care is performed over a limited period of time and only performed by one paramedic or emergency medical technician.

Method

Ambulance work is roughly divided into three stages. The first stage is the arrival at the scene of injury where the crew assesses the injury or illness of the patient and stabilizes the patient for transportation. The second stage is in the ambulance where the patient is treated based on the prehospital diagnosis and, in severe cases, the ambulance crew announces the patient to the ED. The third stage is the arrival at the ED where the patient is handed over to the ED clinicians. The handover often consists of a verbal account of information gathered at stages one and two, along with a written ambulance record. After initial observations we decided to focus on the first two stages of the ambulance work because they include the main interactions with the patient and medical equipment.

To investigate the work of the ambulance crews we have conducted an empirical study based on observations using the principles of Blomberg et al. [8]. The observations were

conducted at three ambulance stations in three of the five healthcare regions in Denmark. The regions approved the study while agreement about the observations was made with each station individually. The study took place over a period of three months and comprised 66 hours of observation divided onto 30 ambulance runs with 12 teams (each team consisting of two people who are either emergency medical technicians or paramedics).

The observations were conducted as third passenger, and we wore jackets with an "Observer" tag, so that patients would know we were part of the crew and thus subject to rules regarding patient confidentiality and anonymity. We were otherwise not introduced to the patients. The teams we observed were told that our observations were a part of the EAR project and that we observed them to better understand their work and how to support it with IT. The observations were followed up by in-situ interviews with the crews while working and in-between runs. We also conducted informal interviews with other paramedics at the station when the crews were idle. These interviews served as a general elaboration of our experiences and provided explanations about how equipment was used in the stabilization of patients. We primarily recorded our observations in written notes. Considering the delicate and often acute situations with sick or injured people, we found this more appropriate than using dictating machines. In addition, the use of a dictating machine might also have limited the interaction in the sense that the patient would feel less prone to tell more private details otherwise relevant in the situation. We supplemented the written notes with audio-recorded notes at the end of each run, with diary notes containing impressions from the day, and with pictures of ambulance records with private data greyed out.

The analysis of the notes was done as ethnographic content analysis in which the categories and concepts emerged as the study progressed [9]. The initial analysis gave us an understanding of the situation, setting, and the types of work, dividing it into *clinical* actions and *non-clinical* actions. We defined clinical actions as the actual treatment or documentation of vital parameters, while non-clinical actions was background information or communication with the patient about the injury or the treatment. However, it turned out that the distinction between clinical and non-clinical actions did not explain the meaning of the actions as part of the whole trajectory. As we observed more and more runs, clinical and non-clinical actions became increasingly difficult to distinguish. We instead analysed the data using the terms machine work, comfort work and sentimental work from Strauss et al. [7]. Using these terms to encompass and distinguish actions provided for an analysis that better captured ambulance care.

Results

Managing the course of the illness trajectory in the ambulance can be a challenge because decisions are made on the fly and actions are performed at the expense of other actions. The ambulance crew has to nurse and comfort the patient while continuously making prehospital diagnoses and treating the patient by monitoring the patient's vital parameters. The work

performed is partly planned on the basis of the indications of the illness or injury, but contingencies may appear and call for actions other than those planned. In the following, we will first show examples of typical kinds of work and, then, of how these types of work may conflict with each other.

Machine work in the ambulance

Machine work is work done with and around machines. In the ambulance this work is mainly caused by the use of the “LifePak” (LP). The LP is a mobile general-purpose machine that records heart rate, blood pressure, saturation of oxygen, and it also works as a defibrillator. The ambulance crew always assumes the worst and always tries to prepare for contingencies. Hence, the first thing they do upon arrival at the scene of injury is to gain an overview of the situation and make a prehospital diagnosis. The LP is indispensable for this purpose, or as a paramedic expresses it: *“An ambulance without an LP is not an ambulance.”* This statement is underlined by the fact that one of the first actions taken when the paramedics arrive at the scene of injury is to connect the LP to the patient, as the following excerpt from our field notes shows: *“On arrival, the paramedics calmly ask what the problem is. The man gaspingly explains that he feels dizzy, has chronic obstructive pulmonary disease (COPD) and was discharged from hospital a week ago without oxygen. The paramedic connects the LP to the patient through a clamp attached to the patient’s finger to record the saturation of oxygen. The paramedic quickly dismisses the level of saturation: “Well, it’s not oxygen that you need.”* In this example we see three types of machine work. First, the actual action of connecting the LP to the patient. This may seem simple but as the situation is acute, it is critical to get a quick reading of the patient’s condition in order not to administer the wrong treatment. Second, monitoring the outcome of the measurements (the oxygen reading). Third, making a prehospital diagnosis based on the reading. This prehospital diagnosis will shape subsequent actions en route to the hospital.

A fourth type of machine work is also important, though not visible in the above example. The ambulance crew must record readings, clinical observations of the patient, and basic patient information. This type of machine work mostly benefits the ED clinicians but it also serves as documentation of the actions taken by the ambulance crew.

Comfort work

By doing comfort work the ambulance crew tries to prepare, prevent, minimize or relieve discomfort. Comfort work is a central part of ambulance care because treating patients often involves situations of distress and discomfort.

A first assessment of discomfort always takes place upon arrival at the scene of injury when the paramedics create an overview of the patient’s situation: *“When we walk into the room, the patient is sitting in her bed and she complains about a constant oppression in the chest. The LP is attached to the patient right away to make a five-point electrocardiography (ECG) and the paramedic asks whether it hurts when she is breathing. It does hurt, so she is administered heart medicine and during the ambulance run the pain is assessed at regular intervals.”* As this case from our field notes illustrates, the

assessment of discomfort is often connected with the illness itself and machine work done to assess discomfort.

In other cases discomfort may be caused by the ambulance crew trying to minimize or relieve discomfort through medication, as shown here from an otherwise unproblematic ambulance run: *“The paramedic needs to put an IV on the patient to give her something for her nausea. He shows her the needle and tells her not to pull back her hand while telling her that she will feel a small pinprick. The patient cries and starts hyperventilating. As a response the paramedic tells her that he has to do it. The patient does not agree and begs the paramedic not to do it. The paramedic tells her again that he has to do this. He then urges her to relax and says: “I know it is nasty”. The patient starts to cry again and the paramedic comforts her, saying that he too hated needles as a child.”* What happens in this case is that the paramedic must deal with the contingency of the patient’s strong reaction against the needle. He does this by trying to prepare the patient for the discomfort, encouraging her to endure the pain by acknowledging her discomfort.

Sentimental work

In the above example of the man with COPD we see a second type of work going hand in hand with the machine work: biographical work. Biographical work, which seeks to uncover the patient’s medical and social story, is a type of sentimental work. In most cases it unfolds as the ambulance crew tries to get an overview of the patient’s condition. The different types of sentimental work are important to the trajectory in the ambulance, and they are intertwined with all other types of work.

Sentimental work can be intertwined with other work to ward off patient anxiety, as shown in the following excerpt: *“The paramedic takes an ECG, prints the result, and tells the patient that it looks fine and she does not have to worry about her heart.”* In this example, telling the patient not to worry is the sentimental work but it can only be performed due to the machine work (looking at the ECG) being performed first. Sentimental work can also be as simple as the ambulance crew explaining to the patient what they are doing, as shown in the following excerpt: *“The paramedic measures the blood pressure and then the blood sugar, but before doing so he tells the patient: “I am going to measure your blood sugar, so I am gonna make a prick in your finger. You might feel a little pinprick.”* Here the first verbal action taken is the sentimental work where the paramedic explains what is about to happen. After that, the paramedic performs comfort work because he prepares the patient for pain (the pinprick). As a result both sentimental and comfort work are used to ward off the patient’s anxiety.

Overall, sentimental work is what often makes the trajectory proceed more smoothly. Its necessity stems from the patient’s need to feel treated well. Also, informing the patient about the situation can make it easier to take other actions in the ambulance.

Conflicts in the illness trajectory

It is striking how the different types of work are often intertwined and how this affects the way in which the ambulance crew manages the illness trajectory. We will show

that their work is not just a matter of shaping but also of balancing and prioritizing between different types of work.

Sentimental work is often used in handling contingencies. They may not always be critical but still sufficiently disturbing for the other types of work to be compromised, as this excerpt from our field notes shows: *“The ambulance is dispatched to a baby with fever convulsions. Upon arrival the grandmother starts crying and the paramedic comforts her and tells her that it is very normal for children to react this way when the fever rises fast. In the ambulance on the way to the hospital the LP is attached to the baby, and the baby is given oxygen. The grandmother is seated next to the baby and is very upset. When the paramedic picks up the ambulance record and a pen to register the values of the LP, the grandmother keeps repeating that she is shocked and keeps crying. The paramedic keeps trying to reach the LP with her gaze but when she does, the grandmother interrupts and keeps repeating the whole incident, so the paramedic is required to calm her down by telling her that she did the right thing.”* The grandmother’s reaction affects the machine work and, as a consequence, the paramedic has not finished the ambulance record upon arrival at the hospital. She has only registered a single measurement of blood pressure, heart rate, and saturation. Because the paramedic is unable to calm down the grandmother, sentimental work moves from the margin to the centre of action at the expense of machine work. The paramedic must balance the sentimental work necessary to calm down the grandmother against the machine work that also needs to be done. This balancing is necessary because an upset grandmother in the ambulance would only result in a more upset child. However, the sentimental work comes at the cost of neither monitoring the outcome of the machine work nor recording it in the ambulance record. The absence of recordings has the consequence of losing transparency in the course of illness for the hospital staff later on, because some information is missing. Instead the condition and experience of the grandmother are prioritized.

We have also observed conflicts while performing comfort work. As discomfort is often related to the administration of medication, contingencies may appear depending on how tolerant the patient is. In the case with the paramedic who has to put an IV on a patient to relieve her nausea, the work starts as comfort work but ends as sentimental work when the patient’s strong reaction urges the paramedic to communicate in order to abate the strong reaction: *“He then urges her to relax and says: “I know that this is nasty”. The patient starts to cry again and the paramedic comforts her, saying that he too hated needles as a child. Placing the IV takes most of the time during the journey from the scene of injury to the arrival at the ED. When they arrive at the ED the paramedic realizes that he forgot to write down the social security number of the patient and corrects the mistake before leaving the ED.”* The paramedic decides to administer a standard nausea medication to help ensure that the patient can have as comfortable transportation as possible. However, what is initially an action taken to minimize discomfort (placing an IV to administer nausea medication), ends with a sobbing patient that requires a lot of sentimental work encouraging her to keep her composure. The patient herself becomes a source of conflict because her nervousness needs to be dealt with. Again the

sentimental work moves to the centre of action and as a result, neither the monitoring nor the recording of the blood pressure is done because the paramedic has to devote his full attention to sentimental work. This creates – as in the previous example – an information gap in the course of the patient’s illness, because only some values are recorded. The ambulance crews frequently experience a trade-off between the patient’s immediate well-being (here: reducing nausea and discomfort with needles) and subsequently having a more thorough record of the work performed.

The balance in ambulance care can also be shifted in the other direction; that is, towards machine work. The following excerpt concerns an elderly lady who has experienced breathing problems all night and finally decided to call an ambulance: *“Upon arrival the paramedics learn that the patient has experienced three heart infarcts years earlier. In the ambulance, she is given oxygen and the LP is connected to monitor her heart rate. Upon arrival at the ED when she is about to be disconnected, her condition worsens and several systoles appear on the ECG. The situation becomes a bit hectic, as the paramedics need to move the patient but also to record what they just witnessed, as this is vital monitoring information.”* In this example, machine work takes priority, moving to the centre of attention, and the paramedics need to solve the logistic problem of hurrying the patient inside at the ED while at the same time keep monitoring her, because the sudden systoles might indicate a heart problem. Documenting the systoles would be valuable to the ED clinicians, but as the patient’s condition is worsening it is also important to stabilize her as quickly as possible. In this trade-off between information about the patient’s condition and actual treatment of the patient the paramedics, in this case, gave priority to the recording of information about the patient’s condition.

Discussion

In the preceding section, we have shown how the ambulance crews are shaping the illness trajectory throughout the ambulance run. In their work the ambulance crews must perform both clinical assessments of symptoms and more empathic work. One of the paramedics framed this very eloquently during our observations: *“An important part of the job is to calm down the patient. Doing this is a kind of humane craftsmanship.”* We argue, however, that shaping the trajectory often becomes a matter of balancing clinical machine work against humane comfort or sentimental work. Ironically, this challenge is partly caused by the introduction of equipment aimed at making the ambulance crews able to perform a better job. However, more equipment for precise readings of symptoms takes time and attention away from the patient. At the same time, the patient her- or himself also plays an important role. Depending on the course of illness and the patients’ reaction to the treatment and need for nursing they may take time away from the recording of readings and other patient information.

One of the expectations for the EAR system is to free up time previously spent on machine work so that the ambulance crew can focus more on the patient. Automating the process of recording equipment readings and integrating the EAR with the LP could help achieve this. Whether more equipment

entails more or less work is rendered a moot point by Strauss et al. but they generally argue that some machine work has become more complicated [7, pp 60-61]. We find some support for this contention in our observations in that equipping the ambulances with machinery entails additional work practices rather than a simplification of ambulance work. The main reason for this development is that every piece of equipment requires some work, and this work competes for the ambulance crews' time and attention, along with comfort and sentimental work. As long as the ambulance crews are able to blend machine work with comfort and sentimental work in a balanced and competent manner the trajectory runs smoothly, but in some cases the equipment or the patient requires extra attention and the ambulance crew must give priority to one at the expense of the other. In these cases it is, at present, often machine work that suffers to provide time for comfort and sentimental work. The contingencies and the patient her- or himself also explains why the trajectory may vary substantially from run to run even though a process model of ambulance work makes it appear to be the same: drive to scene of injury, assess the patient, take patient to the ED, and hand over the patient to the ED staff.

The fact that no two runs are alike makes it difficult to pinpoint when and where it could be fruitful to support ambulance work with equipment such as information technology. What we can say is that it is important to devise information technology that supports ambulance crews in balancing the different types of work competently and dynamically and to avoid equipment that requires the crew's attention for unbroken periods of time. We recommend toning down procedural approaches to the description of ambulance work in favour of a more functional approach. This provides for acknowledging a richer set of constituent activities and for remembering that ambulance work is work *with* people. The skill in working *with* people must be supported by the equipment, including EAR, and should not be viewed by designers as dispensable, secondary, or independent of the design of the equipment.

Conclusion

In this study we have investigated patient care as it unfolds in the ambulance. The most common types of work that emerged during the ambulance runs were machine work, sentimental work, and comfort work. Machine work is related to continuously monitoring the patient through the LP. Sentimental work is related to verbal care, and comfort work is related to the mental and physical care of the patient. The ambulance crews balance these types of work in their continual response to the situation. Different patients invoke different patterns of trajectory work. In some cases the balancing of machine work, comfort work, and sentimental work involves no conflict, and the shaping of the trajectory flows naturally. In complex cases either the medical equipment or the patient requires so much attention that the ambulance crew is forced to give priority to some types of work at the expense of others. During our observations, machine work was often sacrificed to provide room for sentimental and comfort work. In these cases the patient treatment was often neither monitored nor documented.

We found Strauss' conceptualisation of hospital work useful in a prehospital setting. It provided a nuanced understanding of the richness of prehospital work as opposed to fitting the work into a process perspective, which may render invisible the important differences between individual ambulance runs. We argue that when new information technology is introduced in ambulances it should support the ambulance crew in balancing work rather than pre-specify the order of actions in an attempt to optimize patient care.

Acknowledgements

We are thankful to the ambulance crews and the patients in Region Northern Jutland, Region South Denmark, and Region Zealand for letting us observe the ambulance runs.

References

- [1] Elmqvist C, Brunt D, Fridlund B, and Ekebergh M. Being first on the scene of an accident - Experiences of 'doing' prehospital emergency care. *Scandinavian Journal of Caring Sciences* 2010; 24(2): 266-73.
- [2] Hodgetts TJ, and Smith J. Essential role of prehospital care in the optimal outcome from major trauma. *Emergency Medicine* 2000; 12(2): 103-11.
- [3] McNicholi BP. The golden hour and prehospital trauma care. *Injury* 1994; 25(4): 251-4.
- [4] Calland V. Extrication of the seriously injured road crash victim. *Emergency Medicine Journal* 2005; 22(11): 817-21.
- [5] Beul S, Mennicken S, Ziefle M, and Jakobs E-M. What happens after calling the ambulance: Information, communication, and acceptance issues in a telemedical workflow. In: *Proceedings of the i-Society 2010 International Conference on Information Society*. Los Alamitos, CA: IEEE Press; 2010.
- [6] Hyde P, Mackenzie R, Ng G, Reid C, and Pearson G. Availability and utilisation of physician-based pre-hospital critical care support to the NHS ambulance service in England, Wales and Northern Ireland. *Emergency Medicine Journal* 2011.
- [7] Strauss A, Fagerhaugh S, Suczek B, and Wiener C. *Social organization of medical work*. Chicago, IL: University of Chicago Press; 1985.
- [8] Blomberg J, Giacomi J, Mosher A, and Swenton-Wall P. Ethnographic field methods and their relation to design. In: Schuler D and Namioka A, editors. *Participatory Design: Principles and Practices*. Hillsdale, NJ: Erlbaum; 1993. p. 123-56.
- [9] Altheide DL. Reflections: Ethnographic content analysis. *Qualitative Sociology* 1987; 10(1): 65-77.

Address for correspondence

Maria Ie Pedersen, Computer Science, Roskilde University, Universitetsvej 1, Bldg 43.2, DK-4000 Roskilde, Denmark, email: mariaie@ruc.dk.