

Sepsis in Poland: Why Do We Die?

Marta Rorat^{a, b} Tomasz Jurek^a

^aDepartment of Forensic Medicine, Wrocław Medical University, and ^bDepartment of Infectious Diseases, Regional Specialist Hospital, Wrocław, Poland

Key Words

Patient safety · Malpractice · Health-care quality · Sepsis

Abstract

Objective: To investigate the adverse events and potential risk factors in patients who develop sepsis. **Subjects and Methods:** Fifty-five medico-legal opinion forms relating to sepsis cases issued by the Department of Forensic Medicine, Wrocław, Poland, between 2004 and 2013 were analyzed for medical errors and risk factors for adverse events. **Results:** The most common causes of medical errors were a lack of knowledge in recognition, diagnosis and therapy as well as ignorance of risk. The common risk factors for adverse events were deferral of a diagnostic or therapeutic decision, high-level anxiety of patients or their families about the patient's health and actively seeking for help. The most significant risk factors were communication errors, not enough medical staff, stereotype-based thinking about diseases and providing easy explanations for serious symptoms. **Conclusion:** The most common cause of adverse events related to sepsis in the Polish health-care system was a lack of knowledge about the symptoms, diagnosis and treatment as well as the ignoring of danger. A possible means of improving safety might be through spreading knowledge and creating medical management algorithms for all health-care workers, especially physicians.

© 2014 S. Karger AG, Basel

Introduction

Patient safety has become a priority of health-care systems all over the world [1]. However, the scope of decisions made is very diverse. In many countries there are special systems which report medical errors or adverse events [2, 3]. The data collected allows for the analysis of high-risk situations in health care that may cause or even escalate already existing threats to patient health or life [1–4]. Adverse events lead to prolonged and multiple hospitalizations, additional risky procedures and increased costs [5]. Hence, the aim of what can be broadly understood as quality control is to monitor the correct implementation of medical procedures and to maximize the chances of achieving the desired effect, which is a fast and safe diagnosis followed by the patient's return to good health. In addition, such reports are an excellent source of knowledge for all physicians, not only for those who are at the beginning of their careers [1]. The majority of literature reviews [6–10] show that most of the published reports deal with hazards that are unrelated or indirectly related to human factors, such as drugs and vaccine adverse events, nosocomial infections and defective equipment. However, much less is written about the human factor of the dangerous behavior of health-care workers [10], despite fallibility being a human characteristic. One way of ensuring safety is to develop a strong, systemic defense mechanism against our own imperfections. Researchers focus mainly on emergency situations, where the risk of failure due to the severe health condition

of patients and the number of invasive procedures are exceptionally high [5, 11–15]. The leader in regard to the safety culture is the USA, which provides much of the data relating to safe medicine, such as the organization of adverse events and ways to avoid them [9]. Despite the fact that over 20 years have passed since the publication of the famous report entitled *To Err Is Human* [9], the safety of patients and, at the same time, the legal security of physicians remain a utopian ideal in Poland. Poland lacks a central system for reporting medical errors, and even more so for reporting adverse events. Since no data are collected, no adequate mechanisms can be implemented to prevent risky situations.

The goal of this study was to improve health safety in patients who develop sepsis by investigating the causes of adverse events and potential risk factors for their occurrence. Sepsis is one of the most important but also often very complex diagnostic conditions and is currently of particular interest in intensive care medicine [16]. The main objective outcome in this issue is to reduce patient mortality since sepsis is a leading cause of death, especially in hospitals [16, 17]. Many factors determine its course, including the type and the virulence of the pathogen, the means of transmission, immune system capacity, general health conditions, or the time required to diagnose and begin appropriate treatment. Failure may be caused by the atypical, crafty or even fulminant course of infection, the lack of doctors' knowledge and experience, ignorance of the threat posed by the invasive infection and medical errors committed as a consequence.

Subjects and Methods

A retrospective analysis of 55 medico-legal opinion forms in sepsis cases issued by the Department of Forensic Medicine, Wrocław, Poland, between 2004 and 2013 was carried out. The opinions were drawn up at the request of the prosecutor or court and examined for medical errors by an expert group that comprised forensic medicine, infectious diseases and intensive care specialists. All medical errors occurred between 2000 and 2013 in different Polish regions, and many of the court cases are still ongoing. Only community-acquired infections were taken into account, while nosocomial and congenital infections were excluded. The material included data from medical documentation (full patient medical records as recorded by physicians and nurses), phone records (only for the emergency services) and testimonies from health-care workers and patients or patients' families obtained during ongoing lawsuits alleging medical malpractice. In their analysis, the authors focused on searching for human rather than systemic factors. The authors were not able to compare the results with a control group, as the number of cases without identified malpractice was inadequate.

Results

Of the 55 medico-legal cases, 26 (47.3%) related to females and 29 (52.7%) to males diagnosed with sepsis. The age of the subjects varied from 2 weeks to 68 years. Twenty-six (47.3%) were children under 18 years of age, and 49 (89.1%) had died. Of the 49 deaths, the time from the onset of the symptoms to death was less than 7 days in 30 cases (61.2%) and less than 48 h in 16 cases (32.7%). Deaths following hospital admission occurred in 51% of cases (25/49), while 5 patients (10.2%) died at home. Twenty five (56.8%) died in less than 48 h after admission and 21 in under 24 h. Seventeen patients had a central nervous system infection, 18 had pneumonia, 2 had phlegmon of a limb, 2 had arthritis, 2 had tonsillitis, 2 had endocarditis, 1 had peritonitis, 1 had pyelonephrosis and 1 had an abdominal abscess, while others only had sepsis. All 55 analyzed adverse events were caused by 113 health-care workers (98 doctors), which is approximately 2 per patient.

The most common causes of medical errors were a lack of knowledge in recognition, diagnostics and therapy in 46 (83.6%) cases and ignorance of risk in 40 cases (table 1). In 22 cases the physical examination conducted by the doctors was incomplete or was not performed at all, whilst in 10 an incomplete or improperly collected medical history was found. In 28 cases we discovered delays in blood tests being ordered, resulting in late recognition. In 22 patients antibiotic treatment initiation was delayed. In 17 cases the doctor did not know the principles of antibiotic therapy. In 16 cases a lack of experience amongst the health-care workers was a significant cause of error. In addition, in 15 cases inappropriate transportation of the patient by private car contributed to the deterioration of their health.

Our study revealed many potential risk factors for adverse events (table 2). The most common were deferral of a diagnostic or therapeutic decision and significant anxiety on the part of the patient or their family about the patient's health and subsequently actively searching for help. The third were 'nonspecific symptoms' (in health-care workers' opinions), which diverted attention and hindered diagnosis, for example abdominal pain, bruising and numbness of the limbs, red rash, blisters, joint and limb pain, lameness, loss of appetite, swelling of the eyelids, swelling of the skin, sore throat, skin inflammation, coma, anemia, jaundice and ear discharge. The most important risk factors were communication errors, including phone consultations, repeating diagnoses of other doctors without verification, insufficient medical staff during weekends and for specific duties, staff having an excess of responsibilities, stereotypical thinking about diseases –

Table 1. Reasons for adverse events

Reasons	Cases, n (%)
Lack of knowledge	46 (83.6)
Ignoring patient safety	40 (72.7)
Deferring or lack of additional examinations	28 (50.9)
Insufficient or lack of physical examinations	22 (40.0)
Deferring antibiotic therapy	22 (40.0)
Incorrect initial qualification of a patient for urgent aid	20 (36.4)
Lack of monitoring of a patient's condition	19 (34.5)
Being unfamiliar with the rules of antibiotic therapy	17 (30.9)
Lack of experience	16 (29.1)
No verification of own actions in connection with the change in a patient's health	15 (27.3)
Incorrect transportation of a patient – use of private transport	15 (27.3)
Shifting responsibilities between the emergency services and night help	11 (20.0)
Incomplete or incorrectly collected medical history	10 (18.2)
Division of duties – redirecting between specialist, hospital and outpatient department, and outpatient department and emergency medical services	10 (18.2)
Deferring emergency aid, such as fluid therapy or intubation	9 (16.4)
Not referring a patient to a hospital	3 (5.4)
Focusing on redirecting the patient rather than on treatment	3 (5.4)
Lack of verification of procedures performed	2 (3.6)

'easy diseases' (e.g. smallpox, angina, urinary tract infection, bronchitis, otitis, sinusitis, arthritis, phlebitis, jaundice in newborns) and dismissing serious symptoms with easy explanations (e.g. chest pain as neuralgia, foot bruising as pressure on the popliteal artery from sitting on a chair, arm numbness as the presence of a peripheral venous catheter, diplopia as the result of sitting in front of a computer, vomiting and hemorrhagic rash as the side effects of antibiotics).

The most common first symptoms of sepsis were fever, vomiting, weakness, headache and joint/limb pain. All symptoms which appeared before a diagnosis was determined are listed in table 3. In our study adequate proceedings were found to be delayed, and urgency only increased at obviously life-threatening moments, such as sudden cardiac arrest, respiratory failure, septic shock, hemorrhagic rash, decreased level of consciousness or gastrointestinal hemorrhage.

Discussion

In this study, the most important reason for medical errors relating to cases of sepsis seemed to be a lack of knowledge regarding recognition, diagnosis and therapy (especially in fluid resuscitation and antibiotic treatment, type of antibiotics and dosing). There was a striking lack

of awareness regarding the symptoms of sepsis and its course. Diagnostic errors that many researchers concentrate on [18] concern the general (basic) medical examination, as well as a lack of microbiological analysis. Adverse events occurred even if the scope of examination was correct since it was postponed (by doctors and nurses) while the patient's condition required urgent intervention. Doctors did not check whether nurses had carried out the procedures as ordered. These abnormalities resulted not only from ignorance, but also, among other factors, from either perceiving no recognizable risk or ignoring it – which constitutes another extraordinarily significant psychological error factor.

Another risk factor was the fact that patients or their families were ignored, for example in their complaints and the symptoms they presented. There are many reasons that can explain such an attitude, beginning with ignorance, fatigue, too many responsibilities, lack of experience, negative feelings towards the patient in question, lack of motivation, and aversion to work and to patients in general [19]. In some cases ignoring danger had a reciprocal effect, a kind of interpsychological dependence. Doctors were not alarmed after having examined desensitized patients who presented a dismissive approach towards their own diseases, negating their malaise and symptoms, and, in effect, deferring the search for help. Such a situation is directly associated with communication errors [20, 21].

Table 2. Risk factors for adverse events

Risk factors	Cases, n (%)
Deferment of a diagnostic or therapeutic decision	32 (58.2)
By a doctor	20 (36.4)
By a patient or their family	5 (9.1)
Both by a doctor and a patient or their family	7 (12.7)
Significant anxiety of the patient or their family about the patient's health and actively searching for help	25 (45.4)
'Nonspecific symptoms', which divert attention and hinder diagnosis	21 (38.2)
Apparent procedures that do not lead to the recovery of a patient (accidental and inadequate examinations and treatment – usually management of symptoms)	18 (32.7)
Shifting responsibility onto a patient and other doctors (delegating)	16 (29.1)
Additional disease (severe or chronic)	16 (29.1)
Stereotype-based thinking about diseases – easy, trivial	16 (29.1)
Weekend care	14 (25.4)
Repeating diagnoses of other doctors without verification	13 (23.6)
Lack of a plan of action/lack of an emergency plan (improvisation)	12 (21.8)
Phone consultations	11 (20.0)
Incorrect doctor-patient communication	10 (18.2)
Young age of health-care workers	9 (16.4)
Explaining symptoms with easy solutions (lack of inquiry into the cause of the problem)	9 (16.4)
Lack of mutual control among health-care workers (between doctors and nurses)	8 (14.5)
No verification of the outcome of specialist consultations – taking it for granted	8 (14.5)
Excess of responsibilities	6 (10.9)
Misleading medical history – diverting attention from the essence of the health problem	5 (9.1)
Negative feelings towards a patient – aversion, aggression	4 (7.3)
Medical consultation in the absence of a patient	2 (3.6)
Being on duty on a different ward	1 (1.8)
Suspecting that a patient is faking the symptoms	1 (1.8)

In an alarming number of cases doctors did not sufficiently review the medical history of the patient or did not carry out a proper physical examination. In almost all cases analyzed these most fundamental and easy medical procedures would facilitate the suspicion of sepsis, even during the first contact with a patient.

Organizing transportation from a patient's home and between hospitals requires a detailed discussion. Because of frequent and unjustified calls for help, emergency medical dispatchers have become increasingly restrictive when deciding to send an ambulance. Unfortunately, often in connection with an incorrectly collected medical history, this leads to help being refused when necessary, which occurred in the analyzed cases. The decision not to send an ambulance was justified by comparing the theoretical time of transporting a patient by ambulance and by private car. Paradoxically, the recommendation to use private transportation is justified by pointing to the patient's welfare and the urgency to provide help. Another problem connected with transportation is a dispute between emergency and ambulatory services (so-called

night and holiday medical help) when it comes to their jurisdiction. In our research, this conflict – mutual redirection of patients between ambulatory care and emergency services – caused a delay in the diagnosis and treatment of sepsis in 20% of patients.

Our analysis also highlighted risk factors for adverse events, which had or potentially could have an influence on the patient's condition. The most frequent one was deferring diagnostic and therapeutic decisions. The second risk factor was the intensive search for help by the patients or their families as a result of deep concern about their condition. Information obtained during discussion with a patient about previous repeated appointments or phone consultations should convince the doctor to pay close attention to the patient's problem. The lack of a plan of action also deserves comment. In the majority of situations analyzed, doctors did not present enough insight and willingness to look for alternative solutions, but, what is more, their actions had no strategy whatsoever. On the one hand, this is connected with apparent procedures, management of symptoms and decisive chaos, since a

Table 3. Incidence of sepsis symptoms

Symptoms	Cases, n (%)
Fever	46 (83.6)
Significant fatigue	45 (81.8)
Vomiting	28 (50.9)
Diarrhea	21 (38.2)
Consciousness disorders (quantitative)	20 (36.4)
Dyspnea	19 (34.5)
Hemorrhagic rash	18 (32.7)
Cyanosis	15 (27.3)
Stomach ache	12 (21.8)
Headache	10 (18.2)
Full body pain	8 (14.5)
Muscular hypotonia	8 (14.5)
Balance disorder	6 (10.9)
Chest pain	5 (9.1)
Joint pain/arthritis	5 (9.1)
Visual disturbances	5 (9.1)
Hemoptysis	2 (3.6)
Photophobia	1 (1.8)
'Feeling of dying'	1 (1.8)

lack of a diagnosis leads to a lack of an appropriate treatment. On the other hand, however, any medical activity consoles the doctors as they constantly react to patients' symptoms and complaints. To some extent this also affords an illusionary feeling of safety to patients who feel that they are receiving professional help. The lack of a plan may also be associated with stereotype-based thinking about diseases, and it is another important risk factor for adverse events. In Poland it is common to treat chicken pox as a trivial disease, which everyone should go through in childhood. In 3 analyzed cases this was identified as the reason for medical error. Thinking that one patient equals one disease seems to be another risk factor. The first, usually easier and more common diagnosis becomes almost automatic, thereby ceasing the search for the reasons for symptoms, and diagnostic sensitivity to other symptoms disappears.

When analyzing risk factors, one cannot ignore the working conditions of health-care personnel in Poland, especially in hospitals. In the 'blame culture', poor working conditions are usually used as an excuse for making mistakes, but in the 'culture of safety' they constitute a challenge that the health-care system must face. The analyzed cases revealed some irregularities, including workers having several places of employment, long shifts, oftentimes on several wards at the same time, with reduced medical personnel, shortages of medical equipment, poor

working organization, and poor logistic planning of branches and laboratories. The academic literature presents many examples regarding the influence of working conditions on mistakes, such as fatigue, night work, schedule instability and long shifts of at least 24 h, but also illness, medications, stress, alcohol, physiological and emotional problems [22–24].

'To err is human' is not a slogan that can be served as an excuse for committing medical errors. Therefore, safety in the health-care system has become of utmost importance almost all over the world [1]. The first step to achieving this goal is to identify the weak points in the current system and to find their causes. As far as sepsis is concerned, one would think that there are many effective ways to reduce morbidity. Health-care workers themselves play a significant role through their knowledge, motivation, need for security, attitude to their work and patients, and willingness to put in extra time and effort to acquire new qualifications. In Poland, the evolution towards patient safety is moving forwards very slowly, mainly because of a lack of money. Financial problems influence not only patient care, safe medical equipment and the control system, but also the organization of training for workers regarding new procedures and regular, obligatory highly specialized education. Therefore, we need time, money and fundamental changes in the area of training health-care workers and the functioning of the health-care system to significantly improve the quality of services in our country.

Conclusion

The most common causes of adverse events regarding sepsis in the Polish health-care system were a lack of knowledge concerning symptoms, diagnosis and treatment, and dangers being ignored. The most common risk factors in our study were related to deferring the decision to provide help, referring to the hospital for making a diagnostic or therapeutic decision in time. In order to improve the safety of patients with sepsis, we recommend spreading knowledge and disseminating medical management algorithms to all health-care workers and especially to doctors. Change is required both in outpatient and inpatient care.

References

- 1 World Health Organization: World alliance of patient safety: WHO draft guidelines for adverse event reporting and learning systems. 2005. http://www.who.int/patientsafety/events/05/Reporting_Guidelines.pdf (accessed December 30, 2013).
- 2 Flemons WW, McRae G: Reporting, learning and the culture of safety. *Healthc Q* 2012;15: 12–17.
- 3 Rafter N, Hickey A, Condell S, et al: Adverse events in healthcare: learning from mistakes. *QJM* 2014. Epub ahead of print.
- 4 Evans EM: Patient safety: make it a priority for your organization! *J Med Pract Manage* 2010;25:373–378.
- 5 Pottier V, Daubin C, Lerolle N, et al: Overview of adverse events related to invasive procedures in the intensive care unit. *Am J Infect Control* 2012;40:241–246.
- 6 US Food and Drug Administration: FDA adverse event reporting system (FAERS). <http://www.fda.gov/Drugs/GuidanceComplianceRegulatoryInformation/Surveillance/AdverseDrugEffects/default.htm>.
- 7 VAERS: Vaccine adverse event reporting system. <https://vaers.hhs.gov/index>.
- 8 Girouard S, Levine G, Goodrich K, et al: Infection control programs at children's hospitals: a description of structures and processes. *Am J Infect Control* 2001;29:145–151.
- 9 Kohn LT, Corrigan JM, Donaldson MS (eds): *To Err Is Human: Building a Safer Health System*. Washington, National Academy Press, 1999.
- 10 Oyeboode F: Clinical errors and medical negligence. *Med Princ Pract* 2013;22:323–333.
- 11 Rothschild JM, Landrigan CP, Cronin JW, et al: The critical care safety study: the incidence and nature of adverse events and serious medical errors in intensive care. *Crit Care Med* 2005;33:1694–1700.
- 12 Valentin A, Capuzzo M, Guidet B, et al: Patient safety in intensive care: results from the multinational Sentinel Events Evaluation (SEE) study. *Intensive Care Med* 2006;32: 1591–1598.
- 13 Bleetman A, Sanusi S, Dale T, et al: Human factors and error prevention in emergency medicine. *Emerg Med J* 2012;29:389–393.
- 14 Tevlin R, Doherty E, Traynor O: Improving disclosure and management of medical error – an opportunity to transform the surgeons of tomorrow. *Surgeon* 2013;11:338–343.
- 15 Pham JC, Andrawis M, Shore AD, et al: Are temporary staff associated with more severe emergency department medication errors? *J Healthc Qual* 2011;33:9–18.
- 16 Kübler A, Mayzner-Zawadzka E, Durek G, et al: Częstość występowania sepsy w oddziałach intensywnej terapii w Polsce. *Anestezjol Intens Ter* 2007;2:90–94.
- 17 Moss M: Epidemiology of sepsis: race, sex, and chronic alcohol abuse. *Clin Infect Dis* 2005;41(suppl 7):S490–S497.
- 18 Croskerry P: Perspectives on diagnostic failure and patient safety. *Nurs Leadersh* 2012; 25:50–56.
- 19 Jurek T, Rorat M: Adverse event analysis in fatal cases of influenza A (H1N1) – a lesson from Poland. *J Forensic Leg Med* 2013;20: 1131–1134.
- 20 Cochran GL, Haynatzki G: Comparison of medication safety effectiveness among nine critical access hospitals. *Am J Health Syst Pharm* 2013;70:2218–2224.
- 21 Ogundiran TO, Adebamowo CA: Surgeon-patient information disclosure practices in southwestern Nigeria. *Med Princ Pract* 2012; 21:238–243.
- 22 Gander P, Purnell H, Garden A, et al: Work patterns and fatigue-related risk among junior doctors. *Occup Environ Med* 2007;64: 733–738.
- 23 Landrigan CP, Rothschild JM, Cronin JW, et al: Effect of reducing interns' work hours on serious medical errors in intensive care units. *N Engl J Med* 2004;351:1838–1848.
- 24 Stripe SC, Best LG, Cole-Harding S, et al: Aviation model cognitive risk factors applied to medical malpractice cases. *J Am Board Fam Med* 2006;19:627–632.