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The Assumptions of The Program For Trauma Centers Creation in Poland

Założenia Programu Tworzenia Centrów Leczenia Urazów w Polsce

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The aim of the article was to inform about the actions taken by the advisory committee in regards to curing the most serious complications. The committee was founded in 2006 in order to implement the new act for medical rescue. It mainly consists of national advisers and presidents of scientific societies in the fields of medicine mostly related to traumatology together with directors of Polish trauma centers. The elaborate statement is based upon the current epidemic of disparate results for heavy injury treatments between Poland, the EU, and North America. The economic argument that generation of large indirect costs by a low level treatment has a major significance. Assuming that accident casualties are tended to, it is thought – based on university hospitals in 10 largest cities – that creating centers able to admit patients with severe shock within an hour will help. The ability to reach a center would be available to a majority of the adult and infantile population. The hospitals appointed by local authorities will need the acceptance of the committee. The principles of the financing and needs regarding start-up have been discussed. Cooperation of the centers with other hospitals and departments among specialists has been proposed.

Celem przedstawionego opracowania była informacja o dotychczasowych działaniach przeprowadzonych przez doradczy komitet przy Ministrze Zdrowia dotyczących tworzenia centrów urazowych do leczenia ciężkich obrażeń ciała i ich powikłań. Komitet powstał w 2006 dla stworzenia nowego ogniwa w systemie ratownictwa medycznego. W skład komitetu weszli specjaliści krajowi, prezesi towarzystw naukowych dyscyplin medycznych związanych z szeroko rozumianą traumatologią, oraz kierownicy klinik urazowych. Opracowane założenia są oparte na aktualnych czynnikach epidemiologicznych dotyczących ciężkich obrażeń ciała i wynikach ich leczenia w Polsce, Europie, i Ameryce Północnej. Istotne znaczenie ma obecnie generowanie dużych kosztów pośrednich leczenia obrażeń w związku z niskim poziomem udzielanych świadczeń zdrowotnych. Przyjęto, iż ofiary wypadków w ciężkim stanie będą miały możliwość przyjęcia do szpitali uniwersyteckich w ciągu godziny i leczenia specjalistycznego w 10 największych miastach. Istniałaby zatem możliwość korzystania z tych ośrodków przez większość dziecięcej i dorosłej populacji.

Szpitaly wyznaczone jako centra urazowe przez miejscowe władze będą potrzebowały akceptacji komitetu. W ramach działania komitetu przedyskutowano także zasady finansowania i potrzeby związane z rozpoczęciem pracy centrów urazowych. Przedstawiono także propozycję współpracy centrów urazowych z innymi szpitalami.

Introduction

The presuppositions of the medical rescue bill propose including a system of highly specialized rescue centers, particularly stroke, interventional cardiology, and trauma centers. These three causes together account for 80% of rapid deaths. Better conditions for the ill would certainly make it possible to get the treatment results closer to world standards. In each of these diseases there exists a therapeutic window, the use of which significantly increases the chances to save the life. For stroke, the window is estimated to be 1-2 hours, for myocardial infarctions 2-4 hours, and for severe trauma the window is 1 to 4 hours since the accident. Delay in treatment means not only high

risk of death, but also increased risk of permanent disability, which together with people's tragedy results in underestimated economic costs in Poland.

The mortality rate for stroke in Poland is twice as high as that in Western Europe and the USA (90/100 and 25-80/100 thousand citizens respectively). The stroke departments created there resulted in a 28% decrease in death rate during the first 4 months of operation. The diagnostic and therapeutic equipment, treatment standards, and intensive care of the specialized medical staff are the basic keys to success here [1,2]. A similar situation occurs with myocardial infarcts. Only early diagnosis and thrombolytic or angioplastic treatment in a specialized department can increase the chances of

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survival [3]. In Poland, wherever appropriate cardiologic care system was initiated the mortality during first heart infarct dropped from 10 to 3%, as in the best Western centers.

However, the third "sudden assassin" i.e., trauma, has been neglected in Poland. Despite two long-lasting ministry programs in the 1980s and 1990s, conducted by eminent surgeons (Prof. K. Czyżewski, Prof. T. Wencel and Prof. J. Lipiński), no actions have been taken in this matter. These programs brought doubtless conclusions based upon detailed, multi-center epidemiological and clinical research. Their conclusions were compared with data from Western countries. The necessity for providing a higher level of treatment to the current system for accident casualties became obvious, yet to this day no projects regarding this matter ever came to term.

Trauma centers in the world

A well-known American trauma surgeon, H. Champion, introduced the following stages for creating a medical rescue system in the USA [4]. First, the standards for ambulatory equipment and procedures in life-threatening situations were laid out. Next, first-aid teaching methods for medical technicians were set with three categories needing advancement.

In most American states, hospital units have been appointed, thus creating local systems. Rescue medicine specialization has been introduced. In the beginning the candidates for operation were in sudden-onset cardiologic states. Trauma was taken into account in the 70s, and the final products of these actions were the BTLS (basic trauma life support) and ATLS (advanced trauma life support). Finally, a network of trauma centers with three reference levels had been set, with a 4th and 5th level added in the 90s. The whole concept was supervised by committees of trauma surgeons. Institutions taking care of epidemiological research, quality control, and research on organization have been created. The effect of all these actions emerged as a decrease in the severity of shocks and improved prognosis.

The pre-hospital and hospital period procedures [5], the evaluation of their accomplishment (using the national registry of trauma accidents, as in the USA, UK or Canada – authors reference) and finally, the accreditation for particular centers brought improvement of treatment results. Therefore, decrease in the num-

ber of deaths is possible.

The experience of developed countries definitely proved the effectiveness of the network of Emergency Medical Services – EMS and the network of trauma centers of different stages. Not only do they rescue people, but also they help to save money. It has been proven by a trauma clinic in Essen (Germany) [6]. During 25 years, with a low increase in trauma severity, the time in the intensive therapy ward increased, but the mortality dropped from 29% to 14%. Procedures have been introduced that are recognized as milestones of modern traumatology for early fracture stabilization, early intestinal feeding, ventilation with positive ex-hale pressure (PEEP), immunological support, newer procedures, orthopedic damage control, and last but not least the open lung concept, (which led to more frequent use of PEEP with higher values than before) [7]. In Munich, there has been stated a decrease in time to start a blood transfusion, to start a life saving operation, a drop in late diagnoses from 6 to 3% and a drop of mortality. All these differences were statistically significant [8].

The improvement in results after restructuring the trauma treatment system in the USA applies also to people over 65 with multiple traumas, which is another urgent problem to be solved in Poland. The 5% decrease in mortality in this group of victims is not related to the improvement in treatment of all shocks for elderly people [9]. The desire to obtain accreditation or to keep it brings a significant improvement in the level and results of treatment [4]. In one New York hospital, the overall mortality dropped by 25% (to 6.1% – compare this data with that from Polish centers) and by 50% in the emergency room and almost by 50% amongst the ill with injuries over 30 points ISS after implementing the prescribed changes. The frequency of unexpected survivals increased five-fold, the stay in the Intensive Therapy Ward and in the hospital in general was shortened. It was followed by a drop in complications, which implies that effective treatment took place in cases with heavier injuries. In 1998, the American Surgeon Society performed a verification of trauma centers. For this, 8000 patients had been tested, and a drop of 10% in hospitalization time, 1/3 in mortality, and 5% in treatment cost was shown [11]. Comparing the results of treatment for injuries with more than 155 ISS scores in 5 different accredited trauma centers, it has been shown that

outcome depends not only on severity and mechanism of injury or the age of the treated, but also on their ISS score [12,13]. The experience of the team is important. Also, the permanent presence of residents decreases the patient stay in the rescue department and shortens hospitalization [14].

Evaluation of quality has basic significance in traumatology. In Detroit, the quality data from 242 trauma centers has been analyzed [15]. A group of ill with multiple traumas were examined. The lowest mortality (4.8%) was recorded in 14 centers with over 1200 patients treated per year; the highest mortality (6.34%) was seen in 33 centers with admittance lower than 800 per year.

Traumatology in Poland

The results of treatment for multiple traumas obtained in leading Polish centers are not much different from those presented above, which are supported by numerous findings presented in Bydgoszcz and Warszawa during succeeding congresses of Polish surgeons in 1999 and 2001. These findings cannot be quoted here, but not mentioning them is difficult. since they confirm the observations of American authors: a trauma center's experience and accreditation are main elements in rescuing accident victims.

Generally, Polish observations on traumatology are alarming. The amount affected by trauma grows year after year as does the severity of injuries (more injuries to the head, thorax, abdominal cavity and multiple trauma). Post-trauma mortality is high (78/100 thousand people yearly), mortality after road accidents is 2-4 times higher than in western Europe and North America [7].

In the present system, it is not possible to meet set goals, which is the reason for previous and ongoing reform attempts:

- Securing for the severely injured optimal and complete diagnostic and medical procedures in one accredited center.
- Possibility for quick specialist dressing of multi-organ injuries such as brain and skull damage, backbone and spinal cord, main arteries or arm.
- Decrease of complications, high mortality, and post-trauma disability.
- Creation of a current registry system for data regarding trauma and results of treatment (i.e. about mortality and disablement)

- Recommendation of present diagnostic and medical standards, especially modern operation techniques.

Adapting the trauma centers' concept to Polish conditions would make it possible to improve the deplorable statistics, thus bringing highly valuable social and humanitarian advances. It would create measurable financial savings (less people unable to work and shorter recovery for 90% of heavy trauma, which is not included in the hospitals' costs). It would also bring back the future for general surgery, which has been gradually replaced by quickly developing departments that are highly specialized using newer and less traditional surgery therapy methods.

A team appointed for this task consisted of national advisors and presidents of scientific societies in the fields of medicine most connected to traumatology (general surgery, orthopedics, traumatology of moving organs, anesthesiology, neurosurgery, child trauma surgery, rescue medicine) together with directors of trauma centers in Poland. This team was led by minister Jarosław Pinkas.

Epidemiology of road accidents

Road accidents are the cause of 70-75% of the heaviest multi-organ body injuries. Thanks to police statistics, they are the only statistically documented group of heavy traumas in Poland [16]. Presently, only they may serve as the basis for description of the trauma process to the extent necessary for conclusions regarding organization of heavy trauma treatment. During the last five years, a drop in the number of road accidents was recorded, which contributed to a decrease in the number of dead and injured, but despite significant progress in contemporary aid the mortality rate remained unchanged. It is important because the Polish statistics concerning road accidents are worse than in the EU countries – more people on average die here per accident or per km of road. The relation between the injury and death is also unsatisfactory.

The number of the dead per number of accidents in particular province does not reflect the network structure of the emergency department and medical rescue team - most deaths are recorded in Lubuskie and Podlaskie province, where the highest amount of system units per population exists and the lowest population densities.

What is worth thinking about is the relation between the number of the dead

to the general number of victims – lowest in the Małopolskie and Śląskie province and also low in Łódzkie and Pomorskie. These places experience a large difference both in population and density, saturation of system units, and in road systems. Is the immeasurable effect quality and not quantity?

Planning of distribution of trauma centers

The frequency of accidents with heavy injuries is 1-2 patients per day per approximately 800,000-1,000,000 adult inhabitants. The experience of Western countries speaks of creating similar units for populations of at least 1 and optimal 2 million people and more. It appears from high costs but also from necessity of appropriate inflow of patients in order to use the possessed funds for maximum amount of patients and to acquire and sustain necessary experience and professional efficiency of the staff employed there.

On the other hand skipping the issue of transport the accident victims by choppers, the time of arriving form the accident place to the hospital should not exceed one hour. Therefore at first the centers should be created in the biggest city and academy agglomerations so that including the neighboring regions they should cover maximum amount of population. Preliminary estimations with regard to population of particular agglomerations and neighboring regions together with the distance of the capital of the province, adjusted afterwards by government data [17] point at: Silesia agglomeration (4.592 million habitants), Warsaw (3.238 million habitants), Łódź (2.294 million habitants), Poznań (1.884 million habitants), Wrocław (1.736 million habitants), Gdansk (1.734 million habitants), Bydgoszcz (1.573 million habitants), Lublin (1.302 million habitants) and Szczecin (1.043 million habitants). All together the mentioned above regions are inhabited by over 21.5 million people. Amongst the Academy hospitals only Białystok whose center could cover only 773.000 people is outside the list, yet its location is highly useful for creation of trauma center there, similar to Lubuskie province (with highest accident rate) where potentially live 719.000 charges. How would that refer to not listed Rzeszów (potentially 2.020.000 charges - almost whole province) , Kielce

(1.199.000) or Opole (1.085.000 – all province) even assuming higher significance of air transport. Let us give an example of such planning for Śląskie province. In the Silesia Agglomeration inhabited by almost 5 million people who mainly live in the cities a center located in Katowice would cover 95% of the population of province – all except two neighboring regions. More to this it would cover also Oświęcim, Chrzanów and Olkusz regions from Małopolskie province and also Strzelce region (63km, 86.000 people) together with Kędzierzyn-Koźle region (64 km, 110.000 people) from Opole province.

All suggested places of trauma centers are corresponding to places where the LPR choppers are on duty. During next two years a process of exchange of choppers is predicted. This generation change will create prospects in the near future. Firstly, the area covered by choppers will be altered (it is predicted that 100km range will be reachable within 30 minutes, which will significantly increase the area and population under the care of the centers. Secondly it will enable 24h duties with the limit of highly unfavorable weather conditions.

Trauma center standards

It is necessary to create the trauma centers in the hospitals that hold or plan to hold centers of intervention cardiology, angiocardiology and shock departments which with centralization of diagnostics will reduce the costs. The hospital should ensure the conditions for further treatment of the ill after complex dressing of all injuries together with their rehabilitation or lingering medical care for individuals who need it so that the problem of checking – out the patient after specialized treatment does not arise.

The accreditation should be available only for full-profile hospitals, having emergency department equipped according to highest reference standards. The Emergency Departments would not also take responsibility for preliminary dressing and sustaining life functions during life-threat states but also for full preliminary diagnostics.

For trauma cases they would also perform the operation treatment, planned according to priorities, and in case of such a need damage control divided into stages. The patients would stay in the department until all injuries are dressed and homeostasis stabilization.

Such a department should be equipped according to the needs of: general surgery with low invasive techniques, intensive therapy (with kidney-substitute treatment), neurosurgery and neurotraumatology, orthopedy and traumatology of movement organ and angiosurgery, with low invasive techniques, including intervention radiology.

It should also have: full range picture diagnostics, full range laboratory diagnostics, blood bank, possibility of consulting and cooperation of further specialists within the department and landing space for choppers.

The hospital must also have fixed rules of cooperation with:

- Rehabilitation centers with lingering ill care centers.
- Highly specialized centers for certain exceptional events (e.g. trans and re-plantation, necessity of complex recreation operations, such as in event of injuries of arm, backbone or scalds).
- Sanitary transport available on request – own or from Emergency Department.

Problem of child trauma and centers of child trauma surgery

Criteria for child trauma surgery departments are fulfilled by centers in Białystok, Katowice, Kraków, Lublin, Łódź and Poznań. All of them together with the rest should undergo accreditation for formalizing the position in the system. Some exceptions are valid for post-trauma children mortality (4 -5 lower), yet the issue of post-trauma disablement is particularly dramatic, and for the fact that relatively more of Polish children live in the villages i.e. beyond the assumed transport range of the accidents sufferers. Lengthening of allowable transport time to 1.5 or 2 hours may be the solution here which in regard to type of trauma experienced by children seems to be acceptable in some cases. Yet one should not forget that: children should be treated as adults but better.

The number of children is reaching 9 millions in Poland. They are 1 of the population and 1 of the accident victims and 1 of the hospitalized due to that. Like in case of the adults the percentage of heaviest multiple injuries is 10%. One difference however occurs: out of 100 hospitalized adults victims 10 dies, and for children 2.5 out of 100. One out of 10 children is subjected to trauma, every 100th needs hospitalization, out of those 10.000 is heavily injured and nearly 2000

(apparently healthy people) dies due to body injuries.

The utter conditions for children traumatology centers are:

- The center should secure the population of 0.5-1.5 million children.
- Central location should guarantee fast and safe land and air transport from the whole region.
- It should be able to cooperate closely with adult trauma center.
- It should be organized with the base of hospitals needing minimum outlays.

The provision of children trauma centers should be compliant to the need of structures of multi-specialist hospital for children and its organization and operation must be compliant with above utter conditions. Similar rules apply to medical, technical and administrative staff, and in selection of specialists certified abilities must be taken into account.

In regard to decided time criteria for arriving at the center (60 min - 60-70 km) and remembering the population amount which can be subject to mentioned hospitals care only centers in Katowice, Łódź, Kraków and nearly Poznań fit to the 0.5-1.5 million children range.

Organization of center's work

The patient is placed in the trauma center via Emergency Department. Utter criteria for admittance to the center (it does substitute orthopedic and traumatic departments or other but fill the gap between them), together will states of life threat resulting from fresh trauma (patient unconscious or/and in shock with breath insufficiency) are accepted.

The center admits also the casualties of accidents, preliminarily treated in other hospitals, after alignment of transfer transport conditions.

The Emergency Department performs the diagnostics together with preliminary and final operation treatment, and its end and stabilization of hemodynamic, neurologic and metabolic state the patient is transferred to the most appropriate (based on types of injuries or other therapy conditions) hospital department or intensive care department. Also there are placed patients who suffer from local or general distant intricacies (such as contagion, extemporary breath or circulation insufficiency, suppurative matters, neurological or metabolic troubles).

Patients in need of extemporary care after heavy trauma cannot however be an

additional load to operation departments longer than necessary. For them the hospital (agreed with the president of province) guarantees place in care center with appropriate level of supervision and rehabilitation – as first in order before the waiting.

Uniform medical documentation and central database for all patients and all trauma centers is needed. Its design (equivalent to one used in other countries Multiple Trauma Outcome Score – MTOS) is stated in document titled "Koncepcja systemu rejestracji obrażeń ciała i sprawozdawczości dla nadzoru specjalistycznego w chirurgii" presented by Poznań center (att. 1), uniform illness history in electronic form should be prepared before founding the center network.

Structure and equipment of trauma center

The suggested center of treatment of heavy, numerous and multi-organ body injuries should consist of: covered ramp for ambulances (at least 2 stands) and landing space for choppers not more than 50 m away from entrance, hospital rescue department, surgical block, intensive therapy department. The suggested center should have optionally 30-40 beds in trauma surgery department, general and vascular surgery department – as the base for employing and routine work of medical staff, necessary for keeping duties in the Center and neurosurgery department.

Extra personnel resources for center operation

The center has a task instead of structure profile. The basis of its operation are extra duties, supplying the duty team of Emergency Department. In order to conduct correctly the diagnostic and medical process an appropriate trauma team is activated. Other specialist supply the permanently on duty team of doctors, general and trauma surgeons together with specialized nurses, attendants, rescuers and X-ray technicians.

Expected advantages from the project

Mentioned above observations regarding results of accidents in Poland and in the world, analysis of accidents and epidemic research lead to the following conclusions:

- As shows the experience of coun-

tries where as a supplement of pre-hospital aid a network of accredited trauma centers has been build and accepted the procedure standards, records show a significant drop of post-traumatic mortality and the rate of disabled and unable to work as a result of body injuries.

- Polish experience from similar projects in regard to fresh heart infarct and brain stroke showed similar effects.
- Accustoming of medical rescue system despite certain progress in this matter does not bring perceptible results in statistics.
- The statistics of road accidents does not give the basis for conclusion that better or worse effects could be reflected in the development of local rescue network.
- Shock treatment results is some leading academy centers are twice better than in the whole country.
- Present high treatment costs of heaviest shocks (amounts between 20.000 and 100.000 and more PLN) are in the best event only 10% of general accident costs which consist of pensions, compensations, additional hospitalization and long rehabilitation, and also and mainly of long and permanent disability to work of accident victims.

Project aims are mainly reducing the mortality and lameness resulting from trauma to the level of that in EU and North America.

- Reducing the rate of avoidable deaths form present 20-25 to acceptable 10%.
- Reducing the posttraumatic mortality from 75 to 50 people out of 100000 inhabitants yearly (i.e. from 30 to 20 thousand people).
- Reducing the posttraumatic invalidity from 40 to 25% (in relation to 300.000 people hospitalized yearly due to accidents means decreasing the number of post-accident invalids from 120 to 75 thousand).
- Assuring conditions for liquidating results of catastrophes and mass accidents or terrorist acts in the largest agglomerations.
- Development of medical knowledge based centralized tests in the centers having excellent equipment, qualified staff and high amount of patients.
- Training of further medical staff (doctors, nurses, medical rescuers) inevitable for securing the country needs in this matter.
- Based on this possibility of participation in international programs not

only as performer of selected tests but also as co-author of projects and author of obtained results.

It should be accompanied by noticeable improvement of pre-hospital actions, where in short time one should notice statistic positive effects of rescue system development(reduction of pre-hospital traumatic mortality from present 50% to 25%).

Accomplishment of this task will have doubtless impact on the results obtained during further treatment stages – heavier injured and threatened patients are brought to hospitals.

Another part of improvement of public safety should be based on trauma prevention programs, which in Europe and in America (where they have been accustomed) resulted in a drop of number of trauma events and followed by reduction of mortality by approx. 30%.

Bypassing the immeasurable advantages (no less important) accomplishing task from point 1 and 2 should bring measurable economic effect. With the average accident victim age equal to 40 years the trauma in Poland cause a loss of 500.000 years of life, which is 3 days per day for each citizen (look at research done by prof. J. Lipinski for MZ 15 between 1995-1997 and presented above analysis of ill data from Krakow agglomeration where in relation to adult population mortality at 50/100000 thousands was recorded, and lost days factor was equal to 1.5).

Simulation calculation carried out on the basis of present GNP and GNP pc (approx 70 PLN per day – GUS 2006). All employed participate in its creation so each of them brings 140-150 PLN to the economy. Loosing 3 days by 38 million Poles multiplied by 70 PLN of unmade GNP gives an approximate of 8 billion PLN (compared to USA trauma costs estimated at 150 billion USD yearly).

Assuming that the centers will cover only half of the population and decrease in disablement will be 15% it gives an expected economic advantage of 600 million per year.

Assuming 2 heavy trauma events for 1 million people (i.e. 75 people daily for the country) and the cost of treatment in modern hospital equal to 20.000 PLN (compared to USA – 75.000 USD) it gives an amount of 550 million PLN per year. So bypassing a single investment to one center (it was decided within the team the amount of 10 to 20 million so totally 200 million) yearly expenses and advantages are equalizing, remembering that presently treatment costs are also taken!

The presented above simulation is only general, but for precise calculations (which have not yet been done in Poland) the range of numbers will remain the same.

Problems for elaboration and decision after project acceptance

- The average cost of curing one ill person is at least 20.000 PLN. Negotiations with National Health Fund should take place so that the financing of centers was for performed procedures (list inevitable). Financing of numerous procedures for one ill (also by the TISS system and readiness lump in order to ensure appropriate duty cast. Rules of payment for hospitalization must be settled, so that moving the patient to another hospital department (assumed in the specific Center situation) would not result in reduction or loss of fund. The lists of procedures regarding particular specialties inevitable in the trauma center should be elaborated by the national specialists before starting up of the grid. The score system should include a particularly loading type of work of the medical staff and therefore the payment system.

- While accustoming the program one must assume a preliminary financial aid for diagnostic and medical equipment just like it happened in the "medical rescue" program – the amount and date of the funds for particular hospitals together with rules of the accounting are subject for further settlements so that pathologies form "rescue program" do not repeat. It has been settled during previous meeting that the estimated costs of organizing the trauma center in the operating hospital e.g. academy with the assumption of necessity of adaptation or repair works and additional equipment for each of appointed 10 (12) hospitals should be around 15 million PLN. Its source may be form national budget, from local authorities funds, from National Health Fund contract (similar basis to prevention programs).

- The first task, after medical, of the centers will be accustoming on their areas the ATLS standards for the pre-hospital period and elaboration of standards for diagnostic and medical procedures – medical in the Emergency Department and in Centers – for particular damages and depending on the state of the ill. For this matter a currently prepared handbook of trauma surgery and first treatment re-

sults gathered in the central database may be helpful. It will be inevitable to settle the rules for checking the quality of centers work.

- It is also worth considering as a second but not distant stage the propriety of creation of similar (with lower costs) scald centers (3-5 for country), backbone and spiral core treatment (3-5 for country), arm trauma (1 for the province), toxicology (1 for the province), vascular surgery (1 for province) with the use of existing departments and not by building new ones. The same is for smaller auxiliary trauma centers with less potential and capability but able to cure up to 90% of the ill located as 2nd stage in smaller cities. Their position in the medical rescue system will allow full use of their power in case of massive accidents.

References

1. **Consultant neurologists, Polish Neurological Society, Institute of Neurology and Psychiatry.** National program for stroke prevention and stroke treatment. Warsaw 1997.
2. **Prusiński A, Domżał T, Kozubski W, Szczudlik A.** Niedokrwienne udary mózgu. Medica press, Bielsko-Biała 1999.
3. **National Heart Attack Alert program Coordinating Committee, 60 minutes to treatment working group.** Emergency Department: rapid identification and treatment of patients with acute myocardial infarction. *Ann Emerg Med* 1994; 23: 311-29.
4. **Champion H.** US emergency medical system and role of paramedics. *Turkish J Trauma & Emerg Surg* 2002; 8: Suppl: 51-53.
5. **Simons R, Kasic S, Kirkpatrick A, Vertesi L, Phang T, Appleton L.** Relative importance of designation and accreditation of trauma centers during evolution of regional trauma system. *J Trauma* 2002; 52: 827-834.
6. **Nast-Kolb D, Aufmkolk M, Rucholtz S, Obertacke U, Waydhas C.** Multiple organ failure still a major cause of morbidity but not mortality in blunt multiple trauma. *J Trauma* 2001; 51: 835-842.
7. **Bielecki K.** Mnogie obrażenia ciała. In: Noszczyk W (Ed). *Ó chirurgii polskiej końca XX wieku.* Warszawa: Fundacja Polski Przegląd Chirurgiczny 2001; 428-437.
8. **Ruchholtz S, Waydhas C, Lewan U, Piepenbrink K, Stolke D, Debatin J, Schweiberer L, Nast-Kolb D.** A multidisciplinary quality management system for the early treatment of severely injured patients: implementation and results in two trauma centers. *Intensive Care Medicine* 2002; 28: 1395-1404.
9. **Mann NC, Cahn RM, Mullins RJ, Brand MD, Jurkovich GJ.** Survival among injured geriatric patients during construction of a statewide trauma system. *J Trauma* 2001; 50: 1111-1116.
10. **Dirusso S, Holly Ch, Kamath R, Cuff S, Sullivan T, Schraf H, Tully T, Nealon P, Savio JA.** Preparation and achievement of American College of Surgeons level I trauma verification raises hospital performance and improves patient outcome. *J Trauma* 2001; 51: 294-300.
11. **Piontek FA, Coscia R, Marselle CS, Korn RL, Zarling EJ.** Impact of American College of Surgeons verification on trauma outcomes. *J Trauma* 2003; 54:1041-47.
12. **Margulies DR, Cryer HG, McArthur DL, Lee SS, Bongard FS, Fleming AW.** Patient volume per surgeon does not predict survival in adult level I trauma centers. *J Trauma* 2001; 50: 597-603.
13. **Sava J, Kennedy S, Jnordan M, Wang D.** Does volume matter? The effect of trauma surgeons caseload on mortality. *J Trauma* 2003; 54: 829-834.
14. **Offner PJ, Hawkes A, Madayag R, Seale F, Maines C.** General surgery residents improve efficiency but not outcome of trauma care. *J Trauma* 2003; 55: 14-19.
15. **Lucas CE, Buechter KJ, Coscia RL, Hurst JM, Lane V, Meredith JW, Middleton ID, Mitchell FL Jr, Rinker CF, Tunggle D, Vlahos SA, Wilberger J, Yu P.** The effect of trauma program registry on reported mortality rates. *J Trauma* 2001; 51: 1122-27.
16. <http://www.policja.pl/index.php>
17. <http://www.odleglosci.pl/podzial-administracyjny.php>