World Health Organization

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QUANTITATIVE AND QUALITATIVE ANALYSIS OF UKRAINE'S EMERGENCY MEDICAL SERVICES TO ASSESS CURRENT CAPACITIES AND OPPORTUNITIES FOR FUTURE DEVELOPMENT

World Health Organization
REGIONAL OFFICE FOR Europe

Quantitative and qualitative analysis of Ukraine's emergency medical services to assess current capacities and opportunities for future development

ABSTRACT

WHO conducted a qualitative and quantitative survey of emergency medical services (EMS) across Ukraine in 2019 to build a comprehensive picture of the challenges and opportunities facing EMS. The study used a range of methods for collecting and analysing data. In general terms, it was a cross-sectional study with retrospective elements. Qualitative and quantitative components were included to cover all levels of the EMS system, from regional health administrative staff to ambulance drivers, with end-user patients included. EMS systems and prehospital care are critical in saving lives and decreasing morbidities, but they are challenging to evaluate. A newly adopted law has assigned administrative and financial responsibilities for prehospital emergency care to EMS centres at regional level, moving from fragmented district-based supervision to a more coordinated, regional approach. This survey aims to provide evidence-based recommendations for the Ministry of Health to improve the overall quality of EMS in Ukraine. The survey outlines core approaches needed in EMS reform in Ukraine, with key suggested interventions, and proposes strategic directions.

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ACRONYMS

CBRN ..... chemical, biological, radiological and nuclear (materials)
CPD ..... continuous professional development
ECG ..... electrocardiograph
EMS ..... emergency medical services
EMDPRS ..... emergency medical dispatch protocol reference system
GPS ..... global positioning system
ICU ..... intensive-care unit
PPP ..... purchasing power parity
SOPs ..... standard operating procedures
UAH ..... Ukrainian hryvnia (currency)

INTRODUCTION

Emergency medical services (EMS) respond to a wide range of acute conditions, such as trauma, infectious diseases, emergencies in pregnancy and exacerbations of noncommunicable diseases for people of all ages. The functions of EMS include timely recognition of an emergency, provision of prehospital care, transport to facility-based emergency departments and initiation of early operative and critical care. For many people in settings where barriers to accessing health care exist, EMS are usually the first point of contact with the health system (WHO, 2019a).

Well organized EMS are both an effective and cost–effective measure for improving health outcomes across a range of emergency conditions (Reynolds et al., 2018). Failure to organize basic components of EMS, such as creating designated emergency departments, providing appropriate training to health-care providers at all levels and ensuring the system is able to timeously recognize and respond to emergencies, can cost lives (Grimes et al., 2011; Dare et al., 2015). Interventions to expand the availability of disease-specific treatments will be compromised in the absence of a well functioning EMS. Specifically, if the critical link between the place of emergency and definitive care is not ensured by EMS, patients will be unable to reach the care they need even if it exists in another part of the health-care system.

EMS directly address nearly all health-related Sustainable Development Goal targets, as well as some targets focused on disasters and violence (Reynolds et al., 2018). Recognizing the importance of EMS during the Seventy-second World Health Assembly, all Member States agreed that "a well functional emergency care system is essential to universal health coverage, and investing in frontline care saves lives, increases impact and reduces costs in other parts of the health system" (WHO, 2019a). The World Health Assembly through resolution WHA72.16 on EMS for universal health coverage, ensuring timely care for the acutely ill and injured called for all Member States to take additional efforts to strengthen the provision of emergency care to ensure the timely and effective delivery of life-saving health services to those in need (WHO, 2019b).

EMS in Ukraine are part of the public health-care system and are mandated to respond to medical emergencies by law. They include both prehospital emergency medical services and facility-based emergency care (Parliament of Ukraine, 2013). In light of the national health-finance reform that started in 2017, a set of policies was initiated by the Ministry of Health to improve Ukrainian EMS (WHO Regional Office for Europe & World Bank, 2019). These included establishing a network of intensive care hospitals, improving skills of the frontline workforce, coordinating between and within prehospital and facility-based parts of the system, and bringing additional resources into the sector (Ministry of Health, 2019a). In 2019, the President of Ukraine issued an order on reform priorities in which he emphasized the need for further improvement of EMS (Office of the President of Ukraine, 2019).

WHO, working to achieve the first (achieving universal health coverage) and second (addressing health emergencies) pillars of the Thirteenth General Programme of Work, 2019–2023 adopted by the Seventy-first World Health Assembly and to address the World Health Assembly resolution on EMS for universal health coverage, conducted a strategic assessment of Ukraine's EMS (WHO, 2018; WHO, 2019b).

For more details on the background and the profile of EMS in Ukraine, refer to WHO Regional Office for Europe (2020).

Aim

The aim of the survey was to provide evidence-based recommendations to improve the overall quality of EMS in Ukraine.

Objectives

The assessment objectives were to:

- describe EMS in Ukraine with regards to their capacity, utilization and efficiency across selected geographic regions and catchment areas;
- assess the utilization and outcomes of current prehospital EMS care;
- identify perceived needs for improving EMS in key areas based on input from local stakeholders, including EMS providers, hospital-care providers, administrative staff and patients;
- create an evaluation model of EMS performance; and
- provide recommendations for the improvement of EMS in Ukraine.

Currently, there is a shortage of evidence about EMS in Ukraine.The survey was designed to offer relevant evidence-based recommendations to support the restructuring of the EMS system in Ukraine.

METHODOLOGY

The study used a range of methods for collecting and analysing data to build up a comprehensive picture of the challenges and opportunities facing the Ukrainian EMS. In general terms, it was a cross-sectional study with retrospective elements. Qualitative and quantitative components were included to cover all levels of EMS from regional health administrative staff to ambulance drivers, with end-user patients included.

Context

This report constitutes the third and final phase of the multi-phased comprehensive review of the Ukrainian EMS.

The first phase was a pilot study using a small sample (N = 11) of health-care workers in Kyiv, with the goal of finalizing and checking the quality of the data-collection tools and other procedural and managerial features. The questionnaire was uploaded onto tablets after being translated into Russian and Ukrainian.

The second phase engaged stakeholders in the regions of Donets'k and Luhans'k. Over **500** patients were interviewed to achieve a precision of **5%**. The aim for the other subpopulations was to reach a precision of **10%** by aiming to interview **78** people. The study has been published (WHO Regional Office for Europe, 2020).

This third phase has expanded the survey to the remaining regional EMS centres and national Ministry of Health staff.

Data collection

Qualitative and quantitative data were collected from a wide range of EMS stakeholder groups:

1. Ministry of Health leadership
2. EMS regional directors
3. hospital doctors
4. ambulance medics (doctors, feldshers and nurses)
5. ambulance drivers
6. dispatchers
7. regional financial administrators
8. establishment financial administrators
9. university lecturers
10. university students
11. patients who recently have received EMS
12. official EMS data registries.

For each participant group (with the exception of groups 9–12), two questionnaires were designed: one structured questionnaire was used to collect quantitative data, and the other semi-structured one was used to collect qualitative data. For the other groups, one mixed questionnaire was designed. This resulted in 20 separate questionnaires in total.

The questionnaires were disseminated in electronic form that could be filled-in using mobile tablet computers. The open source software package Open Data Kit (Hartung et al., 2010) was used, enabling interviewers to enter and submit responses remotely from the field to a central server. These data were then stored centrally in a format suitable for processing electronically, automatically and securely backed up to the cloud, and allowed for real-time monitoring of the national data-collection effort.

The qualitative data were translated from Ukrainian to English and then encoded manually by an English speaker, being grouped according to specific themes of interest. Quantitative analysis techniques could then be used to summarize these coded data structures, and detailed quotes could be incorporated into the discussion to bring a deeper understanding of the issues.

The quantitative data for groups 1–10 were collected through guided interviews. Patients in group 11 and registries in group 12 were given a hard copy of the questionnaire to complete in their own time. Their results were then entered into the tablets by the interviewers.

Sampling strategy

The primary sampling unit was a Ukrainian raion (PCode ADM2). Raions are the smallest administrative divisions in Ukraine that possess

a hospital capable of providing emergency care and an EMS station.

Multiple raions make up a larger Ukrainian region called an oblast. There are **25** oblasts in Ukraine, not including the Autonomous Republic of Crimea, and separating Kyiv City from Kyiv. The oblasts of Luhans'k and Donets'k were surveyed in Phase 2 of the study, so are not addressed here. This left **23** oblasts to be surveyed by this study. For more detailed information on the Donets'k and Luhans'k oblasts, see WHO Regional Office for Europe (2020).

A stratified sampling method was used to extract representative samples of each stakeholder group across all 23 oblasts. This was done using the populations of the oblasts.

As there are no relaible data on the number of dispatch centres, doctors working in ambulances and other medical staff involved in EMS, the aim was to gather the largest samples of EMS staff that time and resources would allow. This began by seeking to select 66 raions across Ukraine. Each of the 23 oblasts was assigned a number of the 66 raions based on the proportion of the national population that resided within the oblast. An assigned number of raions was selected from each oblast by first taking the raions containing the oblast's administrative centre then using a randomized process to select the rest.

Eight interviewers were selected for the study: half were WHO staff and the other half consultants with experience in prehospital care. All interviewers were trained on the study methodology, interview process and ethical considerations prior to deployment in the field. Four data-collection teams were formed, each containing one WHO member and one consultant. The teams were equipped with vehicles and tablets were sent to the intensive care hospital and EMS station located in each of the selected raions. If the intensive care hospital or EMS station was absent in the selected raion, another from the raion's establishment list was randomly chosen.

The aim was to interview a convenience sample of staff in each raion, comprising an ambulance medic, an ambulance driver, a hospital doctor, a dispatcher and a financial administrator. Interviews were also sought with the oblast EMS director, an oblast-level financial administrator and the oblast's official data registry in raions that were the central cities of each oblast.

Cochran's formula was used for the patient survey, with maximum variability, a margin of error of **5%** and a confidence interval of **95%**, which led to the conclusion that a sample of **385** patients should be sought. Keeping in mind that international practice suggests that questionnaires have a response rate of **70%**, the aim was to distribute the questionnaire to a minimum of **501** patients.

Two members of the national Ministry of Health leadership were also interviewed, as were **12** students and **11** teaching staff from the Faculty of Medicine of Uzhhorod National University, Rivenska Medical Academy and Khmelnytsky Basic Medical College. This brought a deeper understanding of the challenges and opportunities facing EMS.

Data analysis

The Ukrainian qualitative data were first sent for translation into English. The translated data were then coded according to recurring and interesting themes in the qualitative responses. Summary statistics were produced for each quantitative and qualitative question in the form, which an EMS expert from WHO then interpreted as textual statements. These statements are presented in the results section.

A crosscut of the questions according to a list of interesting themes was then compiled. This crosscut was used to structure discussion of the data. The discussion includes: [1] comparisons of responses by participant groups and related questions; visualizations of the data in tables,

[1] *Some of the figures in the discussion section comprise diagrams depicting oblast areas. These diagrams are for illustrative purposes only and should not be inferred to represent actual oblast geographic areas.*

charts and figures; quotes taken from the qualitative data; and consideration of data and conclusions from related third-party studies, data sets and legislation.

All data analysis has been undertaken using Python programming libraries and has been version-controlled to ensure that results are traceable for the purposes of reproduction.

The data collected in this study are self-reported by a convenience sample of EMS staff and patients. As such, they will be subject to human bias and error. The intention of the study was to survey a broad cross-section of staff concerning a wide range of issues, with a view to identifying evidence supporting ideas for reform and further study. As such, this report does not seek to present unbiased robust empirical measurements of the performance of EMS, as this is the responsibility of the national registries.

Ethical considerations

Following the official request of the WHO Country Office in Ukraine to endorse the study, the Ministry of Health distributed a letter in support of the study to all health authorities in the country. This letter gave a legal basis for the data-collection team to make contact with health workers and patients to invite them for interviews. Prior to the interviews, however, all respondents were briefed on the objectives and methodology of the study and gave their verbal informed consent to participate.

Convenience samples were taken, providing flexibility to minimize disruption to the work of EMS staff. Participants' right to remain anonymous has been respected throughout this report.

Limitations

Recognized limitations to the study are as follows.

- Some **participant groups** were intrinsically limited due to sample sizes; for instance, there is only one EMS director per oblast. Errors in smaller samples will therefore carry greater weight.
- The intention was not to make oblast-level conclusions from the staff groups, as **sample sizes** stratified at oblast level were relatively small. Where participants were responsible for speaking on behalf of the oblast, such as the EMS director, or oblast registry, inter-oblast comparisons have been mapped out.
- Certain indicators of the aggregated data collected from the official registries are **clearly incomplete, imprecise or inaccurate**. The information management system is not computerized across Ukraine, so human error cannot be excluded; further work is required to improve the quality of EMS monitoring across Ukraine.
- After randomly stratifying the sample across EMS sites, a **convenience sample** of staff was selected. This may have biased the results; for instance, it is possible that staff with stronger opinions on how EMS should be run volunteered more readily to be part of the survey.
- **Self-reported data** are subject to human bias and error, so the largest sample sizes possible were collected. In many cases, different stakeholder groups were asked the same question to enable comparisons across the groups. By doing this, the study is able to build understanding of the biases and priorities of each stakeholder group.
- The interviews were designed in English, undertaken and recorded in Ukrainian, and then analysed in English. Where possible, the risk of **translation errors** has been mitigated by collaborating closely with Ukrainian speakers.

All these considerations were taken into account in preparing the report and recommendations.

RESULTS

Ministry of Health leadership interviews

Two members of the Ministry of Health leadership were interviewed for this study. The same individuals responded to both qualitative and quantitative questionnaires.

Legislation and governance

The current legislation of emergency care access was accepted between 2010 and 2015.

This law provides for:

- a minimum standard of care, last updated in 2019
- minimum standards for equipment in emergency departments and ambulances
- standard definitions of emergency cases
- minimum requirements for qualifications for EMS staff
- compulsory annual training on the management of emergency cases.

It was unclear from participant responses whether the law also includes:

- standard operating procedures (SOPs) for dispatch centres
- regulation for a national state of emergency.

A list of medical procedures that EMSs are obliged to provide can be found in the qualification requirements for EMS professions (Ministry of Health, 2018a) and in EMS treatment protocols (Ministry of Health, 2019b).

Both leaders reported a clear definition of what constitutes an "emergency case".

Order #370 on unified emergency system provides regulation for emergency departments (Ministry of Health, 2012a).

There is no standardized system of quality control for EMS beyond conducting an analysis of registry data.

There are no national standards of performance for emergency departments.

Some private hospitals also provide EMS.

They use general regulations but are not included in national information management systems.

It is unclear from the Ministry of Health leadership whether the DO NO HARM concept is applied.

Human resources

All personnel must hold a specialist certificate for their chosen profession to work for EMS.

An examination must be passed after training to receive this certificate, but there is no national board of certification in emergency care. It is unclear whether the training programmes for EMS staff follow a nationally approved curriculum. Staff should undergo training every five years, though one respondent acknowledged that heads of regional institutions could also decide on the frequency. One respondent believed that training for EMS should include more practical components and be quality-controlled by external parties.

The Ministry of Health leaders believe that community first-responders (such as police officers and bus drivers) receive an insufficient level of training.

Refresher courses are provided for first-responders, but they are sporadic. First-responders are protected in law. It is unclear

from responses whether there are community awareness campaigns on first aid.

> According to the respondents, there is a protocol to protect dispatchers and ambulance staff from violence, but no such protocol exists for health-facility staff.

Finance

> EMS financing is conducted through subvention based on the particular needs of the region.

Until 2019, funding came from national general medical subvention to regional budgets. The oblast councils would then divide the subvention and allocate EMS their funding. One respondent acknowledged regional discrepancy in financing of EMS based on regional council decisions. Starting from 2020, EMS are part of the state-guaranteed medical package, with each regional EMS centre being financed individually.

> The Ministry of Health leadership believes that the total EMS cost is on average Ukrainian hryvnia (UAH) **110** per capita per year.

One respondent acknowledged that the level of financing currently is insufficient. They reported that from 2020, it will be UAH **150** per capita per year. Sufficiency of financing is assessed against the number of requests from the field.

> Finances are tracked through multiple audits conducted by various stakeholders.

There are external audits of the Accounting Chamber of the Ukrainian Parliament as well as oblast-level audits. One of the respondents mentioned an electronic system for tracking finances, but the details of the system remain unclear.

> EMS do not have their own budget reserve in case of a disaster or crisis.

EMS can use reserve funds of the Cabinet Ministers or Government. The main service responsible for responding to disasters is the State Rescue Service. The Ministry of Health is involved only through legal regulations, as EMS coordinate their routine responses at regional level. The police and military might also be involved.

> EMS are free of charge for the user. Both respondents recognized that this is protected by law.

One senior Ministry of Health official recognized that out-of-pocket payment from the patient does sometimes occur, but mostly at hospital level.

Resourcing

> Distribution of EMS resources depends on the region.

Territorial distribution of EMS hospitals takes place by region and hospital district according to population density. The number of dispatch centres depends on the region, and the number of ambulances is calculated according to population density. The Ministry of Health leadership reports that there should be one ambulance per **10 000** people.

> The distribution of ambulances and dispatch centres is determined by the directors of regional EMS centres.

Response time is used to ensure this distribution is adequate.

> It is unclear from the responses whether there is a standardized list of equipment and medicines that each ambulance must have.

> It is unclear from the leaders whether every hospital has a blood bank.

Access to blood is legally guaranteed.

Information management

> There was lack of clarity from the leaders on whether a national entity regulates the flow of information among dispatch centres, ambulances and hospitals.

Information management systems are in place, but it was unclear whether they are computerized. One of the respondents said the systems are used to oversee and monitor

prehospital care. Private hospitals are not included in the systems. The systems are not used to update, regulate and disseminate best-practice protocols.

Problems and solutions

The most common problems with EMS work seen by the Ministry of Health leaders are:

- management of EMS centres is often unwilling to change
- training of personnel
- low level of finances in the sector
- no adherence to protocols
- the lack of post-dispatch support
- absence or low quality of first aid at the scene
- absence of legal protection for first-responders.

The reasons for these problems are reported as:

- low quality of education, especially practical training
- lack of education quality control
- lack of centralized dispatch centres and dispatch protocols
- lack of the Good Samaritan Law
- lack of an electronic reporting system
- EMS are not a financial priority.

The participants proposed the following solutions to these problems:

- the introduction of external quality control of education
- creation of central dispatch centres
- implementation of the Central 103 telephone number
- passing of the Good Samaritan Law
- increased funding for the sector
- making EMS a national priority
- creating a plan for the medium term of around **5–7** years.

EMS director interviews

Twenty-three EMS directors took part in the qualitative questionnaire and **21** in the quantitative questionnaire.

Budgets

The overwhelming majority of EMS directors (**90%** of quantitative respondents) did not consider the funding of their establishment sufficient.

Qualitative respondents requested a budget increase of **67%** on average. Responses ranged between **10%** and a staggering **300%** (with **95%** confidence interval of **38–97%**). EMS directors report that human resources salaries are affected most by underfunding (**85%** of qualitative responses mentioned this), with ambulance maintenance (**69%**) and medical equipment (**44%**) also being cited regularly.

Sixty per cent of qualitative respondents said their region did not have a sufficient number of hospitals that can provide EMS. The number of EMS workers typically is calculated on a per capita basis (reported by **90%** of qualitative respondents).

EMS directors reported primarily using population density to calculate the required funding for EMS (**76%** of qualitative responses).

Other indicators used to calculate required funding include:

- number of cases they were handling
- number of facilities in their establishment
- number of people
- number of teams and institution needs.

Dispatch centres

Seventy-three per cent of quantitative respondents reported having just one centralized dispatch centre in their oblast.

The others reported having between seven and **24** dispatch centres. Two thirds of the EMS directors (qualitative) said the dispatch centres in their oblast were functionally connected to each other. Half (qualitative) said there was coordination between the regional and Kyiv dispatch centres, but many others reported that this coordination had still to be implemented.

All qualitative respondents said their dispatch centres provide telephone consultations to patients who do not require an ambulance response.

In some cases, this was confirmed to be provided by a separate telemedicine team.

The efficiency of dispatch centres typically was calculated through multiple mechanisms, including:

- time to arrival on site (seen in **85%** of qualitative responses)
- the percentage of hot calls responded to on time (**79%**)
- a journal of attendance (**47%**)
- the percentage of hospital referrals (**47%**)
- survival rates (**47%**).

Dispatch centres do not have real-time knowledge of intensive care unit (ICU) beds in hospitals.

A few quantitative respondents believed they did, but upon further questioning it appeared this was just via telephoning the hospital.

No standardized approach to evaluating the efficiency and quality of dispatch centres was found.

Most quantitative respondents (**81%**) believed they had quality monitoring and evaluation systems in place to assess the efficiency of the dispatch centres in their oblast, but when asked to describe the system, the answers showed a lack of standardization. The system should be improved by incorporating a more in-depth process and output indicators, such as survival rates.

Protocols and collaboration

No standard emergency medical dispatch protocol reference system (EMDPRS) has been put in place.

A wide range of EMDPRS were reported, including:

- Kharkiv
- Esenteks
- Manteks
- Epim 103
- Erim.

On average, EMS directors (quantitative) reported responding to **48%** of non-urgent calls (the **95%** confidence interval across responses was **38–57%**).

Most quantitative respondents believed non-urgent calls should be transferred to a primary care physician, while the others believed that direct medical advice should be given. Some also suggested that patients should pay for non-urgent calls.

All of the EMS directors (qualitative) said they had a chemical, biological, radiological, nuclear and explosive materials (CBRNE) plan.

In all cases, the last CBRNE drill had taken place within the previous year.

Most quantitative respondents (**81%**) reported that their dispatch centres had a written triage protocol available at prehospital level.

Just over half of these (**53%**) were using protocols developed by the oblast instead of a national protocol.

An overwhelming majority (**91%**) of quantitative respondents said their

oblast had a written triage protocol available for ambulance staff at prehospital level.

Most of these respondents (**61%**) reported using a national protocol.

The EMS directors (qualitative) said they collaborated on a daily basis with the police and rescue services.

Ambulance management

The EMS directors (qualitative) agreed that ambulances are adequately distributed across their oblast.

Eighty-one per cent of quantitative respondents said their oblast had type A ambulances available, **95%** said they had type B ambulances available, and **all** oblasts had type C ambulances[2] available.

The method used most commonly to distribute ambulances was population density (mentioned by **53%** of qualitative respondents).

Other methods mentioned included:

- geographic area (**16%**)
- accessibility of emergency services (**16%**)
- response time (**11%**)
- number of teams (**11%**)
- number of calls (**11%**).

EMS directors (qualitative) said ambulances generally are maintained monthly, though two said weekly and one said annually.

Three quarters of qualitative respondents also said that in addition, ambulances are maintained on demand. Quality control of ambulances is undertaken through regular field inspections (**92%** of qualitative respondents), but only **15%** of EMS directors said they had an electronic system to help with this.

ICU ambulances generally are reserved for severe, specialized emergency conditions.

Three qualitative respondents said their use depended on the number and conditions of the patients, and four said their ICU ambulances were in common use. Generally, dispatchers are responsible for authorizing the use of ICU ambulances, though this is often in conjunction with a senior physician.

Ambulance staff are able to communicate with the hospital prior to their arrival with an incoming case, but communication is mostly ad hoc through dispatchers via phone.

Education and training

No standardized approach to the scheduling of ongoing staff training was found.

EMS directors reported that it is organized:

- upon request from the facility (mentioned by **56%** of qualitative respondents)
- upon request of the director (**50%**)
- at central level (**44%**)
- upon request from staff (**38%**)
- on recommendation following analysis of data (**32%**).

There is wide variation in how often staff are trained.

Thirty per cent of EMS directors (qualitative) say staff are trained weekly, **30%** monthly, and **22%** annually or less frequently. **Seventeen per cent** say only on demand.

Problems and solutions

The top three most common problems reported by the EMS directors were:

- lack of staff (**48%** of qualitative responses)
- lack of new vehicles (**43%**)
- lack of funding (**33%**).

The primary reasons for these problems were given as:

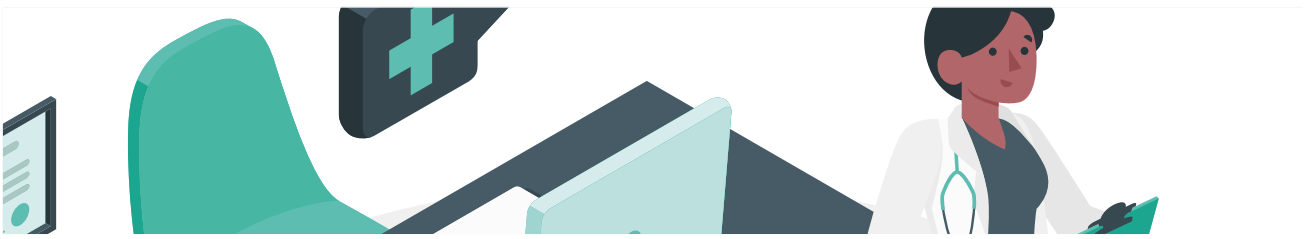
- insufficient funding (**55%** of qualitative respondents)
- lack of prestige associated with working for EMS (**14%**).

[2] *Types A and B ambulances are basic ambulances with different equipment and different mandates; type C ambulances are mobile ICUs.*

The most commonly reported solutions to these problems were:

- increase EMS funding (**43%** of qualitative respondents)
- modify legislation (**24%**)
- improve population awareness (**19%**).

Interviews with hospital doctors



Fifty-eight participated in the quantitative survey of doctors working in hospitals, and 55 in the accompanying qualitative survey.

Reception at hospital

Hospitals occasionally are made aware of incoming severe cases by phone. Only one doctor (qualitative) reported that an alarm system was in place.

In most cases (**81%** of quantitative respondents), doctors said there was an alert system to warn them about incoming cases. This is not, however, a SOP and is generally based on ad hoc phone calls. Where the doctors reported that an alert system exists, they said they only receive the alert half of the time. There was no consensus on whether the ambulance must inform the hospital about incoming patients prior to arrival, with **48%** believing that it is mandatory (qualitative) and **44%** believing it is not (**7%** did not know).

In **84%** of cases (qualitative), doctors identified that their emergency department was not separate from the admissions department.

In most cases (**88%** of quantitative respondents), the emergency/admissions department was reported to be financially separate from other hospital departments. All but one of the doctors (quantitative) said their establishment receives patients with trauma. In the case in which they do not, the doctor said it was because another designated hospital takes trauma patients first.

The vast majority of quantitative respondents said their hospital has trauma specialists.

Most hospitals (mentioned by **86%** of quantitative respondents) do not provide mobile clinics. Almost all doctors (95% of quantitative respondents) said their hospital contains a physiotherapy or rehabilitation centre for disabled people, but in two thirds of cases (qualitative), no limb prosthesis service was reported to be available. Seventeen per cent of respondents said their hospital provides only endoprostheses. Limb prostheses are not available free of charge in most cases (mentioned by **88%** of quantitative respondents), usually because the hospital does not provide prostheses.

In most cases (qualitative), there are no requirements in place to access the emergency department.

Some emergency departments ask to see a form of identification (such as a passport) before admitting patients, and patients are also asked for insurance documentation in a few cases.

Only **24%** of qualitative respondents identified electronic elements to the organization of the registry in their oblast.

Registries generally do not communicate with other registries in the oblast (**73%** of qualitative respondents).

Most quantitative respondents (**92%**) said EMS own their ambulances,

and **25%** said the hospital also owns ambulances EMS could use.

Almost all doctors (**97%** of quantitative respondents) said their hospital had a disaster plan.

The last drill was held within the previous year in 74% of these cases.

Eighty per cent of doctors (qualitative) said the hospital had a CBRNE plan.

The last drill had typically taken place in the previous year, but three doctors stated that they had never seen a drill happen.

Fifty-two per cent of qualitative respondents said they had never observed delays in the emergency department.

Where delays had been observed, they typically were due to mass casualties or lack of specialists and staff.

When asked how triage is organized within the hospital, **47%** of qualitative respondents said it depended upon patients' conditions, **29%** said it was organized by the head doctor or doctor on duty, and **5%** said it was coordinated by all doctors. Two qualitative respondents said there was no organized triage at their hospital. Only a fifth of qualitative respondents said quality control took place during meetings, while another fifth said there was no quality control of the triage system at all. In **24%** of cases, doctors said that the chief doctor or doctor on duty organizes quality control of the triage system.

Ninety per cent of doctors (qualitative) said an emergency clinical protocol is available.

Several identified the protocol produced by the Ministry of Health, although a number expressed lack of satisfaction with the protocol. Doctors were divided equally (quantitative) on whether there were national standards of performance for their emergency department to follow.

Seventy-one per cent of doctors (quantitative) said patients get endotracheal intubation in the emergency department.

Only **24%** of quantitative respondents said they perform lactate tests for multi-trauma patients.

There is no standardized system in place for administering secondary referrals.

Several qualitative respondents noted that cases could be referred to other hospitals if necessary. Only **17%** of qualitative respondents confirmed that referral routes had to be approved according to the type of case. Several respondents mentioned that secondary referrals are arranged in an ad hoc manner over the phone. A third said that EMS transport typically is used during secondary referral to another hospital, which generally are made for treatments or diagnostics that cannot be provided internally (cited by qualitative respondents). The top reasons for secondary referral include neurology (mentioned in **26%** of responses), cardiology (**22%**), children's cases (**18%**), infections (**18%**), and gynaecology and obstetrics (**18%**).

Staffing and working environments

Doctors generally felt their department was understaffed (71% of qualitative respondents).

The most commonly reported staff groups requiring additional capacity were doctors (mentioned by **62%** of respondents) and nurses (**27%**).

All doctors (quantitative) believed their salary was unsatisfactory.

Doctors (quantitative) were evenly divided on whether their working conditions were satisfactory. Most (**64%** of quantitative respondents) said they did not have the tools to do their job. Increased salary and improved equipment were overwhelmingly the most popular suggestions for improving the work environment. The work of trauma specialists mostly is organized into daily shifts that cover **24** hours (**90%** of qualitative responses), with trauma specialists available on call. In some cases (qualitative), trauma specialists are on shift during the day then remain on call through the night.

Thirty-three per cent of qualitative respondents said they would change their job if they had the chance.

Salary and working conditions were the main reasons for this.

Education and training

Two thirds of EMS establishments provide advanced trauma training for their ambulance staff, **47%** provide basic trauma training, and one third provide multi-casualty training.

Some establishments provide other training, including courses on heart disease, obstetrics and blood transfusion, courses with invited specialists and intensive-care life-support . In some cases, quantitative respondents reported their facility had paid for postgraduate medical education.

Problems and solutions

During the interview process, doctors (qualitative) mentioned specific problems.

The three most common were:

- equipment and diagnostic device issues (mentioned in **37%** of responses)
- lack of staff (**31%**)
- non-emergency patients (**28%**).

Most doctors (qualitative) identified lack of finances as the reason for these problems.

Other reasons given included low awareness, lack of a legal framework for alcohol and trauma, and a negative attitude towards medical staff.

The most commonly suggested solutions to resolve these problems were:

- increase funding (mentioned by **23%** of qualitative respondents)
- increase salaries (**20%**)
- educate the public (**20%**).

Interviews with ambulance staff

The qualitative questionnaire was used to survey **113** ambulance staff. **Sixty-seven per cent** were feldshers, **28%** doctors and **5%** nurses.

The quantitative survey was used to survey 121 ambulance staff, of which 65% were feldshers, 31% doctors and 4% nurses.

Staff operations

The top-10 most common steps in procedure of work reported by ambulance staff (qualitative) were:

- arrival to address (**82%** of qualitative respondents)
- receiving a call (**73%**)
- examination of the patient (**58%**)
- preparation and departure (**53%**)
- transport to the hospital (**40%**)
- confirm the call (**32%**)
- anamnesis (**31%**)
- documentation completion (**28%**)
- first medical treatment (**26%**)
- diagnosis (**26%**).

Some disparity in work procedures is reported by ambulance staff (qualitative).

This suggests there is a need to improve the monitoring and evaluation of staff adherence

to SOPs. If the SOP does not currently exist, it should be developed.

> The vast majority of ambulance staff (**84%** of qualitative respondents) agreed that there was a list of checks they must do prior to starting a shift.

The most common emergencies seen by ambulance staff (quantitative) are:

- heart problems (**73%**)
- injuries (**46%**)
- hypertensive crisis (**41%**).

Thirty-eight per cent of quantitative respondents worked in ICU ambulances.

> Just over half of quantitative respondents (**56%**) reported that they are involved in a programme to educate the public in first aid.

Equipment

> In the event that ambulence staff lack information about a case, **69%** of qualitative respondents said there was a standardized list of equipment they should take with them.

The most common items staff reported as being on this list were a medicine bag, a cardiograph, intravenous systems and oxygen. Several staff commented that the list was too long to recount in the survey, with some saying they simply take everything that is available.

> About half of the staff (qualitative) had never been in a situation at scene where insufficient medical supplies had been available.

Should there be a shortage of medical supplies, staff said they would contact another team, use alternative drugs or inform the dispatch centre. In a small number of cases, staff or patients bought supplies themselves.

> A significant proportion of the ambulance staff (**35%** of quantitative respondents) reported having bought medical or other items needed for their work at personal expense.

Among these:

- **40%** said they had bought uniforms and shoes
- **22.5%** had bought stethoscopes
- **17.5%** venous catheters
- **17%** medicines.

Staff satisfaction

> The overwhelming majority of quantitative respondents (**98%**) did not find their salary satisfactory.

A small majority (**53%**) declared that their working conditions were satisfactory, and most quantitative respondents (**74%**) believe their work is managed satisfactorily. A majority (**67%**) reported that they have all the tools and equipment they need to do their job.

> Almost half (**45%**) of quantitative respondents reported that if they had the chance, they would change their jobs.

Most feldshers and nurses (**75%** of quantitative respondents) would retrain as paramedics. The overwhelming majority of quantitative respondents (**87%**) who reported they would change their jobs if given the chance stated salary as a reason.

The top-four most common suggestions from staff to leadership to improve the work environment were:

- increase salary (**89%**)
- improve equipment and tools (**36%**)
- improve training (**17%**)
- improve vehicles (**17%**).

Communication

> Mobile phones are the primary means of communication used by ambulances.

Only **19%** of staff (qualitative) reported using radios. No clear backup plan was in place for communication if the mobile phones failed. Only **5%** of qualitative respondents mentioned being able to use a portable radio as a backup plan.

Updates and training

Most staff (qualitative) would prefer to be told about EMS updates over the Internet, using emails, Ministry of Health websites and social networks.

Most ambulance staff (qualitative) had received in the previous month an update from the Ministry of Health on EMS transformation, but **11 per cent** reported never having received an update.

A quarter of staff (qualitative) reported not receiving training within the last two years.

Fifty-six per cent of respondents believed that training should be upgraded every two years or more frequently.

Most quantitative respondents (**80%**) had received basic trauma training. Around half had received advanced trauma training (**59%**) and/or multi-casualty training (**57%**).

Twenty per cent of quantitative respondents attended courses every five years. **Fifteen per cent** reported that they had attended an EMS training course and **15%** that they had received no training. **Seventy-seven per cent** of quantitative respondents reported undertaking refresher training between 2017 and 2019 and **23%** said their last refresher training took place in 2016 or before.

Protocols

The overwhelming majority of quantitative respondents (**88%**) answered that triage protocols were available at prehospital level either in the dispatch centre or in the ambulance. **Ten per cent** did not know and **2%** answered that protocols were not available.

The most commonly reported triage protocols were Ministry of Health executive order **366** (**24%**) and local protocols (**15%**).

Almost all quantitative respondents (**97%**) answered that there is an EMS treatment protocol in place.

The most commonly reported EMS treatment protocols were the Ministry of Health executive order **1269** (**53%**) (Ministry of Health, 2019c), the new clinical protocol for prehospital care (**53%**) and local protocols (**24%**). About half of the quantitative respondents (**50%**) considered the EMS treatment protocol to be very good or excellent, **44%** considered it neither good nor bad, and only **6%** considered it very bad or terrible. Most respondents (**78%**) answered that they and their colleagues follow the protocol, **21%** that the protocol was followed sometimes, and the remaining **1.7%** that it was not followed.

The overwhelming majority of quantitative respondents (**95%**) reported that they provide oxygen in respiratory arrest/distress.

Only three of the **110** respondents who said they provided oxygen had not done so in the last year. In cases when it was reported that oxygen was not provided, **40%** responded that there were no cases of respiratory arrest/distress, **40%** that oxygen was not available and **20%** did not know the reason.

Most qualitative respondents (**78%**) reported that a 12-lead electrocardiograph (ECG) was performed in patients over **35** with suspected cardiac chest pain.

All who reported performing a 12-lead ECG said they had done so in the last year. Of the respondents who indicated a 12-lead ECG was not performed in patients over **35** with suspected cardiac chest pain, **81%** reported that they did not have a 12-lead ECG and **12%** that it was not needed.

Most quantitative respondents (**74%**) reported that they gave aspirin to patients over **35** with suspected cardiac chest pain.

All those who reported giving aspirin said they had done so in the last year. Of the respondents who indicated aspirin was not given to patients over **35** with suspected cardiac chest pain, **58%** reported that they do not give it before diagnosis, **23%** that they give another drug, and **8%** that the drug is dangerous and harmful when given without checks.

Most quantitative respondents (76%) reported that they do not intubate in prehospital settings.

Almost all of those who reported that they do intubate had done so within the last year. Two participants reported not having done it in the last three years. The main reasons for not intubating were given as "lacking skills/ qualifications" (42%) and "no indications that it was needed" (34%).

Violence at work

Most quantitative respondents (68.6%) reported having been a victim of violence during work.

The most commonly reported perpetrators of violence against respondents were relatives of patients (75%). Patients themselves were mentioned by 74% of respondents, and bystanders were reported as perpetrators by 36%.

Fewer than half of the quantitative respondents (37%) answered that there is a protocol on how to protect yourself from violence. Thirty-two per cent did not know and 31% answered no.

Most of the quantitative respondents (77%) found the protocol "extremely useful" or "more useful than not". The remaining 23% said it was "neither useful nor useless", "more useless than useful" or "extremely useless". The overwhelming majority of quantitative respondents (96%) said that their colleagues follow the protocol.

Problems and solutions

The most common problems reported by ambulance staff are:

- bad road conditions (27% of qualitative respondents)
- false calls (27%)
- lack of (or old) cars (23%)
- aggressive patients (19%)
- lack of qualified personnel (18%).

The most common reasons for these problems were given as:

- public perception of EMS (37%)
- lack of budget (33%)
- insufficient work of family doctors (9%)
- social and economic reasons (9%).

The top-five suggested means to resolve these problems were given as:

- inform and educate people (17%)
- increase the EMS budget (15%)
- increase salaries (13%)
- expand family doctors' work (12%)
- impose fines for non-urgent calls (10%).

The top-three ideas for managing non-urgent calls were:

- fines for non-urgent calls (40%)
- expansion of primary health care (28%)
- readdressing calls to family doctors (18%).

Interviews with ambulance drivers

Fifty-one ambulance drivers took part in the qualitative survey and **61** in the quantitative survey.

Staff operations

The vast majority of drivers (80% of qualitative respondents) agreed that there was a list of checks they must do prior to starting a shift.

The most common items in these pre-shift checklists include:

- the technical condition of the vehicle (**98%**)
- medical examination (**27%**)
- equipment (**17%**)
- take the vehicle to the station (**17%**)
- fill in a travel list (**15%**)
- check/refill fuel (**10%**).

The most common steps in the work procedure reported by ambulance drivers (qualitative) are:

- arrival at address (**76%**)
- assist if needed (**50%**)
- preparation and departure (**50%**)
- receive a call (**46%**)
- stay at the car and guard it (**38%**)
- transport to the hospital (**26%**)
- receive an address (**20%**)
- implement the instructions of the medical professional (**18%**).

Twenty-eight per cent of respondents work in an ICU ambulance.

Only **12%** are involved in a programme to educate the public in first aid.

More than one third (**38.3%**) of quantitative respondents had bought some items needed for work at personal expense.

Staff satisfaction

Almost all ambulance drivers (**95%** of quantitative respondents) do not find their salary satisfactory.

Over one third of quantitative respondents (**38%**) do not have the tools and equipment to do their job. More than half of drivers find their working conditions satisfactory (**57%** of quantitative respondents), and **62%** like the way their work is managed.

Over three quarters of ambulance drivers (**77%** of quantitative respondents) would change their job if they had the chance.

The primary reason (mentioned by 90% of respondents) for wanting to change their job was the poor salary, and some also blamed working conditions (12%). Seventy-two per cent of quantitative respondents would retrain as a paramedic (for the better salary) if they were given the option.

The top-four most common suggestions from staff to leadership on improving the work environment were:

- increase salary (90% of qualitative respondents)
- improve the vehicle fleet (43%)
- make spare parts and repairs more readily accessible (16%)
- improve training (14%).

Communication

Mobile phones are the primary means of communication used by ambulances. Only 6% of staff (qualitative) reported using radios.

If the primary means of communication failed, there was no clear backup plan beyond just finding another phone.

Training

Eighty-three per cent of quantitative respondents had received refresher training between 2017 and 2019.

A third of drivers (qualitative) had not had their training upgraded in the last two years. Thirty-eight per cent of qualitative respondents felt that training should be upgraded on a yearly basis, and **13%** believed it should happen every six months.

Violence at work

Almost two thirds of ambulance drivers (**61%** of qualitative respondents) have been victims of violence during work.

The most commonly reported perpetrators of violence against respondents were:

- a relative of the patient (**89%**)
- the patient (**64%**)
- bystanders (**56%**).

Thirty-eight per cent of quantitative respondents know the protocol on how to protect themselves from violence. **Forty per cent** do not know if the protocol exists and **22%** said there is no protocol.

Only one of **23** respondents said their protocol was a national protocol. Most protocols identified for dealing with violence are local (**61%** of quantitative respondents). Respondents find protocols useful: half of them said they are "extremely useful", while only one person finds them "more useless than useful". All respondents reported that their colleagues follow the protocol.

Feedback on problems and solutions

The top-five most common problems reported by ambulance drivers (qualitative) are:

- bad road conditions (**49%**)
- cars breaking down (**22%**)
- addresses not visible on buildings (**18%**)
- lack of car maintenance (**16%**)
- drivers not giving way (**10%**).

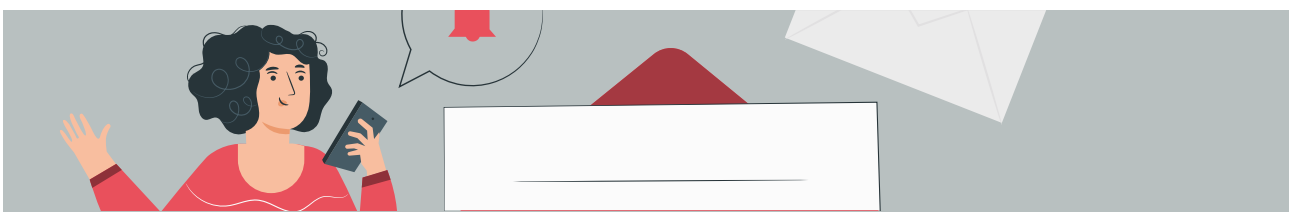
The top-five most common reasons for these problems were given as:

- lack of funding (**27%** of qualitative respondents)
- poor driving culture (**13%**)
- bad attitude of the population (**10%**)
- no monitoring of road conditions (**8%**)
- bad roads (**8%**).

The top-five suggested means of resolving these problems were given as:

- buy what is needed (**19%** of qualitative respondents)
- administrative penalties from the police (**15%**)
- increase salary (**13%**)
- road maintenance (**12%**)
- increase funding for transport needs (**11%**).

Interviews with dispatchers



The qualitative questionnaire was used to interview **57** dispatchers and the quantitative was used to interview **65**.

Staff operations

The top-10 most common steps in the work procedure reported by dispatchers (qualitative) were:

- collecting information about the case (**54%**)
- receiving a call (**34%**)
- confirming and registering the call (**29%**)
- assessing the type and severity of the case (**23%**)
- transferring the call to the team (**21%**)
- finding the closest available team (**20%**)
- forwarding the call to the dispatcher of the direction (**16%**)
- completing the call (**14%**)
- following up all team activities via devices (**13%**)
- getting a call from the receiving call dispatcher (**13%**).

The three most common emergencies reported by dispatchers (quantitative) are:

- traffic accidents (**12%**)
- loss of consciousness (**12%**)
- hypertension (**10%**).

The service responds to, on average, **48%** non-urgent calls (quantitative).

There is evidence of collaboration with other emergency services, police and rescue services, though further steps should be taken to improve this.

Forty-seven per cent of quantitative respondents can send the police as a first-responder, and **47%** the State Emergency Service. Ninety per cent of quantitative respondents cannot send volunteers as a first-responder. Dispatchers confirmed that all of these services respond when called upon.

> Most dispatchers (**88%** of quantitative respondents) do not have real-time knowledge of the number of available ICU beds in hospitals.

Of the eight dispatchers (quantitative) who said they had real-time knowledge of ICU beds in the hospital, three admitted this information was obtained only by phoning the hospital. The other five declared that their system was computerized, but further investigation is needed to assess the quality of the computerized system.

> **Twenty-nine per cent** of quantitative respondents are involved in a programme to educate the public in first aid.

Staff satisfaction

> Almost all dispatchers (**97%** of quantitative respondents) thought their salary was unsatisfactory.

Around three quarters (**72%**) said their working conditions were satisfactory and **80%** like the way their work is managed. Most people (**83%** of quantitative respondents) have the tools and equipment to do their job. **Forty per cent** of quantitative respondents nevertheless would change their job if they had a chance, mainly because of the poor salary (**84%**).

The most common recommendations from staff (qualitative) to improve the work environment were:

- increase salary (**95%**)
- improve equipment (**26%**)
- improve organization of work (**11%**).

Training

There was significant variation in when staff last received an upgrade in training:

- a quarter of qualitative respondents had an upgrade this year
- a quarter had an upgrade last year
- a quarter had an upgrade two years ago
- the final quarter had an upgrade more than two years ago.

> Over three quarters of quantitative respondents received refresher training in EMS between 2017 and 2019.

Eighty-seven per cent of quantitative respondents received basic trauma training, **67%** multi-casualty training and 63% advanced trauma training.

Protocols

> A significant majority of dispatchers (**85%** of quantitative respondents) reported that written treatment protocols are available at prehospital in their dispatch centre.

Protocols were identified for treatment of loss of consciousness, heart attack, injury, epilepsy, bronchial asthma and others. More than half of respondents find the protocols good (**18.4%** "excellent" and **36.7%** "very good"). **Forty-two per cent** said they are "neither good nor bad". The vast majority of respondents say their colleagues follow the protocol.

> Three quarters of quantitative respondents believe there is a triage protocol for their work available at prehospital in the dispatch centre. When pressed to identify these protocols, most respondents pointed towards treatment protocols or unidentified local protocols.

Violence at work

> **Sixty-three per cent** of the quantitative respondents have been victims of violence during work.

Twenty-five per cent of quantitative respondents believe that violence is very common. A relative of the patient is the most reported source of violence (**87.5%**), with violence by patients experienced by **75%** of quantitative respondents and violence by bystanders by **58%**. Half of quantitative respondents think psychological abuse is a common form of violence.

Only one quarter of quantitative respondents said they have a protocol on how to protect themselves from violence.

Fifty-four per cent do not have any protocol and **22%** do not know. More than two thirds of quantitative respondents (**69%**) with access to a protocol find it extremely useful. Everybody who had access to a protocol reported that their colleagues follow it.

Problems and solutions

The top-five most common problems reported by dispatchers (qualitative) are:

- wrong addresses or no address given by patients (**44%**)
- non-emergency calls (**28%**)
- rudeness of callers (**16%**)
- people who cannot describe the patient's condition (**14%**)
- aggressive patients (**12%**).

The top-three most common reasons for these problems were given as:

- lack of public awareness (**40%** of qualitative respondents)
- behaviour of the caller (**13%**)
- insufficient funding (**12%**).

The most common suggested means of resolving these problems were given as:

- educating the public about EMS and primary care (**44%** of qualitative respondents)
- penalties/fines (**12%**)
- improve funding (**8%**)
- adding caller ID to phones (**6%**).

Students and lecturers

The study surveyed **11** lecturers and **11** students to gauge students' interest in pursuing an EMS career.

Student interest

Two thirds of the students surveyed said the EMS specialty was interesting to them.

They nevertheless were less sure about considering taking a specialty in EMS. Only **42%** said they would consider it, while another **42%** said they didn't know. Most lecturers thought that students had high interest in the EMS specialty and believed the key factor in their interest was the opportunity to acquire practical skills.

Top suggestions from the students for making the specialty more interesting included:

- increasing pay
- providing training and more exercises
- providing more modern equipment
- improving working conditions
- making overall changes to EMS
- improving EMS vehicles.

Ideas from the lecturers for making EMS more interesting to students included:

- offering more practical lessons, including simulations
- increasing salaries
- making new methods and technologies visible to students.

Patients

This was the largest sample in the study, with **328** patients completing a questionnaire about their experience after going through the full cycle of emergency care (including hospital and ambulance emergency care). The average (mean) monthly income of patients was **UAH 5100** (with a **95%** confidence interval of **UAH 4163–6063**). The highest educational degree for **38%** of patients was awarded at college level, **34%** at high-school level, **17%** university level and **10%** primary school.

Patient profile

For about half of the patients (**54%**), this was their first call to EMS in three years. For **28%**, this was their second or third call in three years.

Around half (**54%**) of the patients rated their injury or illness to be serious, **38%** to be moderate, and **8%** to be mild. Half believed they could distinguish between feldshers, nurses and doctors.

Patient experience

The mean reported time for ambulance arrival was **16.1** minutes (with a **95%** confidence interval of **14.6–17.7** minutes).

About half of the patients (**52%**) report always being informed about the diagnosis and procedures they were receiving during their transportation to the hospital.

Twenty-seven per cent said they were sometimes informed and **21%** were never informed. These figures compare poorly to the **80%** of patients who said they were always informed about the diagnosis and procedures received at the hospital (**17%** said sometimes, **3%** said never).

The vast majority (**97%**) of patients did not have to pay anything throughout the process of receiving EMS services (prehospital).

Those who did pay mostly paid for drugs or transport to a different hospital. There were other single cases where people reported that they paid "for the attitude" (perhaps a tip), or for time in the operating theatre, or for disposable equipment. The average expenditure for the medical service issued after EMS by the hospital was **UAH 5792** (with a **95%** confidence interval of **UAH 4386–7197**).

Patient satisfaction

Ninety-two per cent of patients were either "satisfied" or "very satisfied" with their EMS experience.

Eight per cent said they were "neither satisfied nor dissatisfied", "not very satisfied" or "dissatisfied". **Ninety-three per cent** rated the dispatchers' politeness and professionalism as a **seven** or more on a scale of one (poor) to **10** (excellent). Patients particularly liked the EMS personnel (mentioned in **41%** of responses), the speed of the ambulance response (**30%**) and the professionalism of the service (**20%**).

Forty-four per cent of respondents could think of no way to improve their EMS experience.

Suggestions from others for improving the EMS experience included:

- improving the cars (mentioned in **31%** of responses)
- improving the staff service (**15%**)
- improving roads (**14%**)
- improving equipment and medicines (**9%**)
- improving service speed (**3%**).

Interviews with oblast-level financial administrators

Twenty-five oblast-level financial administrators were interviewed with a qualitative questionnaire and **24** with a quantitative questionnaire.

Budgeting

> The most common algorithm used to calculate the oblast-level EMS budget was population density (**79%** of qualitative responses).

The number of available ambulances was used in **47%** of responses, and the number of cases was also used in **47%** of responses. Other factors mentioned included geographic distribution, facility distribution and staff availability. Resolution 228 of the Cabinet of Ministers of Ukraine addresses the allocation of central funds to regional budgets.

> Most of the budget is taken by human resources, with a mean percentage of **78%** (qualitative).

The mean percentage of budget given to medicines is **3.8%**, to equipment **4.4%** and to training **1.2%**.

> The most common suggestion for changing the budget distribution was to increase the funding (**41%** of qualitative responses).

Other suggestions included:

- replacing vehicles
- buying medicine and equipment
- giving more money to repair and maintain the premises.

> All financial administrators (quantitative) report that their oblast has a written budget.

Seventy-nine per cent of quantitative responses indicated that deterioration from the budget at the end of the financial year has already occurred, but **21%** of respondents say it has never occurred. The mean total funding for EMS in an oblast is **UAH 249 million**. Qualitative respondents say budget requests can be made for estimates of further funding that is required; this funding generally comes from oblast level (**96%**), though some (**20%**) say it can also come from federal level.

> All but one of the quantitative respondents agreed that EMS in their oblast are underfunded.

Most of the qualitative respondents (**84%**) agreed that there was underfunding in the oblast EMS budget.

> **Eighty-eight per cent** of quantitative respondents believe there is a mechanism for verifying that EMS funds in their oblast are sufficient.

Only one oblast reports not having any financial tracking mechanism. Almost all qualitative respondents (**95%**) reported using yearly budget analysis to check whether the funding of the oblast is sufficient, with **36%** saying the number of requests from the field weighed into this process. **Four per cent** (one response) mentioned using cost per capita. Monthly reports are the most common means of tracking financial flows in oblasts (qualitative).

> All but one qualitative respondent said that patients should not need to incur out-of-pocket expenses for EMS.

> All quantitative respondents agreed that access to emergency care is free of charge.

Despite this, in two of **23** cases, quantitative respondents said patients need a copayment to access EMS. It is unclear whether the

respondents were referring to official or unofficial payments.

> Fewer than one third of oblast EMS systems surveyed (quantitative) have a budget reserve available in case of disaster.

The budget reserve was on average **1%** of the overall oblast budget.

Interviews with hospital financial administrators

A qualitative questionnaire was used to interview **71** individuals and a quantitative questionnaire to interview **60**.

Budgeting

> The average (mean) establishment budget is **UAH 80 million** (according to quantitative responses).

The average (mean) total funding for the emergency department in the establishment is **UAH 18 million** (quantitative responses) and for EMS in the establishment **UAH 5 million** (quantitative responses). These data should be treated with caution as they are self-reported and do not completely align with data from the Ministry of Finance and the National Treasury. This is further addressed in the discussion section.

> Most of the qualitative respondents (**86%**) believed there was underfunding in the emergency care budget for their establishment.

Ninety per cent of quantitative respondents believe that EMS are underfunded, with salaries, medicines and equipment the three main EMS areas suffering most. **Sixty per cent** of emergency departments (quantitative) do not have a budget reserve in case of disaster.

> Budget requests typically are made at regional level (qualitative) if the establishment desires further funding.

Forty per cent of quantitative respondents said the establishment runs out of budget before the end of the financial year every year, but **26%** believe this has never happened. The budget generally comes from regional level, with only **17%** of qualitative respondents saying EMS funding came from national level. **Eighty-four per cent** of quantitative respondents believe a mechanism is in place to verify that the funds for EMS in the establishment are sufficient.

> **Ninety-one per cent** of quantitative respondents report that establishments have financial tracking mechanisms.

Financial reports, typically on a monthly basis, are used to check whether the establishment funding is sufficient (qualitative). Reports are also used to track financial flows within the establishment.

> Funding generally comes from national (**77%** of qualitative responses) and local (**71%**) budgets, with only **19%** of respondents mentioning other sources of income such as charity, nongovernmental organizations and patient payments.

Most of the budget is given to human resources, with a mean percentage of **75%**. The mean percentage of budget given to medicines is **7.8%**, equipment **3.4%** and training **1.2%**. Other areas of the budget include utilities, nutrition, fuel and vehicle maintenance.

> Almost all of the quantitative respondents (**96%**) believe that access to emergency care is free of charge.

Patients generally do not need to pay to access EMS, although paid access was acknowledged by **14%** of quantitative respondents. Only **13%** of quantitative respondents said that prostheses are available in their establishment; most that offer prostheses (**89%**) do so free of charge.

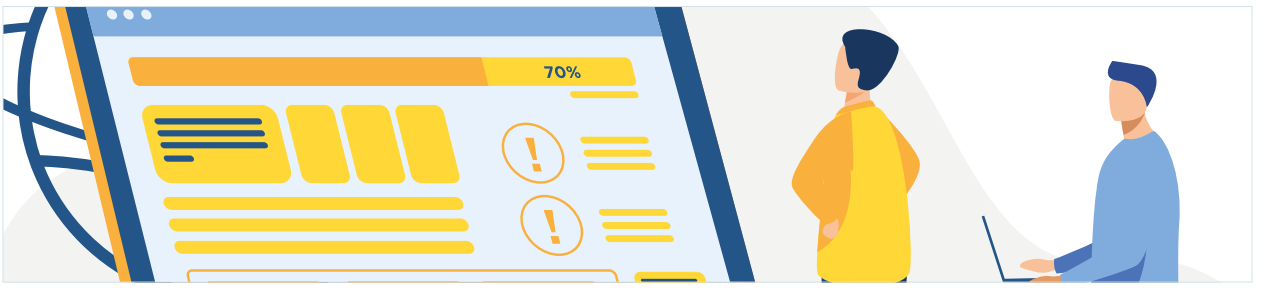
Forty-four per cent of qualitative respondents said patients should not incur out-of-pocket expenses for EMS.

Some of the reasons for incurring out-of-pocket expenses were given as:

- medicine and drugs not being available on the national list
- patients having foreign nationality
- the need for supportive therapy
- to meet fuel costs during non-urgent transportation to other regional hospitals.

In almost all cases (qualitative), these out-of-pocket expenses were imposed by the hospital service, not EMS.

Registries



Sixty-nine per cent of qualitative respondents said this was not on a cost-share basis.

A questionnaire was sent to each oblast's registry. *Table 1* shows the responses for each oblast. Certain indicators of the aggregated data are incomplete, imprecise or inaccurate; the information management system is not computerized in Ukraine, so human error cannot be excluded.

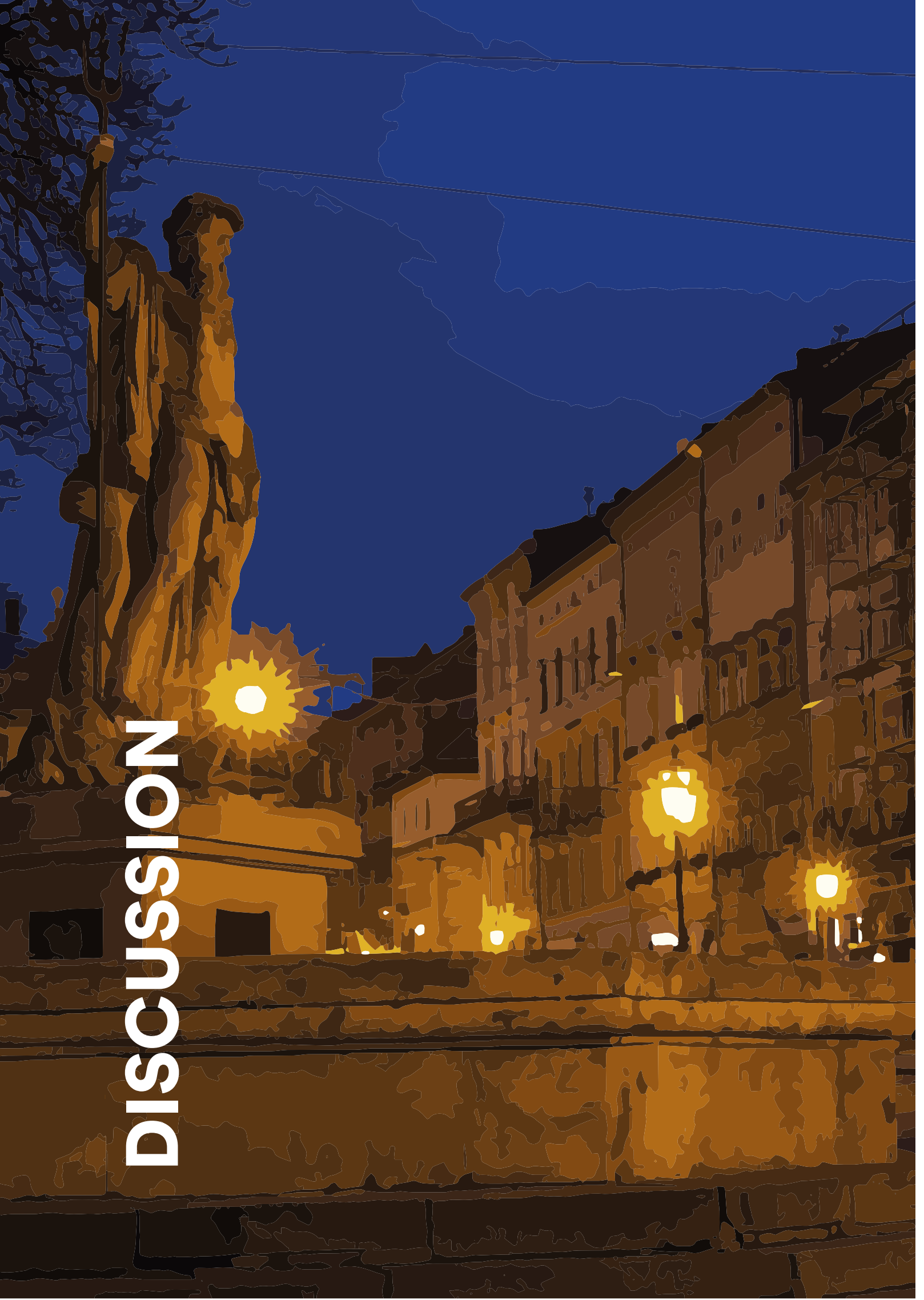
- Replenishing supplies of airways support materials, analgesics, anticlotting medications, oxygen and ECG leads generally takes **1–2** days.
- Replenishing communication technologies can take months or years.
- New ambulances are received on average once in **5.4** years (with **95%** confidence interval of **4.2–6.6** years).
- Ambulances are used for **12.7** years on average (with **95%** confidence interval of **10.4–15** years).
- **Ninety-four per cent** of registries reported that ambulances are kept in garages, but **83%** reported that ambulances can also be kept in open parks.

Table 1. Answers provided by oblast registries

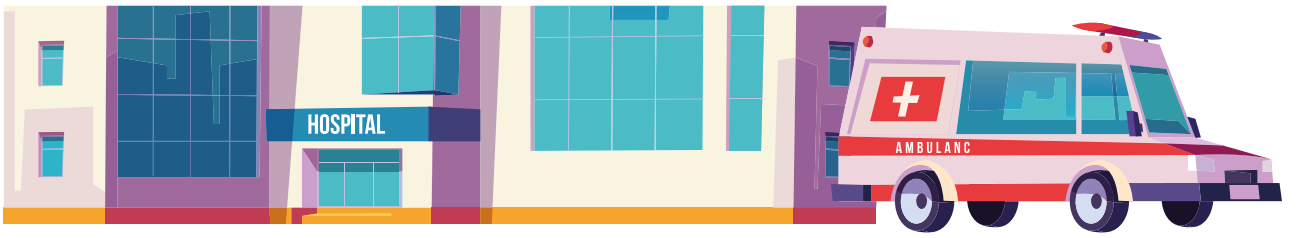
Regions	Ambulances	Doctors	Feldshers	Education specialists	Paramedics	Nurses	Drivers	Dispatchers	Calls from previous year
Khmelnytsky	159	154	645	–	–	122	422	–	–
Chernivtsi	–	188	343	348	76	–	260	13	202 452
Ivano-Frankivs'k	160	178	406	2	68	8	305	58	143 810
Kherson	81	26	80	–	–	–	0	–	–
Volyn	112	102	461	0	77	–	383	–	174 705
Ternopil'	115	180	635	6	74	26	375	36	213 809
Rivne	133	179	484	0	111	0	390	138	246 316
Dnipropetrovs'k	344	378	898	4	315	130	426	124	978 487
Poltava	153	200	676	0	69	64	–	84	562 548
Zhytomyr	167	98	603	–	110	51	427	147	277 034
Chernihiv	106	58	505	–	50	2	385	35	211 021
Vinnytsya	186	223	618	3	42	182	510	175	522 669
Zakarpattya	136	172	536	–	62	–	458	63	241 423
Sumy	165	93	510	60	107	34	439	58	220 283
Kharkiv	220	322	898	6	360	100	603	621	658 933
Kyiv City	167	–	–	–	–	–	–	–	675 258
Mykolayiv	100	83	503	–	503	1 006	422	–	363 222
Kyiv	–	479	907	1 426	350	464	–	480	–
Kirovohrad	134	76	450	–	–	–	320	–	–
Cherkasy	101	45	395	11	4	–	123	22	113 701

Table 1 contd

Regions	Calls not resulting in dispatch	Calls due to road accidents	Treated on site	Delivered to hospital	Deaths on arrival	Deaths during transport	Age of oldest ambulance (years)	Average response time (minutes)
Khmelnytsky	–	377	–	33 785	1 106	136	21	10.0
Chernivtsi	23 956	725	159 087	24 393	930	80	36	17.0
Ivano-Frankivs'k	132	615	106 648	37 162	98	–	20	10.0
Kherson	–	–	–	–	–	–	–	25.0
Volyn	8 213	793	61 057	31 729	723	343	34	10.0
Ternopil'	13 274	597	142 759	39 006	1 256	91	28	8.8
Rivne	4 458	894	181 469	43 622	1 616	183	20	10.0
Dnipropetrovs'k	31 214	3 494	351 707	180 218	705	34	18	16.9
Poltava	216 338	1 368	216 338	84 339	406	37	22	9.2
Zhytomyr	9 517	1 077	20 044	91 247	2 901	261	28	25.0
Chernihiv	11 000	1 016	161 368	43 702	1 620	170	20	30.0
Vinnytsya	178 752	1 043	142 170	80 570	5 330	86	12	–
Zakarpattya	43 483	1 520	124 608	54 790	85	4	22	8.5
Sumy	28 557	773	121 097	58 852	231	33	30	–
Kharkiv	36	2 584	386 246	–	14 804	676	17	8.6
Kyiv City	438 913	5 020	–	89 654	3 430	418	30	13.0
Mykolayiv	–	–	–	–	–	–	–	15.0
Kyiv	–	–	3 312	166 316	9 686	935	7	10.0
Kirovohrad	8 752	522	117 940	20 229	2 146	120	22	15.0
Cherkasy	3 878	498	93 246	109 823	839	119	24	15.0


DISCUSSION

Prehospital care



Dispatch centres

Access to, and availability of, the EMS dispatch service

Access to EMS in Ukraine is legally prescribed to be free of charge and open to everyone. Despite this, a small number of hospital doctors acknowledged that their emergency department requires some form of identification to be presented by the patient and, in some cases, insurance documents. It is not clear whether this would be required in life-threatening situations. Out-of-pocket payment seems to be the main barrier to hospital admission; further work should investigate why and how these restrictions are being placed upon admissions to emergency departments. Data from the Health Index Ukraine survey for 2019 indicate that **11.2%** of people (N = 1165) in need of hospitalization did not use it due to cost (WHO Regional Office for Europe, 2019; Health Index Ukraine, 2020).

Most EMS directors (62%) said that public safety services in their oblast do not use a unified telephone number. Separate numbers are currently being used to access fire and police services. Ukraine was set to launch the common European emergency number (112) for access to all emergency services back in 2012 (Parliament of Ukraine, 2015), but the process is still ongoing, and the number is not yet fully operational. A centralized phone number (103) is used, however, for access to EMS, in accordance with Ukrainian regulations. Six of the eight directors who said there was a unified telephone number reported that there was also a backup number to call. Only one EMS director (from Kyiv) believed that their unified access number has a global positioning system (GPS) locator. The oblasts that do not have access to type A ambulances are Kyiv, Sumy and Poltava, confirmed by national statistics that generally show the low use of type A ambulances in Ukraine, which is in line with the national EMS protocols.

> Zhytomyr oblast reported having access only to type C ambulances. If true, this will put much strain on the ambulance fleet and budget.

Coordination protocols used between dispatch centres

It is unclear from the Ministry of Health leadership interviews whether the law specifies any SOPs for dispatch centres.

> The only national protocols clearly identified by dispatchers in the survey were treatment protocols.

While the vast majority of dispatchers reported a very clear procedure of work, procedures were found to vary significantly across oblasts. Some dispatchers gave detailed answers, with a clear set of steps to follow. For example, from Lvivska:

> *(1) Receiving a call. (2) Confirmation of receipt and registration of a call in the system. (3) Forwarding of the mobile team. (4) Monitoring of the team's actions (receipt, departure, arrival, completion and return to the substation). (5) On the way back there may be a break.*

Another respondent from Kyiv talked about "service tickets" and a "database" and others of similar concepts, but it is not clear if this is a computerized system:

> *Call registration in the database [...] starting with the choice of ticket: regular, transportation, or service. Open a ticket and fill in the national language: the cause of the call, phone number, city area or metro station, name of the street and house number.*

Another dispatcher simply said:

We get a call, clarify the information, send a car.

These responses show a clear lack of standardization across oblasts.

Fig. 1 shows the regions of Ukraine in blue where dispatchers mention some computerized component to their dispatch system. Dispatchers from Poltava and Sumy reported a work procedure with tablet and smartphone apps used by both dispatchers and ambulance teams. Dispatchers from Kharkiv, Zakarpattya, Vinnytsya and Mykolayiv also reported using computerized systems to facilitate work procedures.

It is not clear in cases where EMS operate near oblast boundaries whether there is sharing and collaboration of resources over the boundary. As most dispatch centres are not connected within the oblast, it follows that they are not connected across the oblasts.

Communication with police and fire services

There is collaboration between EMS and other emergency services such as police and rescue, but collaboration could be further improved. Fifty-five per cent of EMS directors believed there was collaboration with police and 38% with rescue services. This is roughly in agreement with the dispatchers, 47% of whom reported that they could send the police as a first-responder and 47% that they could send the rescue service. It is likely that this collaboration happens by phoning the alternative services' dispatch centres, but further collaboration is required.

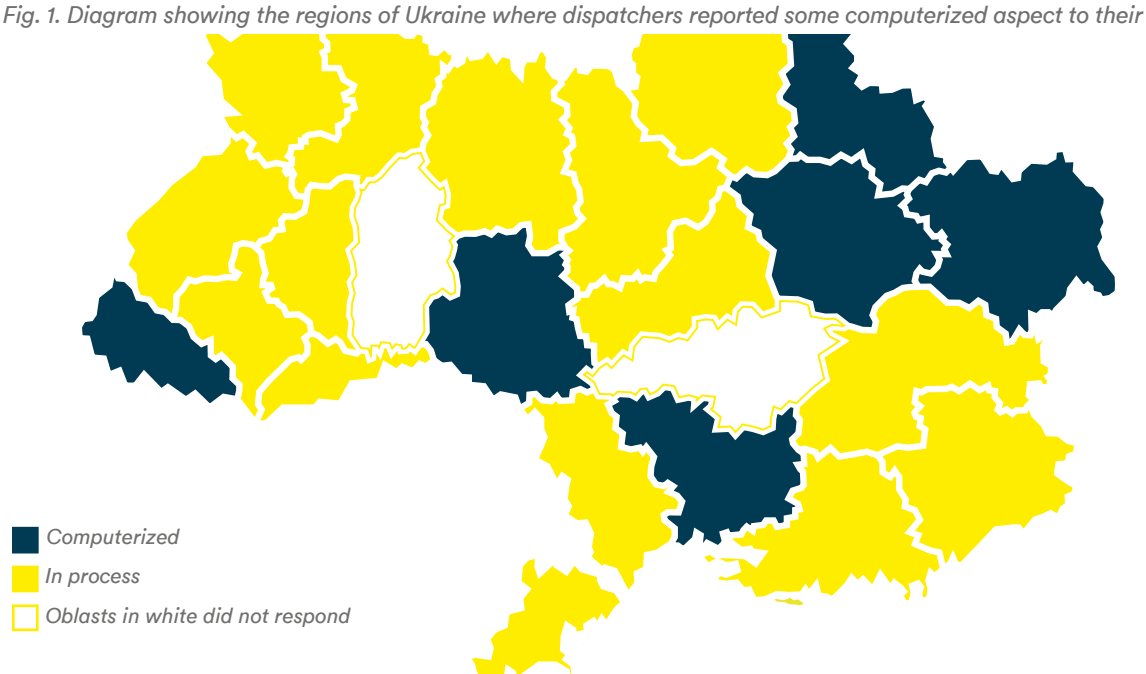
Call prioritization system (triage protocols at dispatch level)

While there are many different computer-aided dispatch systems (including Kharkiv, Esenteks, Manteks, Epim 103 and Erim), it seems that none is capable of assisting dispatchers in determining call priority.

Hospital doctors and ambulance staff were able to identify national triage protocols, but no such protocol could be identified by dispatchers. This is likely to result in a high number of non-urgent cases and dispatch missions.

Although most dispatchers believed they had a triage protocol, when pressed to identify the protocol, they mostly pointed to treatment protocols.

Fig. 1. Diagram showing the regions of Ukraine where dispatchers reported some computerized aspect to their workflow



Some dispatchers (**11%**) identified a local dispatch-level triage protocol. Further investigation into the source of these local protocols should take place. Interestingly, a large proportion (**38%**) of the **21** EMS directors surveyed believed there was a national dispatch-level triage protocol in use at their dispatch centres.

A triage protocol is essential in helping tackle the problem of non-urgent calls. It is important that calls are prioritized quickly and efficiently to reduce the burden of non-urgent calls on EMS. It is recommended that a national dispatch-level triage protocol be developed, endorsed, implemented and monitored if it does not currently exist.

Training and education of EMS dispatchers

Over three quarters of dispatchers in the quantitative study reported having received refresher training in EMS between 2017 and 2019 (the two years before the survey). Dispatchers responding to the qualitative questionnaire yielded a similar result, with a quarter having not received refresher training in the last two years. **Eighty-seven per cent** of respondents received basic trauma training, **67%** received multi-casualty training and a little less (**63.3%**) received advanced trauma training.

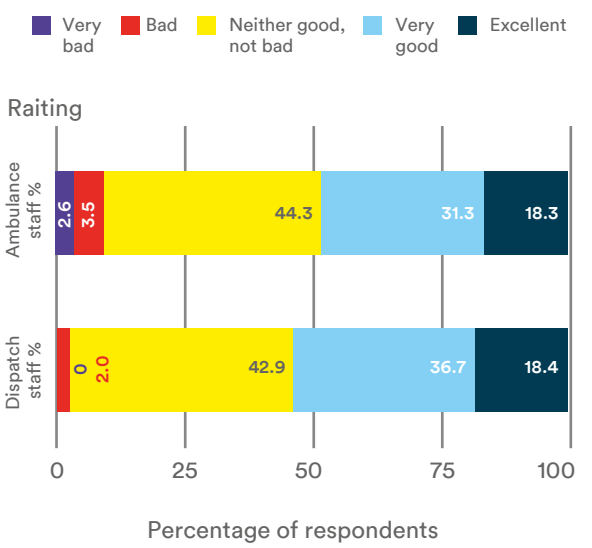
When the dispatchers were asked how often they thought refresher training should occur, the predominant response was every five years (**40%** of dispatchers). Unfortunately, there is no access to data on staff turnover in EMS, so it is hard to assess whether this figure is reasonable.

Perceived usefulness of treatment protocols

Dispatchers found the protocols good or were indifferent to them. Only one dispatcher expressed a negative view towards the protocols; he did not explain why. This is very similar to how ambulance staff and doctors view EMS treatment protocols.

Fig. 2 shows how similarly dispatch and ambulance staff rate the treatment protocols. The data suggest that these treatment protocols are acceptable but could be improved.

Fig. 2. Usefulness of treatment protocols, rated on a five-point Likert scale by dispatch and ambulance staff



Monitoring and evaluation

According to the EMS directors, various indicators contribute to the evaluation of the dispatch process.

The indicators include:

- time to arrival on site (selected by **85%** of EMS directors in the qualitative survey)
- the percentage of hot calls responded to on time (**79%**)
- a journal of attendance (**47%**)
- percentage of hospital referrals (**47%**)
- survival rates (**47%**).

From these responses, the efficiency of dispatch centres appears to be evaluated well.

Data from the EMS directors' quantitative questionnaire, however, reveal lack of standardization across oblasts. Furthermore, time to arrival on site was the most quoted indicator for evaluating dispatch performance, but may not be the most useful or reliable descriptor.

Real-time knowledge of available ICU beds

There is no system or SOP for providing dispatch centres with real-time knowledge of available ICU beds. In the few cases where dispatchers or EMS directors believed there was real-time knowledge of ICU beds at dispatch, several dispatchers acknowledged that this had to be requested through ad hoc phone communication.

> Making the number of available ICU beds known to dispatch via a computerized system could significantly reduce the time to specialist treatment and the incidence of secondary referrals, thereby improving survival rates.

Five of the 11 dispatchers surveyed from Kyiv city believed that a computerized system was in place to provide this information. Further work could look into the effectiveness of the system and whether it could be rolled out across the whole of Ukraine.

Distribution of dispatch centres

There is a move towards the centralization of dispatch services in each oblast. At the time of the survey, three quarters of the EMS directors reported that their oblast had only one central dispatch centre, with the others having between seven and **24**. *Fig. 3* shows in blue the oblasts that have multiple dispatch centres. Oblasts in yellow are in a transformation phase.

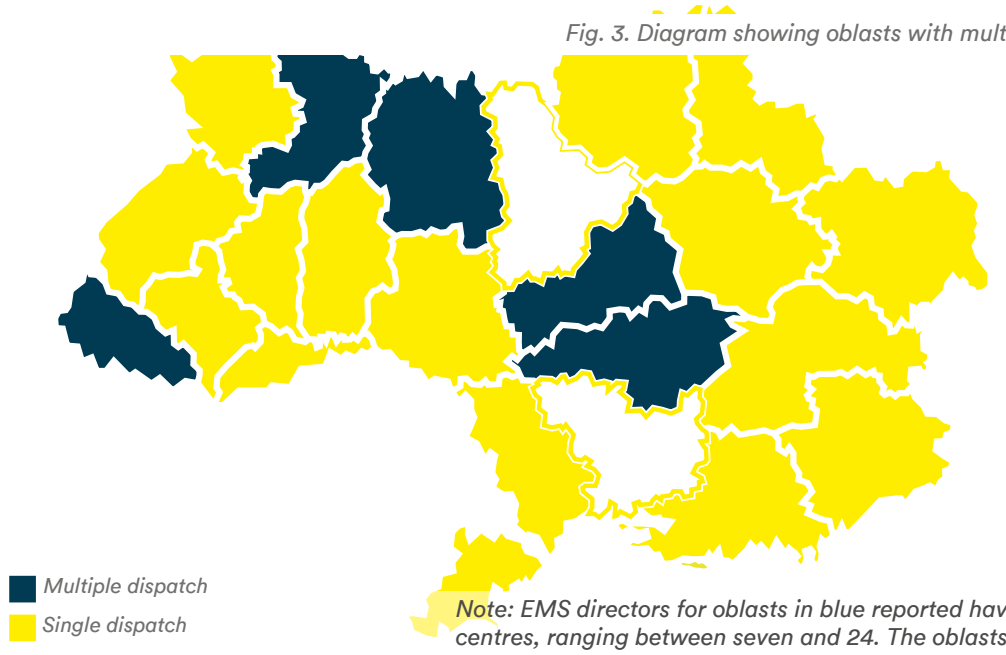
Where an oblast has multiple dispatch centres, there is no functional connection between them. Half of the EMS directors said there was coordination between their dispatch centres and those at national level. Where this was not the case, the predominant reason was that coordination was still being implemented.

Fig. 4 shows the oblasts in blue where the EMS director reported there was coordination with the centralized national dispatch centre in Kyiv, which appear to be mainly those near the line of contact and those near Kyiv.

Provision of telephone consultations for non-urgent cases

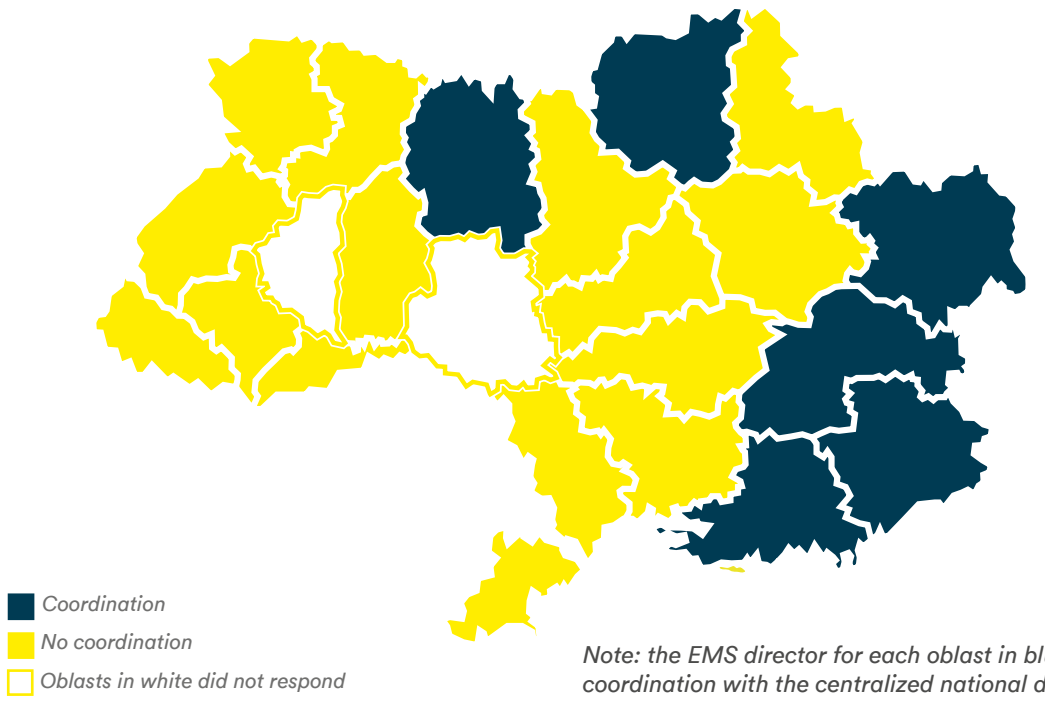
All EMS directors said their dispatch centres provide telephone consultations for patients who do not require an ambulance response. Only in Kyiv did they clearly report that a separate team was responsible for delivering this non-urgent service.

Fig. 3. Diagram showing oblasts with multiple dispatch centres



Note: EMS directors for oblasts in blue reported having multiple dispatch centres, ranging between seven and 24. The oblasts in white reported having only a single centralized dispatch centre.

Fig. 4. Diagram showing oblasts reporting coordination with the centralized national dispatch centre in Kyiv



Note: the EMS director for each oblast in blue reported coordination with the centralized national dispatch centre.

The EMS directors from both Kyiv city and Kyiv oblasts said they had a separate department for handling non-urgent calls, with one director explaining:

> *A consulting information department works in the centre, which provides consultations to patients who were transferred from the dispatcher. Also there is a consulting telemedicine department where you can send results, for example.*

Most EMS directors believed that non-urgent calls should be handled by a primary-care physician instead of EMS. This would be in keeping with WHO recommendations (WHO, 2005).

Emergency care provided in ambulance and on scene

Definition of emergency case

Both Ministry of Health leaders who were interviewed reported having a clear definition of an emergency case. One said that an emergency case was "a condition that is threatening to the life and health of the patient caused by a sudden illness or injury and requires emergency care". The other said that the emergency case was defined by "using the protocols".

The definition of an emergency case can be found in law and is described as (Parliament of Ukraine, 2020):

> *Emergency – a sudden deterioration in physical or mental health that poses a direct and imminent threat to the life and health of the person or persons around him and which results from illness, injury, poisoning or other internal or external causes.*

EMS in Ukraine are not only operational in emergencies. They also cover primary health care, provide patient transportation, respond to people's mental health needs and deliver medicines. It is important to acknowledge that ambulances in Ukraine have a broader use than those in other countries.

The pre-treatment workforce includes ambulance doctors, dispatchers, drivers and other ambulance medics (feldshers/nurses/junior medics). The number of EMS workers typically is calculated on a per capita basis.

The law includes minimum requirements for qualifications of EMS staff. *Table 2* profiles the four staff groups.

> The data suggest there is a need to attract more young EMS doctors and drivers to keep the workforce sustainable over the coming years.

Fig. 5–8 show the number of full-time doctors, medics, drivers and dispatchers per **100 000** population by oblast.

There are discrepancies among oblasts compared to international standards that require revision from Ministry of Health leadership.

Table 2. Profile of workforce staff groups

Indicator	Doctors	Dispatchers	Drivers	Medics[a]
Average age (years)	50.25	44.67	50.21	35.88
Average experience (years)	21.69	16.73	17.31	14.84
Percentage under three years' experience	12.79	17.62	13.38	14.94
Percentage over pension age	33.77	20.14	21.00	10.97
Number of part-time staff[b]	10.24	7.38	29.25	44.78
Number of full-time staff[b]	2.26	0.72	1.37	7.35

[a] *Medics include feldshers, nurses and junior and lower medics.*
[b] *Staff numbers are given per 100 000 population.*

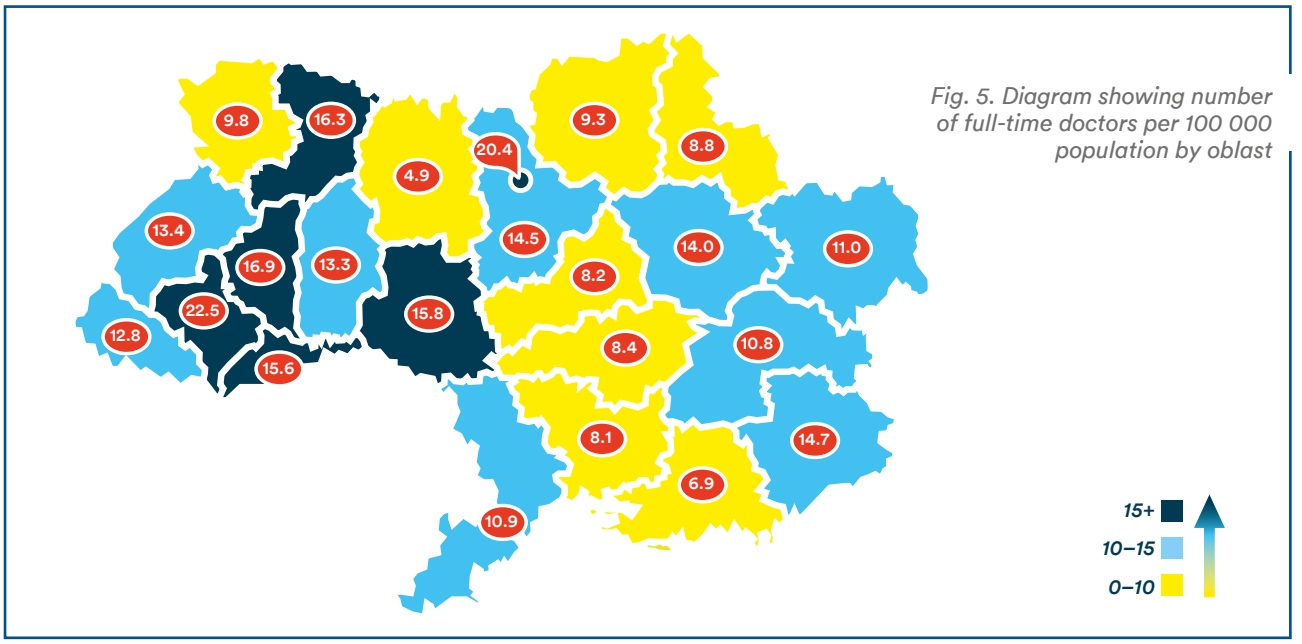


Fig. 5. Diagram showing number of full-time doctors per 100 000 population by oblast

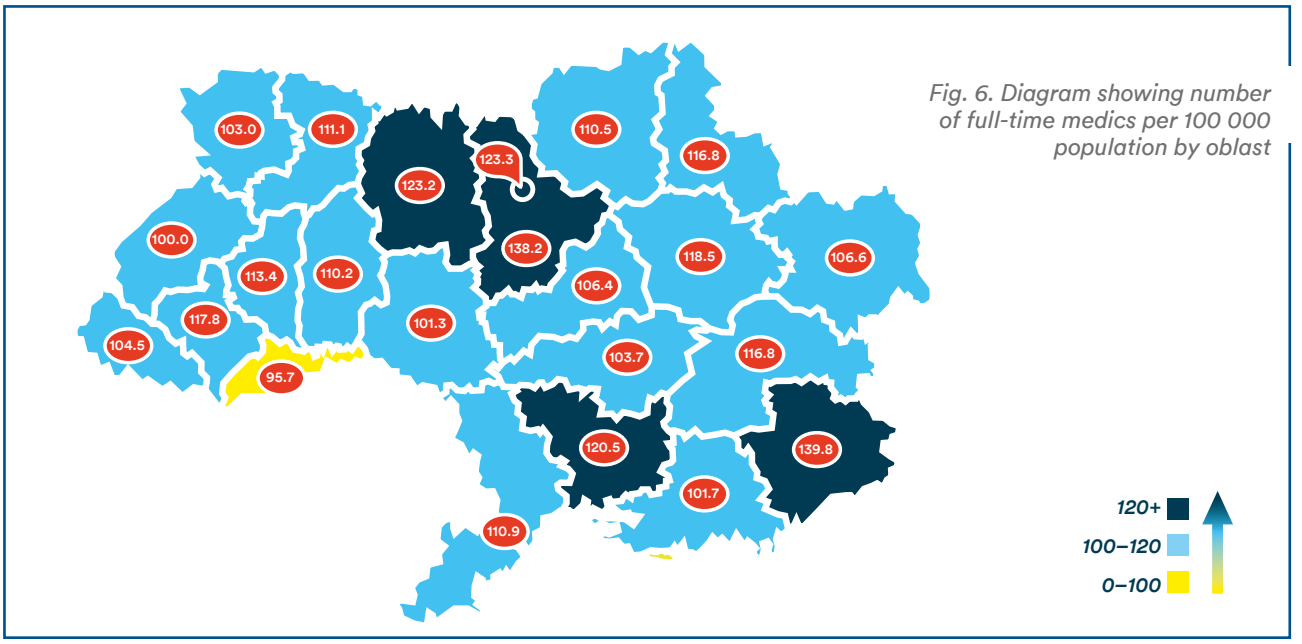


Fig. 6. Diagram showing number of full-time medics per 100 000 population by oblast

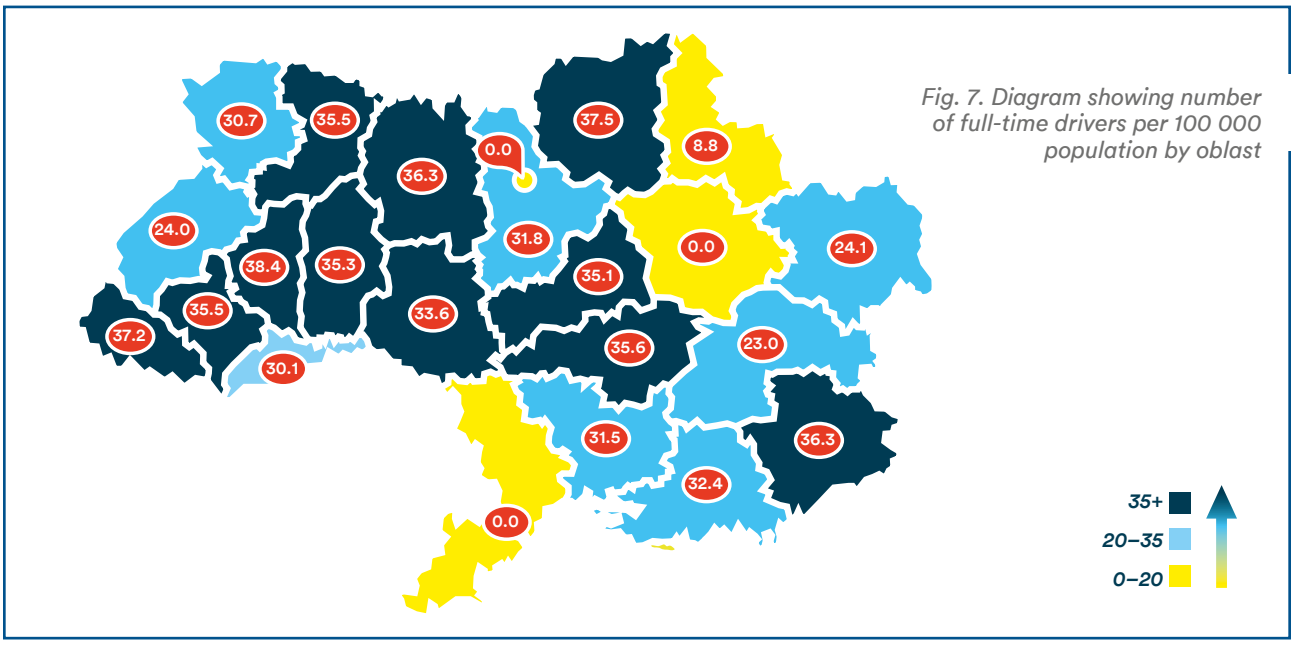


Fig. 7. Diagram showing number of full-time drivers per 100 000 population by oblast

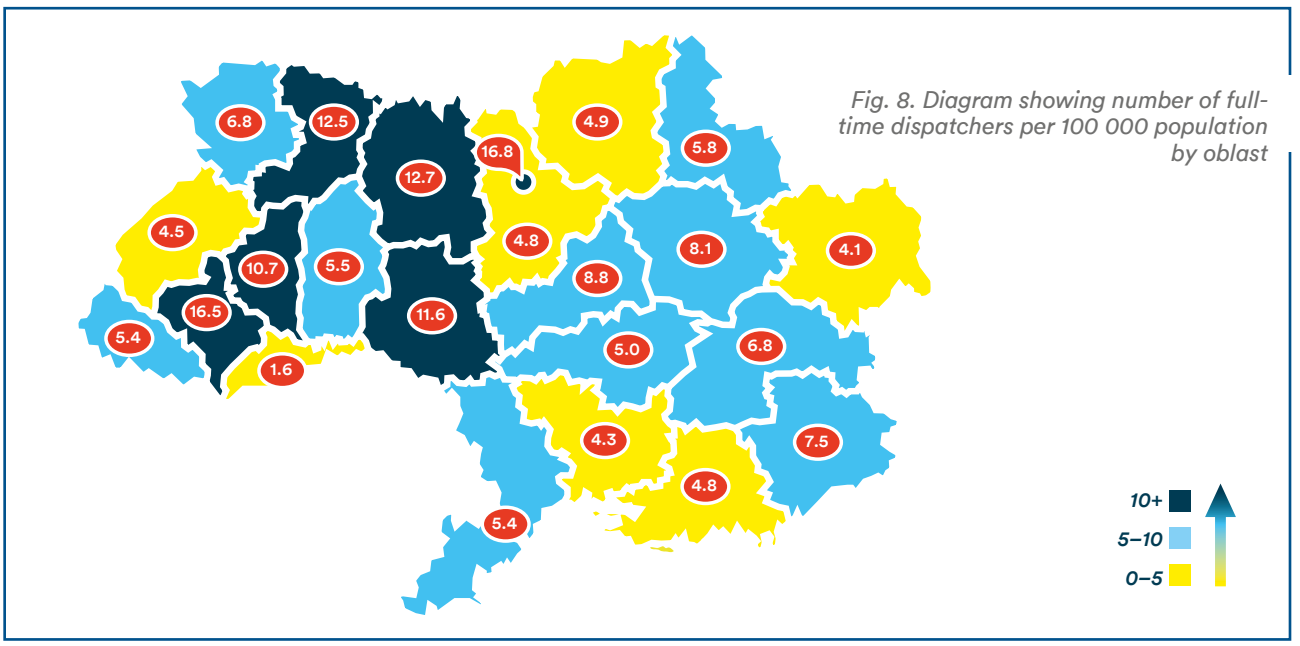


Fig. 8. Diagram showing number of full-time dispatchers per 100 000 population by oblast

Minimal number of procedures provided by EMS

A list of medical procedures that EMS are obliged to provide can be found in the Qualification Requirements for EMS Professions, Issue 78 and EMS treatment protocols (Ministry of Health, 2019c).

The current legislation on emergency care access was developed between 2010 and 2015.

The law includes a minimum standard of care, which was updated in 2019, and minimum standards of equipment in ambulances and emergency departments.

Five per cent of ambulance medics reported that they had not provided oxygen to patients in respiratory arrest/distress. Only **three of the 110** ambulance medics who said they provided oxygen had not done so in the last year. Oxygen is a life-saving intervention. In cases where it was reported that oxygen was not provided, **40%** responded that there were no cases of respiratory arrest/distress, **40%** that oxygen was not available, and **20%** did not know the reason. All ambulance medics should have access to, and understand how to use, this essential life-saving resource.

A significant proportion of ambulance medics (**22%**) reported that a 12-lead ECG had

not been performed for patients over **35** with suspected cardiac chest pain. All those who performed 12-lead ECGs said they had done so in the last year. Among those respondents who had not performed a 12-lead ECG in patients over **35** with suspected cardiac chest pain, **81%** reported that they did not have a 12-lead ECG and **12%** that it was not needed. Performing a 12-lead ECG for suspected cardiac cases is a fundamental diagnostic intervention. All ambulance medics should have access to, and understand how to use, this essential life-saving equipment.

Many ambulance medics (**26%**) reported that they did not give aspirin to patients over **35** with suspected cardiac chest pain. All those who reported giving aspirin said they had done so in the last year. Among those respondents who had not given aspirin to patients over **35** with suspected cardiac chest pain, **58%** responded that they do not give it before diagnosis, **23%** that they give another drug, and 8% that the drug is dangerous and harmful to give without checks. Aspirin can improve the prognosis of cardiac cases by **50%** (Maxwell, 1999; Elwood et al., 2010; Hall et al., 2014). All ambulance medics should have access to, and understand how to use, this essential life-saving medicine.

Most ambulance medics (**76%**) reported that they do not intubate in a prehospital setting. Almost all of those who reported that they do intubate had done so within the last year. Two participants reported not having done it in the last three years. The main reasons for not intubating were given as "lacking skills/ qualifications" (**42%**) and "no indications that it was needed" (**34%**).

These findings demonstrate a gap in skills, knowledge, training, medical supplies, and monitoring and evaluation among EMS staff. This is demonstrated by the insufficient number of EMS staff following the protocols according to the minimum standards of care, such as providing oxygen, giving aspirin and performing 12-lead ECGs, which are prerequisites to saving patients' lives when required. According to international guidelines, these procedures must be delivered timeously by trained staff who have access to the required health supplies and equipment.

Perceived usefulness of protocols

When the ambulance staff were asked whether their colleagues follow the treatment protocols, a fifth replied "sometimes".

The protocols generally are seen as good, with half the ambulance staff saying they are either good or excellent and almost all other respondents saying they are neither good nor bad. This is very similar to how dispatchers and doctors view EMS treatment protocols.

Training and education of ambulance staff

The study found that a great deal of specialist training is provided across Ukraine for all prehospital care staff. This includes training equivalent to the basic and advanced life-support programmes.

The Ministry of Health leaders confirmed that completion of specialist training is required for certification of EMS staff.

The law includes annual compulsory training on the management of emergency cases, but the study found no such standardized approach to the continuous training of EMS staff. The frequency with which staff generally received training was dependent on their role within EMS and the oblast in which they were employed.

Participation in standard training courses by ambulance staff was mixed, with 80% of respondents having received basic trauma training, **59%** advanced trauma training and **57%** multi-casualty training.

It was unclear from the findings whether a national curriculum of training exists.

In 2019, the Ministry of Health introduced a new model of continuous professional development (CPD) for physicians practising in Ukraine (Ministry of Health, 2019c). This also changed the way in which EMS physicians undergo recertification. Previously, recertification was done every five years,

but with the new model, CPD points need to be submitted every year. Additionally, the old model allowed physicians to obtain recertification courses only from government-owned postgraduate medical academies, with international courses not being recognized. The new model will count international courses, such as Basic Trauma Life Support, Advanced Trauma Life Support and Mass Casualty Management, towards annual recertification. This is set to promote the implementation of international standards of care and potentially lead to an improvement in patient outcomes.

Feldshers are the backbone of EMS in Ukraine, as they account for more than **39%** of the EMS workforce, with **47%** in rural areas (Centre for Medical Statistics of the Ministry of Health, 2019). The CPD system, however, is not as well developed for feldshers as for doctors. The EMS report found that programmes for feldshers are mainly director-led at oblast level. One oblast reported that training depends on requests from staff or in the wake of an analysis of EMS data that suggests a specific need for training. There is no professional body to set standards for professional certification in emergency medicine for feldshers. A certification system for feldshers therefore should be developed.

Quality control of prehospital care

The Ministry of Health leadership reported that **there is no standardized system of quality control for EMS** beyond conducting an analysis of registry data.

Each oblast's registry was asked to participate in the study and submit information for review.

The data quality from the registries was found to be really very poor. Certain indicators of aggregated data were incomplete, imprecise or clearly inaccurate.

The registry data are submitted by the regions to the Ministry of Health on an annual basis (usually with significant delays), making it hard to use these data in decision-making or quality control. Indicators used by the Ministry of Health, such as the number of EMS staff per population or per **10 000** and the number of ambulances per population or per **10 000**, are not enough to cover the whole survival chain.

The information management system is not computerized in Ukraine, so human error in accuracy cannot be excluded.

As well as ensuring that data and indicators used to monitor and evaluate EMS are reliable, it is important to consider how data should be interpreted and what actions should be taken as a result.

On-scene triage

Ambulance staff identified that there was a triage protocol available at prehospital level. The triage protocol they identified was either the Ministry of Health Executive Order 366 (Ministry of Health, 2012b) or a local protocol. It is important for the Ministry of Health to understand why some oblasts use a local protocol instead of the national protocol.

Pre-shift operational protocols used at prehospital level

The vast majority of ambulance staff agreed that there was a list of checks they must do prior to starting a shift. These checks generally were focused on the condition of equipment and availability of medicines. The list of checks reported by staff seems to vary in content. One staff member explained:

> *There is no approved separate document on what to do before the beginning of a shift. All members of the team act on the basis of their job descriptions within the scope of their duties.*

Almost all ambulance staff agreed that there was an EMS treatment protocol in place. When asked to identify this protocol, different members of staff pointed to different sources, including various Ministry of Health executive orders and local protocols. There was no consensus on where this protocol was to be found.

Further study should investigate why local protocols are used instead of national protocols in some oblasts.

Prehospital patient routing and coordination between EMS and hospital

Ambulance staff communicate with the hospital about incoming patients, but this appears to be mostly ad hoc through the dispatchers via phone.

Doctors were divided on whether it is mandatory for ambulances to inform the hospital about incoming cases, with **48%** believing that it is mandatory, and **44%** believing it is not (**7%** didn't know).

> There clearly is no SOP or computerized system to alert hospitals about incoming cases. This will probably be pushing up the number of secondary referrals and increasing time to treatment.

There was lack of clarity on whether there is a national entity that regulates the information flow between dispatch centres, ambulances and hospitals. There is an urgent need to develop and implement a computerized system.

Management of ICU ambulances

Although the EMS directors surveyed generally confirmed that ICU ambulances were for use in special circumstances, there was no clear consensus on what these specialized circumstances should be or who could authorize the use of ICU ambulances. Some of the EMS directors said that their ICU ambulances were in common use.

ICU ambulances incorporate specialist equipment at extra cost to EMS, and their availability will be critical to saving lives in some emergencies. Their management and distribution should be coordinated carefully, with a standardized protocol in place to improve survival rates.

Effect of communication on access

The survey very clearly finds that mobile phones are the primary means of communication across EMS, with no clear backup plan in place beyond borrowing someone else's phone or finding a nearby landline phone.

The study asked ambulance staff "What means of communication does your ambulance use?", presenting staff with four options that included "radio". Only **19%** of ambulance medical staff surveyed reported being able to use a radio.

Fig. 9 shows the oblasts in which a member of ambulance medical staff in the study reported having access to radios.

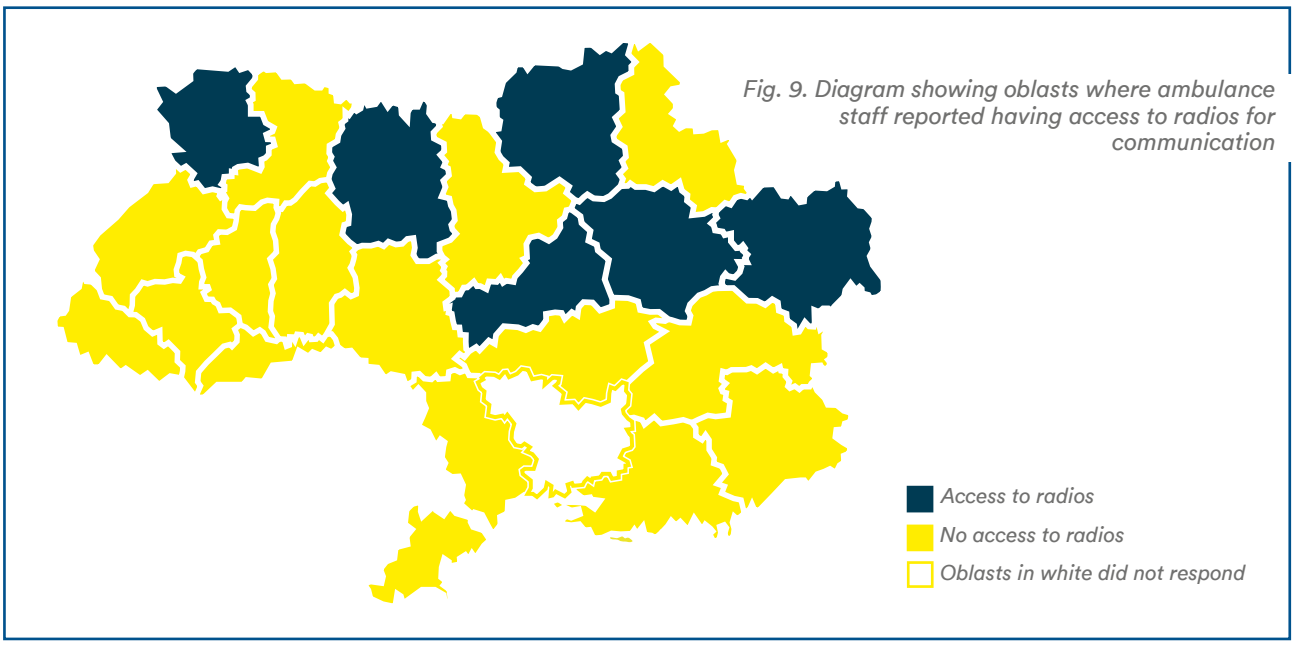


Fig. 9. Diagram showing oblasts where ambulance staff reported having access to radios for communication

There are occasions in which natural or human-made disasters have caused the telecommunications network to fail. In such a case, it appears EMS would be without a means of communication.

Communications are critical in EMS. The failure of the telecommunications network could incur a great deal of preventable loss of life. As Townsend & Moss (2005) state:

> *the failure of telecommunications infrastructure [during a disaster] leads to preventable loss of life and damage to property ... Yet despite the increasing reliability and resilience of modern telecommunications networks ... the risk associated with communications failures remains serious because of growing dependence upon these tools in emergency operations.*

Provision for a radio-based communications system should be made, at least as a backup plan, should the telecommunications network fail (Stratton et al., 1996; Coile, 1997; Townsend & Moss, 2005; Cid et al., 2018).

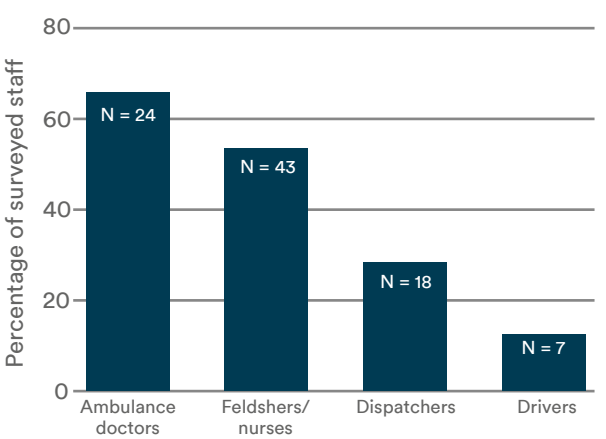
Provision of first aid

The Ministry of Health leadership believes there is an insufficient level of first-aid training provided to first-responders. No clear protocol exists for providing refresher training to first-responders. There is a mixed level of involvement of EMS staff in training and educating the public about first aid.

More involvement from EMS staff improves community relations, helps tackle violence and provides an opportunity to educate the population about the role of EMS.

The study, however, found no standardized approach towards involving EMS staff in educating the public in first aid. *Fig. 10* shows the percentage of self-reported involvement in a first-aid training programme by staff group.

Fig. 10. Percentage of self-reported involvement in a first-aid training course by staff group



Note: *the number of staff this corresponds to is shown in each bar's label.*

While a sizable proportion of the workforce is involved in first-aid education, there is a clear opportunity to increase this proportion moving forwards. Not unsurprisingly, medical staff are most likely to be involved in such programmes.

Hospital treatment package

Distribution of hospitals with emergency departments

According to the Ministry of Health leadership, the territorial distribution of hospitals that provide EMS services is conducted according to the population density of the region and hospital district. Despite this, most EMS directors did not believe their region had sufficient numbers of hospitals that provide EMS services.

Fig. 11 shows in yellow the oblasts where the director said they did not have enough hospitals that provide emergency medical care. This suggests the Ministry of Health should review their hospital distribution plan.

Emergency departments

Ministry of Health leaders reported that there are no national standards of performance, health policies and clinical protocols for emergency departments.

Almost all hospitals accept trauma patients, but the significant majority of them still do not have a designated separate emergency department. Further work should pin down the role of the emergency department with their standards of performance. It is important to mention that the term emergency department is not accurate, as the current function in Ukraine is of admission department.

While the establishment of emergency departments is an important step for the development of emergency care in Ukraine, significant further work is needed to support the future role of emergency departments on a national scale. This should address the distribution, structure, processes, protocols and quality control of emergency departments.

When asked, **91%** of doctors in hospitals believed there was an emergency clinical protocol available to them.

Triage at hospital level

When doctors were asked how triage is organized within the hospital, **47%** of respondents said it depended upon the patient's condition, **29%** said it was organized by the head doctor or doctor on duty, and **5%** said it was coordinated by all doctors. These results show that triage systems are in place at hospitals, but there is a clear lack of standardization, training and skills. Furthermore, the triage systems were not usually quality-controlled. Only a fifth of the doctors who reported that a triage system was in place said that the system was reviewed by a meeting of multiple staff: for example, one said "We debrief all situations in meetings every Thursday."

By and large, there was either no triage quality control at all, or doctors reported that the senior physician alone was responsible for triage and triage quality control.

Delays in care at hospital level

Half of the hospital doctors said they had never observed delays in the emergency (or admission) department. Since they are responsible for hospital treatment and reducing delays, this response may be biased.

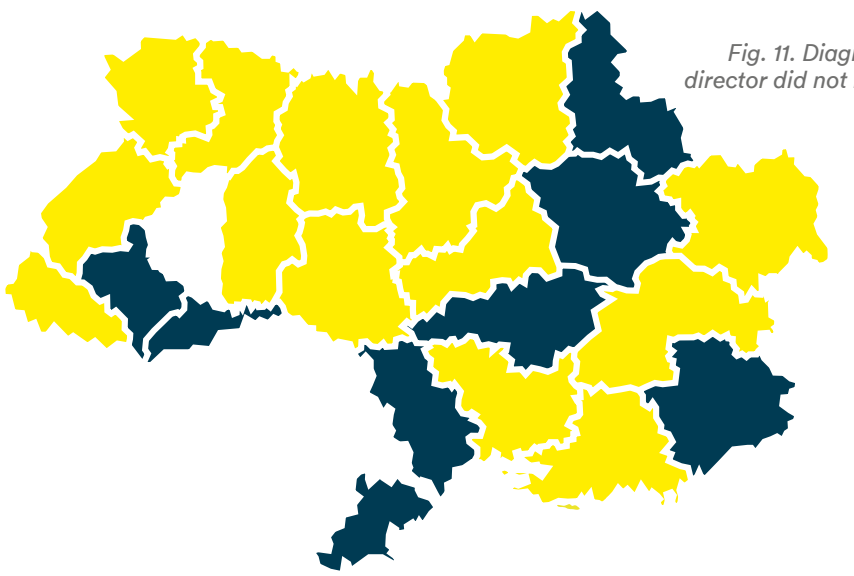


Fig. 11. Diagram showing oblasts where the EMS director did not believe there were enough hospitals to provide emergency medical care

Delays were observed typically due to mass casualties or lack of specialists and staff and lack of emergency department clearing protocols.

Access and governance

In most cases, there are no requirements in place to access the emergency department. Some emergency departments ask to see a form of ID (such as a passport) before admitting patients. In a few cases, patients are also asked for insurance documentation.

There is a plan to create an independent body for inspecting medical establishments and assessing and publishing their compliance with law, standards, protocols and best practices, but it has not yet been implemented.

The use of official online platforms on which patients can leave feedback on services received should be encouraged.

Some areas lack access due to mobile network failures or bad road conditions, but out-of-pocket payments at hospitals could also be a main reason.

National standards for hospitals

National standards for hospitals are in place:

- Order 370 addresses the unification of EMS and includes regulations for emergency departments (Ministry of Health, 2012a)
- the law includes minimum standards of equipment in ambulances and emergency departments.

It is unclear from the Ministry of Health leadership whether every hospital has a blood bank, but access to blood is guaranteed by law.

Private hospitals also provide EMS. They use general regulations and follow Ukrainian law, but limited monitoring and quality control is in place, and it cannot be verified whether they provide emergency services free of charge. More investigation should take place to understand how private institutions are regulated.

Emergency department/admission department SOPs and governance

Doctors were divided evenly on whether there were national standards of performance for their emergency department to follow. This is alarming and demonstrates poor governance, monitoring and internal communication: the standards exist, but doctors do not seem to be aware of them.

It should be noted that the term emergency department is broadly misused across Ukraine to describe the function of an admissions department. It is important that the governance of Ukrainian hospitals recognizes the significant difference between emergency and non-emergency admissions.

Qualification of emergency department workforce and trauma specialists

The vast majority (**95%**) of respondents said their hospital has trauma specialists. The work of trauma specialists is mostly organized into daily shifts that cover **24** hours and, in some cases, trauma specialists are available on call. There is no national board of certification in trauma and emergency care.

The title trauma specialist is often misunderstood in Ukraine to mean orthopaedic surgeon.

Trauma specialists should have a wider skill set that incorporates abdominal, reconstructive, plastic, vascular and chest surgery. This affects perceptions of the availability and organization of trauma surgeons.

Hospital registry and information management

A quarter of hospitals identified electronic elements in the organization of their registry. This hopefully indicates that hospitals are moving towards electronic reporting of data, which will improve timeliness and completeness of reporting and reduce human error.

Three quarters of the hospital doctors said their registries do not communicate with the other hospital and EMS registries in the oblast. This is likely to push up secondary referrals and could be resolved using electronic reporting of data.

Secondary referrals generally are made for treatments or diagnostics that cannot be done within the facility and which require further case management. The top destinations for secondary referral include neurology, cardiology, children's services, infectious disease, and gynaecology and obstetrics.

There is no standardized system in place for administering secondary referrals, which often are arranged in an ad hoc manner over the phone.

This can lead to duplication in data, does not facilitate optimum and timely case management and decreases the efficiency of resource management.

A few hospital doctors reported that referral routes had to be approved according to the type of case and the need for further specialized care.

EMS transport typically is used during secondary referral to another hospital. Starting from 1 April 2020, the National Health Service of Ukraine (NHSU) will not pay EMS for this service. The hospital will need to pay for interfacility transport to EMS or private providers.

Selected support and care

Rehabilitation/mental health support/prosthetics

Almost all doctors said their hospital contains a physiotherapy or rehabilitation centre for people with disabilities. Only **13%** of financial administrators said limb prostheses were available at their establishment. All except one (**89%**) believed they were available for free. The hospital doctors' survey concurred with these figures.

Mobile clinics

Mobile clinics are an important part of providing primary health care in hard-to-reach areas with poor access, but most hospitals (**85%**) do not provide mobile clinics. Further investigation is required to understand how mobile clinics are organized across Ukraine.[3]

Doctors from hospitals in the following oblasts reported that their hospital was able to offer a mobile service:

- Poltava
- L'viv
- Sumy
- Kirovohrad
- Dnipropetrovs'k
- Volyn
- Odesa
- Ivano-Frankivs'k.

[3] *The above were selected as random indicators. For more details , see WHO Regional Office for Europe (2020).*

Current EMS workforce

Feedback reported by current EMS workforce

Table 3 shows the most common problems reported by each staff group and their suggestions for resolving the problems.

Recommendations from the workforce

Staff were asked what they would recommend to the EMS leadership to improve their working environment. *Table 4* shows the top suggestions from each staff group and the percentage of staff in the groups who raised the suggestion.

Professionalism of EMS workforce

Patients overwhelmingly were satisfied or very satisfied with their EMS experience, and many quoted the personnel and the professionalism of their service among the most common reasons for their satisfaction. **Ninety-three per cent** of patients rated the professionalism and politeness of the dispatchers as **7/10** or higher. This is all to the credit of the EMS personnel, but improving the staff service was also the second most common suggestion from patients for improving their EMS experience (after improving the cars).

Table 3. Summary of the most common problems reported by each staff group and their suggestions for resolving the problems

Staff group	Most commonly reported problems	Proposed reasons for those problems	Solutions
Hospital doctors	Equipment failure Lack of staff Non-urgent cases	Lack of funding Poor legal framework for alcohol and trauma Poor public awareness Poor attitude towards staff	Increase funding Increase salaries Educate the public
Ambulance medical staff	Bad road conditions False calls Lack of quality vehicles Aggressive patients Lack of staff	Poor public awareness Lack of funding Lack of family doctors Socioeconomic reasons	Educate the public Increase funding Increase salaries Expand family doctors' work Introduce fines
Ambulance drivers	Bad road conditions Cars breaking down Addresses not visible on buildings Lack of car maintenance Drivers not giving way	Lack of funding Poor driving culture Bad attitude of the population No monitoring of road conditions Poor road conditions	Buy what is needed Introduce fines Increase salary Improve roads Increase funding
Dispatchers	Poor location information Non-emergency calls Rudeness of callers People cannot describe the patient's condition	Poor public awareness Behaviour of the caller Lack of funding	Educate the public Introduce fines Increase funding Add caller ID to calls

Table 4. Top recommendations from each staff group to the EMS leadership

Staff group	Recommendations
Hospital doctors	Increase salary (82%) Improve equipment (50%)
Ambulance medics (doctors/ feldshers/ nurses)	Increase salary (89%) Improve equipment (36%) Improve training (17%) Improve vehicles (17%)
Ambulance drivers	Increase salary (90%) Improve vehicle fleet (43%) Improve vehicle maintenance (15%) Improve training (14%)
Dispatchers	Increase salary (95%) Improve equipment (26%) Improve organization of work (11%)

Some **15%** of patients (**44** respondents) made some suggestion to improve the staff service. There is always room to improve professionalism.

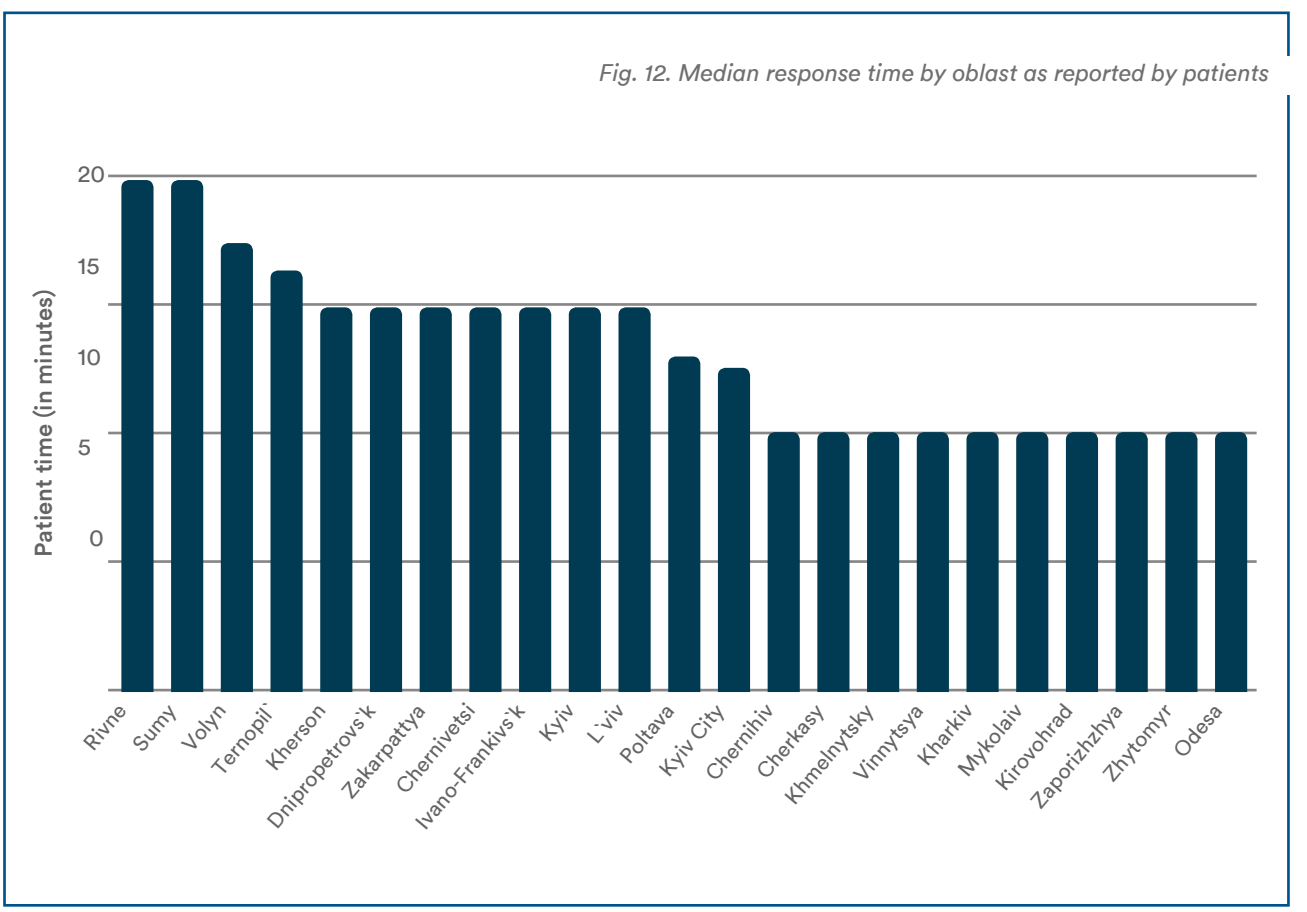
Half the patients believed they could distinguish between feldshers, doctors and nurses. A professional service should ensure that patients are always aware of who is treating them and what authority they carry.

The national target for ambulance response time is **10** minutes in an urban setting and **20** in a rural setting. The patients reported a mean response time of **16.1** minutes (with a 95% confidence interval of **14.6–17.7** minutes). This response time is broadly in keeping with the national targets, but the data cannot be stratified by urban and rural settings.

The registries reported an average response time of **14.1** minutes (with a **95%** confidence interval of **11.0–17.2** minutes). This figure, though smaller, is still broadly in agreement with patient-reported response times.

Fig. 12 shows the median response time by oblast as reported by patients. Times vary between **10** and **20** minutes across the country.

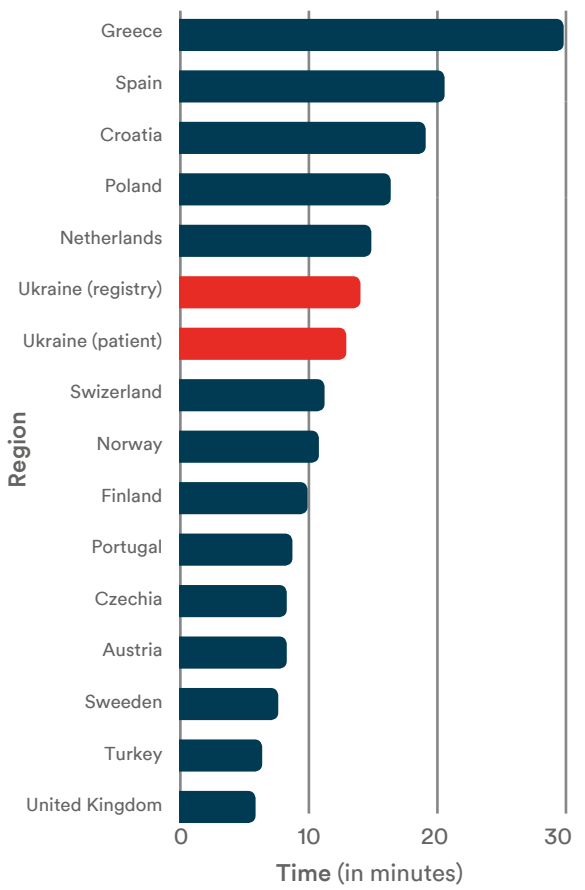
Fig. 12. Median response time by oblast as reported by patients



Seconds can make the difference between life and death in urgent emergency situations. It is important that an EMS professional monitors and evaluates arrival times properly, working towards targets that are drawn up with reference to other comparable countries.

Fig. 13 shows how average ambulance response times in Ukraine compare to that reported by other countries (dos Santos Cabral et al., 2018). It shows both the registry-reported and patient-reported figures from the data collection.

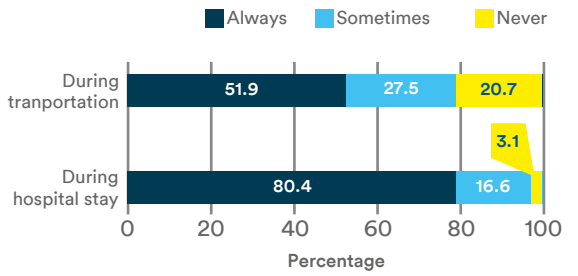
Fig. 13. Comparison of ambulance response times across European countries



Note: the Ukrainian figures are calculated from patient-reported data and data collected from national registries.

Fig. 14 shows how patients reported being updated on diagnosis and procedures by EMS staff during transport and by hospital staff during hospital stay. The data show that hospital staff keep patients much more regularly informed about their treatments and diagnosis than ambulance staff.

Fig. 14. Patients being informed on diagnosis and procedures during transportation and in hospital



Compared to the hospital doctors, patients reported that EMS staff were poor at keeping them updated about the diagnosis and procedures they were receiving. **Twenty-one per cent** of patients said EMS staff never informed them about the procedures and diagnosis they were receiving (compared to **3%** for hospital doctors). Only around half of the patients reported that ambulance medics always kept them updated on their procedures and diagnosis. This should be addressed to improve service professionalism.

The questionnaires asked staff about their compliance with a selection of treatment protocols. EMS professionals are aware of treatment protocols and have the tools and training to be able to comply with them. *Table 5* shows the compliance rates of various EMS staff groups with different treatment protocols.

With the exception of providing oxygen in respiratory arrest/distress, these figures are strikingly poor, especially for intubation in a prehospital setting and lactate-testing for multi-trauma patients.

Where staff had reported compliance with a procedure, almost all staff also reported having performed the procedure in the last year.

Reasons given by staff for not complying with the treatment protocols included:

- lack of equipment for 12-lead ECG and oxygen provision
- lack of training/skills for intubation in a prehospital setting
- lack of awareness of international treatment protocols
- never having seen a situation where the treatment protocol was needed.

Table 5. Compliance rates of various EMS staff groups with common treatment protocols

Procedure	Setting	Percentage of staff complying	Reasons for not complying
Do you provide oxygen in respiratory arrest/distress?	Prehospital	95	No equipment Not needed
Do you intubate in a prehospital setting?	Prehospital	24	Lack skills Not needed
Do you perform a 12-lead ECG in patients over 35 with suspected cardiac chest pain?	Prehospital	78	No equipment Not needed
Do you give aspirin to patients over 35 with suspected cardiac chest pain?	Prehospital	74	Use other drug Lack knowledge
Does the patient get endotracheal intubation in the emergency department?	Hospital	71	–
Do you perform the lactate test for multi-trauma patients?	Hospital	24	–

Feedback from medical univercities and future workforce on EMS

Interest in EMS was thought to be relatively high, from both students and lecturers. **Two thirds** of students said that the EMS specialty was interesting to them, and **82%** of lecturers thought students' interest was "high".

The most common reasons given by lecturers for students' interest in EMS was the opportunity to gain practical skills and work in a new branch of medicine. Reasons given by lecturers include:

> *This is a new interesting branch of medicine.*
>
> *New opportunities, new training methods, accessibility of data submission, enthusiasm of training staff.*
>
> *Demand for care because of high rate of emergencies, traffic accidents, trauma, diseases.*

Where lecturers believed that interest was low, they said it was because:

> *The system is old, and nobody knows anything about paramedics.*
>
> *Nothing is clear about the job.*

Forty-two per cent of students said they would consider taking the EMS specialty, while another **42%** said they did not know. These data suggest that two of the **12** surveyed students had actually ruled out the option of taking-up a specialty in EMS, but that up to **84%** of the surveyed students might still choose to take-up the specialty, with half being more likely than the other half.

Suggestions from students for increasing student interest in EMS include:

> *Access to modern equipment, proper working conditions, decent salary.*
>
> *We know nothing about the reform. If we were told more about cases and their work [the specialty might be more interesting to us].*
>
> *Total change of the system, management system, employment approach based on physical and intelligence indicators, clear standards and responsibilities.*

Suggestions from lecturers to increase student interest in the field include:

> *Equip the training rooms with modern equipment and provide a chance to use it.*
>
> *Financial factor (paramedic's salary), simulation training, informing the applicants about the peculiarities in the specialty.*

More practical exercises with the use of equipment and simulation of real-life situations.

Financial and social support when starting work as an EMS doctor. Expanding the practical part [of] the educational process.

Adding more practical exercises/simulations in emergency response/disaster management proved to be a very exciting and engaging part of the course. Building on this could be a valuable way of attracting more students to EMS. It is essential for the future of the workforce that students are presented with the very best of an EMS career. Investment should be made to ensure that the most modern equipment and methods are made available to them.

Staff satisfaction

Fig. 15 shows staff satisfaction with their salary, working conditions, equipment and management. No data were available for hospital doctors' satisfaction with their management, and 0% of doctors were satisfied with their salary.

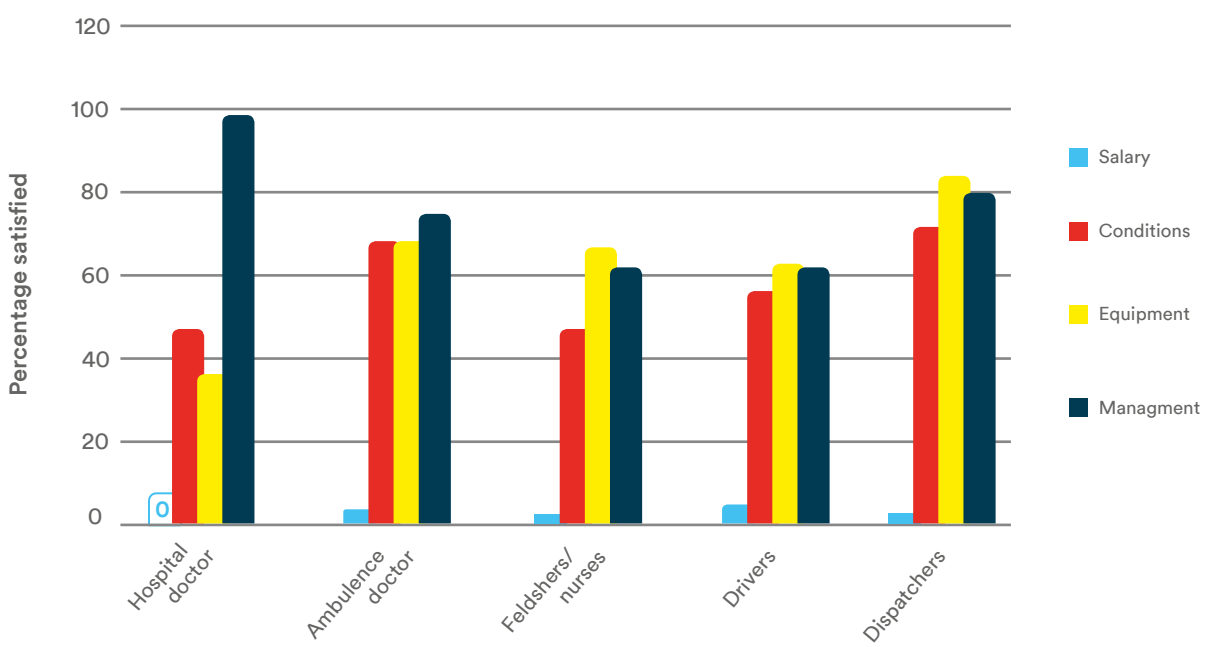
Fig. 15 shows that all staff are dissatisfied with their salary, but most EMS staff are generally satisfied with their management. There is some variation in satisfaction with working conditions and whether they have the tools to do their job.

All staff groups are unhappy with their salary, with hospital doctors being the least happy (**0%** satisfied) and drivers being the happiest (**5%** satisfied).

A significant majority (**64%**) of hospital doctors do not believe they have the tools to do their job. Hospital doctors have more extensive equipment requirements than the other staff groups, especially dispatchers. This could explain this significant difference in satisfaction with equipment between dispatchers and hospital doctors.

There is a striking difference (**21%** difference) in satisfaction with working conditions between ambulance doctors and feldshers that could be associated with the fact that feldshers typically work in rural areas and on older ambulances.

Fig. 15. Staff satisfaction with their salary, conditions, equipment and management

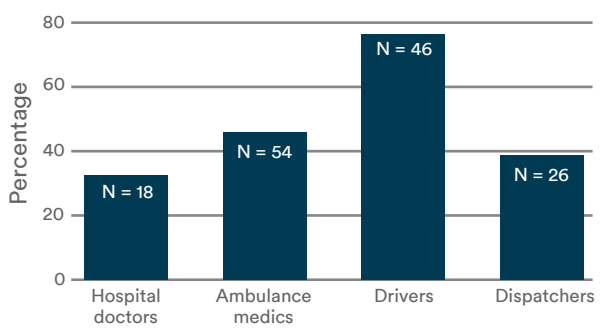


Note: no data were available for doctors' satisfaction with their management.

EMS staff retention

Fig. 16 shows the percentage of each staff group who would change their job if they could.

Fig. 16. Percentage of staff who would change their job if they could



In almost all cases where staff wanted to change their job, salary was the primary reason.

A much larger proportion of drivers wish to change their job than any other staff group. Seventy-four per cent said they would retrain as a paramedic if given the opportunity and an increased salary. This could be a good investment, as their prior experience working as part of an ambulance team would help them deal with emergency cases. If drivers require less training and experience than paramedics, new drivers could be hired from the public, while experienced drivers could have the option to retrain as paramedics.

Fig. 17 shows how satisfaction varies between those who would change their job if they could and those who would not. Each red dot indicates the average satisfaction of those who would change their job, and each blue dot indicates the average satisfaction of those who would not change their job. The line indicates the difference between these two groups

Fig. 17 shows that there is very little difference in satisfaction with salary between those who would and would not change their job. Those who are happy to continue working for EMS clearly do so for reasons other than salary.

The biggest differences are seen in satisfaction with equipment, suggesting this would be an excellent place to start improving staff retention.

Those who would change their job are generally much less satisfied with their equipment than those who are happy remaining in their job.

Fig. 17. Satisfaction levels between those who would change their job if they could and those who would not

Dispatchers who are happy to remain in their job are far more likely to be satisfied with their management, conditions and equipment. Lack of equipment, good conditions and management could be correlated to their desire to change job.

For ambulance medics, including feldshers and nurses, satisfaction with management, equipment, salary and conditions has much less to do with their desire to change job than for other staff groups. Further research could address why nearly half of ambulance medics would change their job if they could.

Drivers are the most likely to want to change their job. Those who are happy to remain in their job are much more likely to be satisfied with their management and equipment than those who want to change their job. There is little difference in satisfaction with salary and conditions.

EMS staff well-being and protection

Violence during work

Approximately two thirds of all EMS staff groups have been victims of violence during their work for EMS. *Fig. 18* shows how similar these figures are across staff groups. The percentage of respondents who have experienced violence at work is above 60%.

The number of respondents this corresponds to is also shown for each staff group.

Fig. 18. Staff groups experiencing violence at work

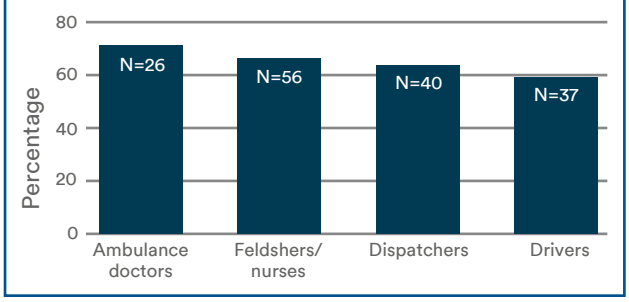


Fig. 19 shows the perpetrators of violence towards each staff group. All staff groups had experienced violence from the patient, a relative of the patient or a bystander at the scene.

Fig. 19. Perpetrators of violence towards each staff group

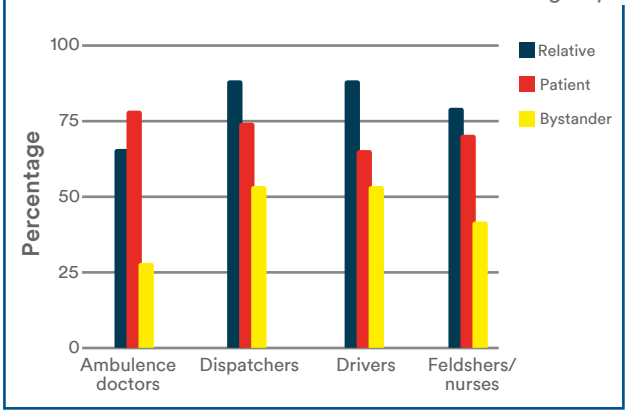
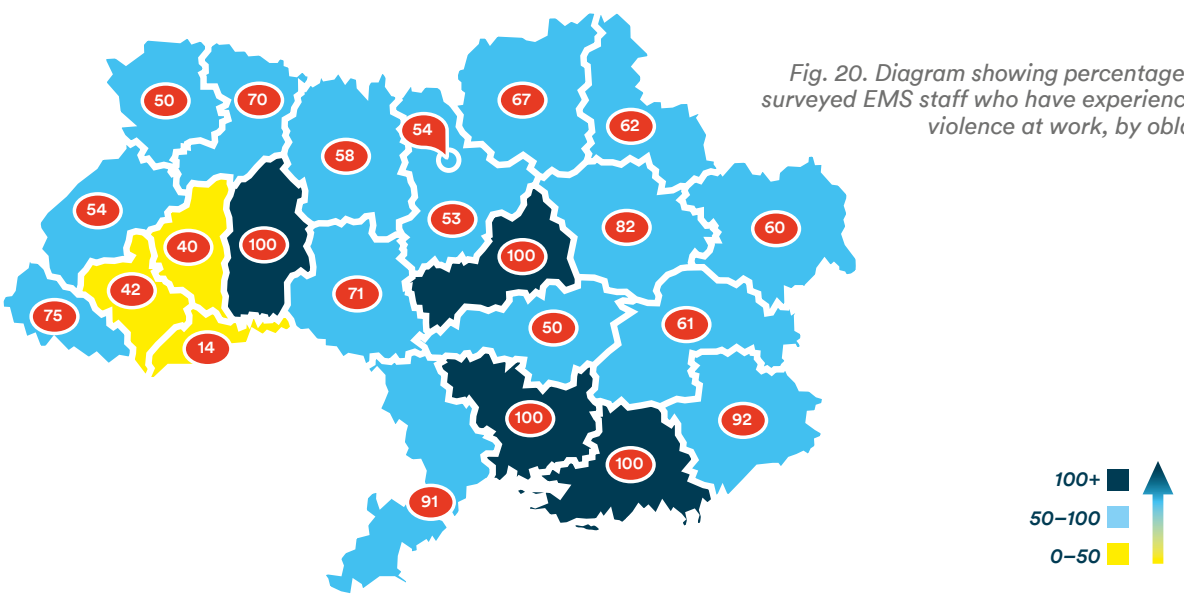


Fig. 20 shows that violence is experienced by EMS staff in all oblasts, though there is some

Fig. 20. Diagram showing percentage of surveyed EMS staff who have experienced violence at work, by oblast



variance by oblast in the percentage who have experienced violence. The percentage of staff in each oblast who have experienced violence at work ranges between **14%** and **100%**.

Violence towards staff is a commonplace problem experienced consistently throughout the workforce. Public awareness campaigns could help to reduce the amount of violence experienced by staff.

Violence protocols

According to the Ministry of Health leadership, there is a protocol to protect dispatchers and ambulance staff from violence, but no such protocol exists for health-facility staff. Despite this, very few EMS staff are aware that the protocol exists. *Fig. 21* shows how staff groups report whether they have a protocol for violence. Dispatchers are particularly unaware that a protocol exists.

Fig. 21. Awareness of a violence-at-work protocol by staff group

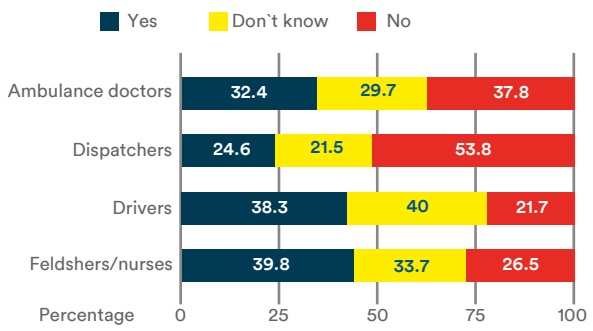
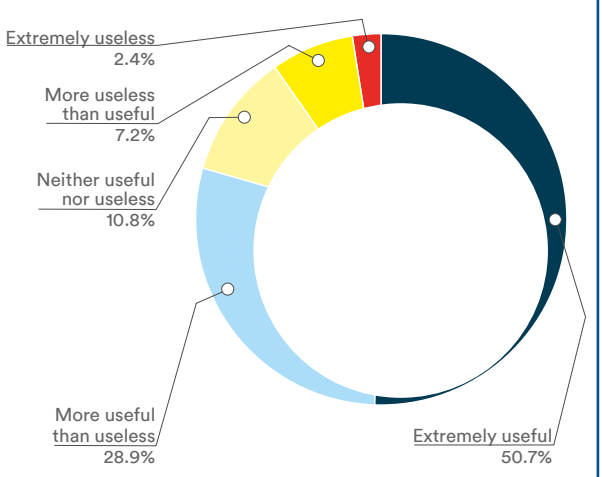


Fig. 22 shows the percentage of surveyed staff in each oblast who report having a protocol to deal with violence. The figure shows significant variance between oblasts, with staff from oblasts in the west appearing less likely to be aware of a protocol to handle violence. If a national protocol for violence exists, it clearly is not being promoted in all oblasts.

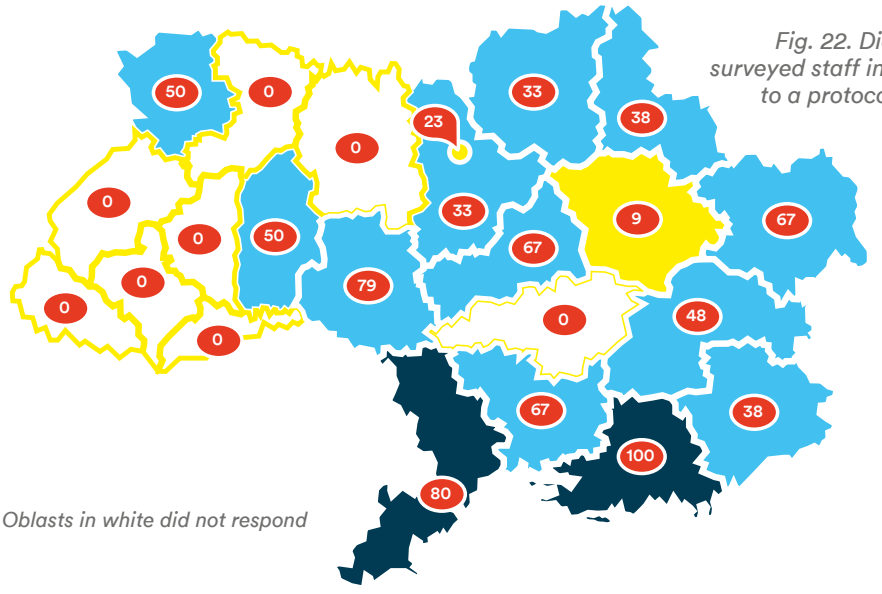
Fig. 23 shows how staff who reported having a protocol for violence rated it.

Fig. 23. Staff perceptions of usefulness of protocol against violence



Where staff were aware of the protocol, almost all reported that their colleagues follow it. The protocol generally is rated to be useful or very useful.

Fig. 22. Diagram showing percentage of surveyed staff in each oblast reporting access to a protocol to manage violence at work



Coordination with police

The EMS directors confirmed there is collaboration between the police and EMS taking place across Ukraine. In several places, this is facilitated by a panic button arrangement:

> *There is a direct phone line [...], there is also an agreement with the State Security Service and we have the panic buttons.*
>
> *This should be implemented in all oblasts as a start point until full coordination could be reached.*

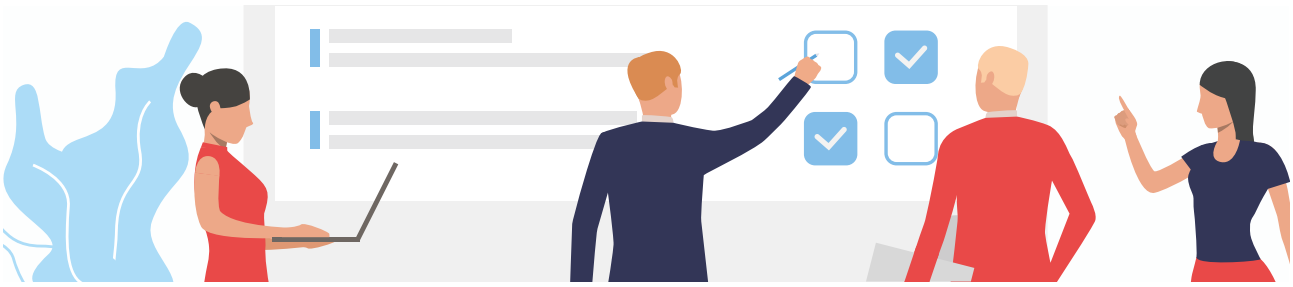
In other places, a more ad hoc arrangement was reported:

> *[We collaborate with the] police [and] emergency service on a daily basis, no protocols but on the personal level.*

Only one EMS director acknowledged this did not take place on a daily basis, and that any connection would happen through the publicly available 102 telephone number:

> *Every day? No. If necessary we can connect via 102. Rescue also only if needed.*

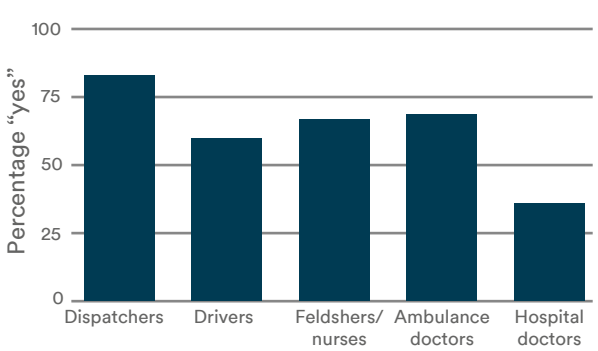
Supply chains and resourcing



Resource allocation

Fig. 24 shows the percentage of staff who believe they have all the tools and equipment to do their job. Dispatchers are the best equipped, while hospital doctors are the least. As mentioned previously, hospital doctors have more extensive and expensive equipment requirements than the other staff groups, especially dispatchers. This could explain this significant difference in satisfaction with equipment between dispatchers and hospital doctors.

Fig. 24. Staff perceptions of having the tools and equipment to do their jobs



EMS directors generally are happy with the distribution of ambulances in their oblast. Ambulances are distributed primarily using population density, but a number of other factors are also taken into account.

The distribution of ambulances is evaluated using response time, according to the Ministry of Health leaders, but it has proved difficult to extract reliable response-time data from the registries, meaning that this approach may be flawed.

Fig. 25 shows the number of ambulances per **100 000** population, as reported by registries. Figures vary quite drastically, from nine ambulances per **100 000** people to **16**. These ambulances are not only operational in emergencies, but also cover primary health care, provide patient transportation, respond to people's mental health needs and deliver medicines. It is important to acknowledge that ambulances in Ukraine have a broader use than those in other countries; the fact that they cannot get rid of old ambulances due to law constraints is also notable.

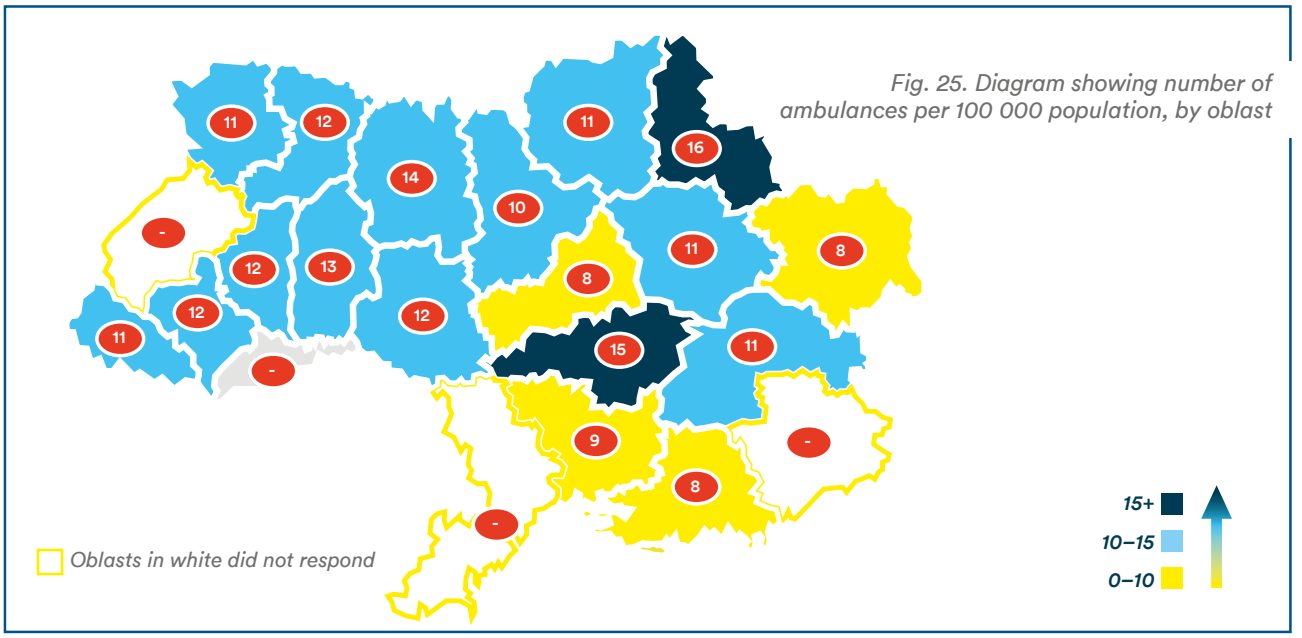


Fig. 25. Diagram showing number of ambulances per 100 000 population, by oblast

Maintenance of ambulances

Improving the vehicles is one of the key recommendations from both staff and patients for improving EMS, but the study found no standardized national approach to conducting ambulance maintenance. EMS directors said ambulances are primarily maintained on demand. Only a quarter of EMS directors reported that maintenance took place on a regular basis – either every week, month or year.

Ambulance status typically is quality controlled through reports and regular field inspections. Just three of the EMS directors mentioned an electronic system to facilitate this. Registries report that new ambulances are received once in **5.4** years (with **95%** confidence interval of **4.2–6.6** years).

Some of the responses showed that good local protocols were in place. One EMS director mentioned that there were "regional council checks" in place, and another said:

> *A mechanic inspects the ambulance every day and planned review is done every 10 000 km, in case of any needs or concerns the ambulance is checked immediately.*

Fig. 26 shows the age of the oldest ambulance in each oblast. The ages vary from **seven years old** in Kyiv to 36 years old in Chernivtsi.

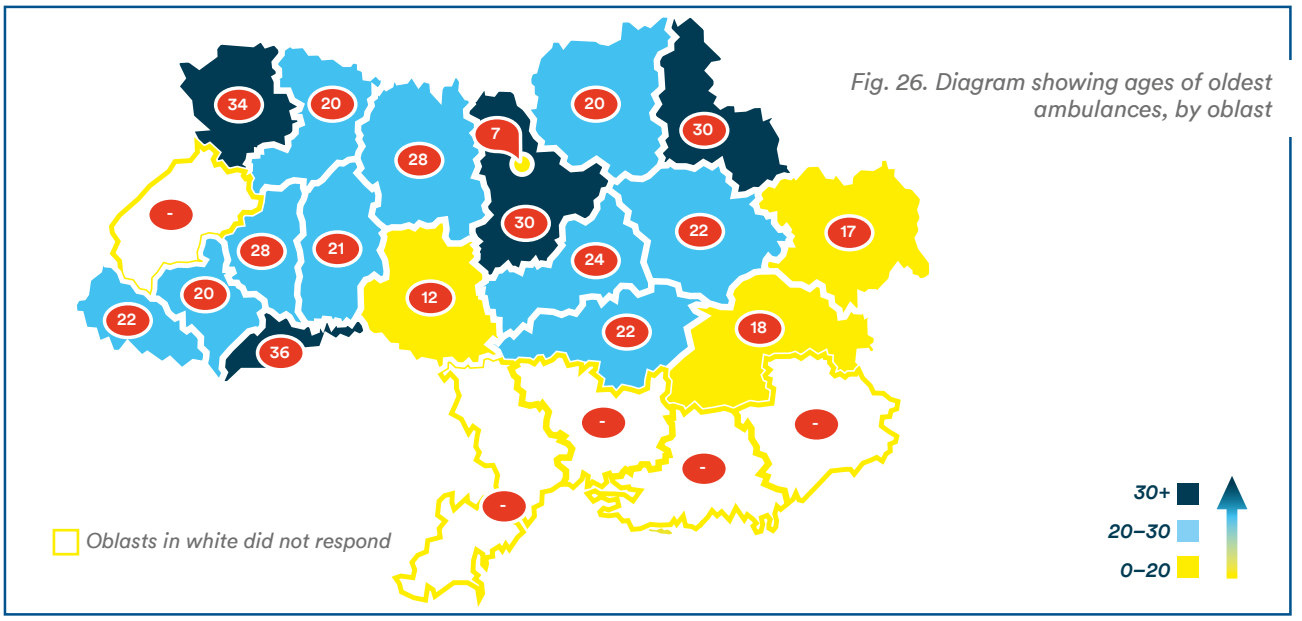


Fig. 26. Diagram showing ages of oldest ambulances, by oblast

The fact there are still oblasts with ambulances of this age suggests an imbalance in the resourcing of oblasts with new ambulances that should be addressed.

Ninety-four per cent of registries reported that ambulances are kept in garages, but **83%** reported that ambulances can also be kept in open parks. Storing ambulances in the open air will significantly reduce the length of their life and introduce further maintenance costs. Further studies could be conducted to check the percentage of ambulances older than **12** years per oblast.

Replenishment of equipment

About half of the staff had been in a situation where there were insufficient medical supplies available at some point in their career. In this event, the staff said they contact another team, use alternative drugs or inform the dispatch centre.

A significant proportion of ambulance staff (**35%**) reported having bought medical or other items needed for their work from their personal finances (out-of-pocket expenditure). **Forty per cent** of these respondents said they bought uniforms and shoes, **22.5%** had bought stethoscopes, **17.5%** venous catheters and **17%** medicines.

Information managment

Data significance

> The Ministry of Health leadership reported that information management systems were in place, but it was unclear how many of these systems were computerized. Although private hospitals provide EMS, they are not included in the information management systems. This issue should be addressed.

The information system uses the available information to ensure oversight and to monitor prehospital care in one of two cases. The Ministry of Health leadership acknowledged that there is no standardized system of quality control beyond conducting analysis of registry data. This is concerning, as the study found registry data to be incomplete and inaccurate. One Ministry of Health leader said, however:

> *We don't have it yet, but we're creating the information analytical system Central 103 that will collect all information from dispatch centres and will have in it the analytical modules. It will be operational from the end of 2020.*

As part of this study, various pieces of information were requested from oblast registries. The data were found to be incomplete, imprecise and inaccurate. Since most of the registry information is collected through manual processes, the data may be subject to a high degree of human error.

At the time of interviewing, half of the EMS directors said there was coordination between the regional and Kyiv dispatch centres. At the time of writing, the functional connection of EMS centres with the central Kyiv dispatch is ongoing. Many more oblasts are connected to the Kyiv dispatch centres than was the case when the data were collected.

Internal communication

Most ambulance medical staff (61%) had received an update from the Ministry of Health on EMS transformation in the last month, but 11% of ambulance staff reported never having received an update. Most staff would prefer to be told about EMS updates over the Internet, using emails, Ministry of Health websites and social networks.

Finances

Disparity in funding

Until 2019, funding was dispersed through subvention from national to regional budgets as part of general medical subvention, then divided by oblast councils. Starting from 2020, EMS are part of the state guaranteed medical package and each regional EMS centre will be financed individually.

Ukraine is undergoing major change regarding how health services are financed. Purchasing of EMS from 1 April 2020 is implemented on a capitation basis through direct contracts between the NHSU and EMS centres in each region (Cabinet of Ministers, 2020). The overall payment method for EMS is "global budget" based on the capitation rate (**UAH 11 661.24**) for readiness to provide EMS services during nine months for **100** people.

The planned cost of EMS is calculated using: the population living in the territory of the respective administrative-territorial unit according to the State Statistics Service of Ukraine; Ministry of Social Policy data on the number of internally displaced persons registered in the respective administrative-territorial unit as of 1 January 2019; and the capitation rate divided by **100**.

In 2020, the actual monthly cost of EMS is being calculated as a ninth of the planned cost of health-care services under the contract, rounded to two decimal places. Subsequent years will be calculated as a twelfth.

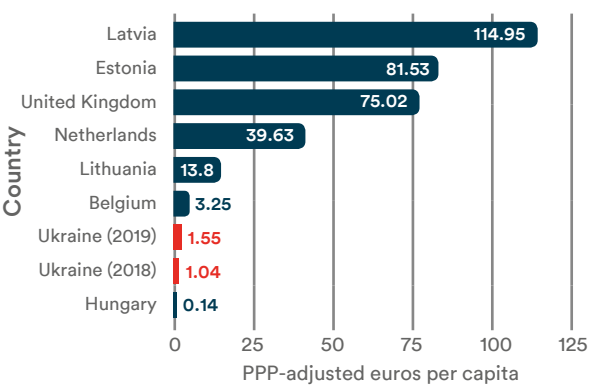
The Ministry of Health leaders said that from 2020, EMS financing will stand at **UAH 150** per capita per year, against the currently assumed figure of UAH 110 per capita. This figure is lower than that reported by the Ministry of Finance and national treasury (discussed below).

All oblasts have a documented traceable budget that can be audited.

All but one respondent (**95%**) reported using yearly budget analysis to check whether the funding for the oblast was sufficient. Only **36%** said the number of requests from the field were considered in this process, and **4%** (one response) mentioned using cost per capita.

Fig. 27 shows how EMS funding in Ukraine compares against funding on ambulance services in other countries. Per capita spending in Ukraine for 2018 was reported to be **UAH 142** and for 2019 **UAH 202**. These figures differ from the data collected through the surveys. As the data collected through the surveys are self-reported, the State Treasury Service of Ukraine data have been used instead.

Fig. 27. Comparison of spending on ambulance services across European countries (purchasing power parity (PPP)-adjusted euros per capita)



Note: figures have been adjusted using PPP indices. These health-care sector-specific indices have been taken from the World Bank International Comparison Programme 2011 (World Bank, 2011) and provide a more reliable means of comparing costs across countries. The 2011 data have been extrapolated for 2018 using the approved method published by the World Bank (McCarthy, 2013) and their data on GDP deflation rates (World Bank, 2020).

Sources: Ukrainian figures have been taken directly from the Ministry of Finance and the State Treasury Service of Ukraine (2018). Other figures have been published by the Netherlands Institute for Health Services Research (Bos et al., 2015).

If the source data from the Netherlands Institute for Health Services Research is to be considered reliable, then Ukraine would appear to lag far behind other countries in their spending on EMS.

> In many ways, it is remarkable that EMS in Ukraine are able to deliver their service at such small cost when compared with the cost incurred by other countries. This is to the credit of the Ukrainian EMS workforce.

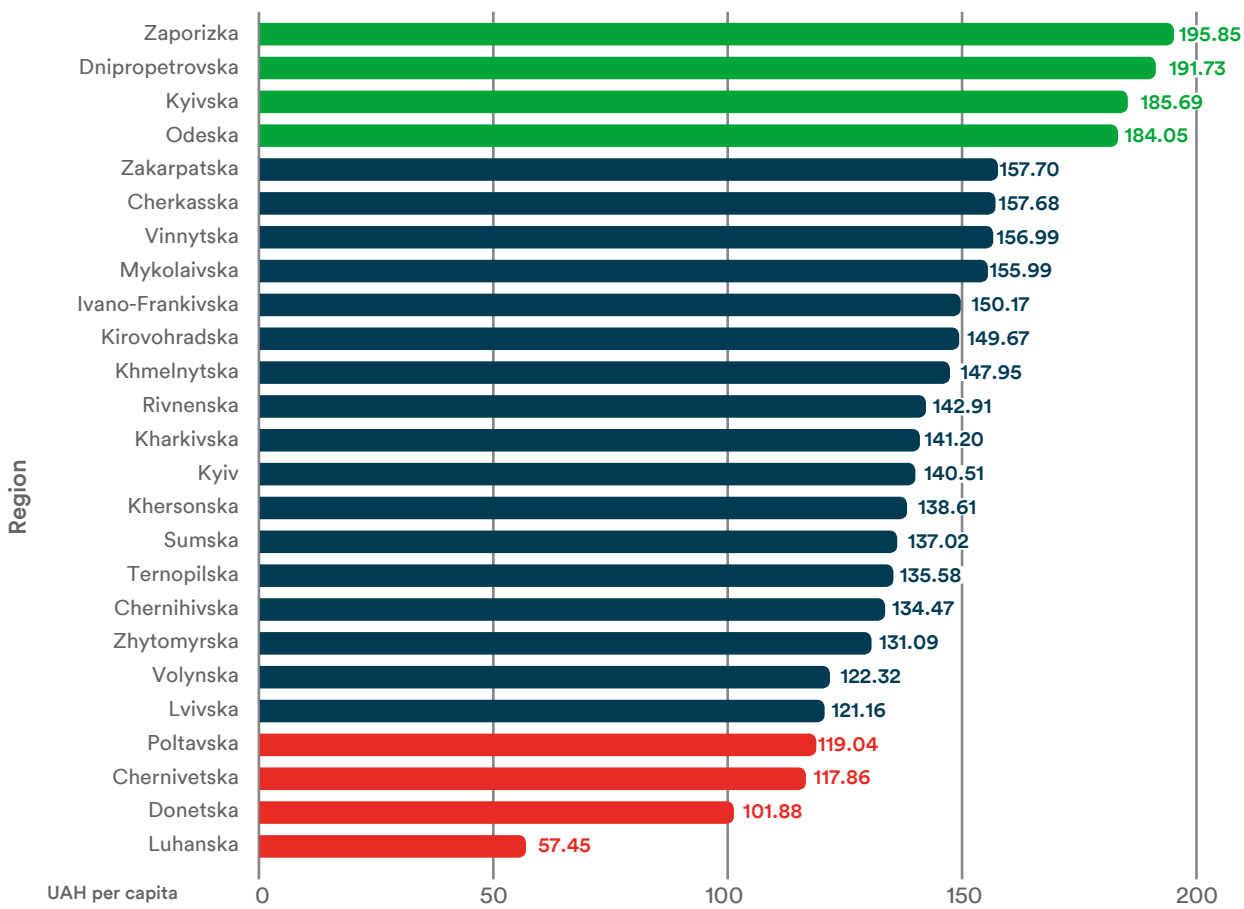
Fig. 28 shows EMS funding at oblast level. According to the data, Zaporizhzhya is the best funded oblast, having 341% of the funding of Luhans'k, the oblast with the least funding per capita.

> Further research should seek to identify the reasons why there is such variation in funding between oblasts.

Fig. 29 shows the typical budget breakdown at oblast level as reported by oblast-level financial administrators. Funding for human resources appears disproportionately large, suggesting that extra funding could be better spent on equipment and medicine. Expenditure classed as "other" includes ambulance fuel, ambulance maintenance and utilities. Further research should validate these self-reported data against the official budgets published by each oblast.

A WHO report found that the average percentage of general health-care expenditure use for human resources globally is **42%**, ranging from **29%** to **50%** in the WHO Eastern Mediterranean Region (Hernandez et al., 2006). Despite the large proportion of the budget spent on human resources, staff overwhelmingly are unsatisfied with their salary.

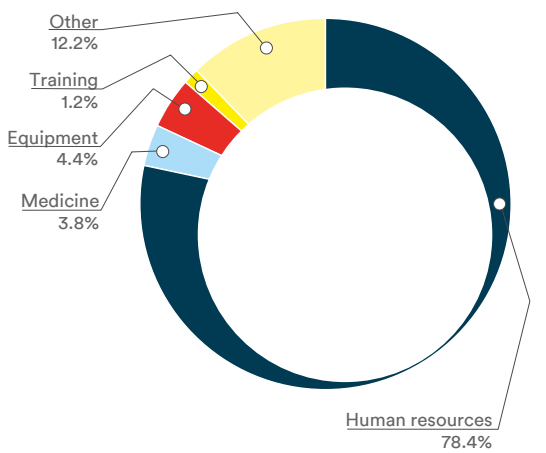
Fig. 28. EMS funding at oblast level, in UAH, 2018



Source: data are taken from the Ministry of Finance and the State Treasury Service of Ukraine (2018).

The large proportion of the budget given to human resources restricts the development of other areas of EMS. If further funds were put into EMS, prioritization should probably be given to other sectors of the budget.

Fig. 29. Average breakdown of oblast-level EMS budget as reported by financial administrators



Underfunding

EMS directors report that human resources salaries are suffering most from underfunding (85% of responses mention this), with ambulance maintenance (**69%**) and medical equipment (**44%** of responses) also appearing regularly.

Other areas that suffer from underfunding are the ambulance fleet (**42%** of responses), equipment (**14%**), staff numbers (**14%**) and medicine (**14%**).

Ninety per cent of establishment financial administrators believe that EMS are underfunded.

The overwhelming majority (**90%**) did not consider funding of their establishment sufficient.

Most oblast finance administrators in the qualitative questionnaire (**84%**) believed there was underfunding in the oblast EMS budget. **Seventy-nine per cent** of establishment financial administrators surveyed said a shortfall in the budget has occurred at the end of the financial year, but **21%** say this has never occurred.

If an establishment desires further funding, budget requests typically are made at regional level.

Financial reports, typically on a monthly basis, are used to verify whether the establishment funding is sufficient.

Twenty-six per cent of the establishment financial administrators said they never ran out of budget, while **21%** say that budget shortfall has never occurred. **Thirty-three per cent** of oblast financial administrators said that deterioration happens every year, compared with **38%** who say they run out of money every year.

These data express a clear narrative of underfunding. EMS directors and financial administrators agree that salaries, equipment and medicines are being hit the hardest.

Fig. 30 shows the percentage increase in funding requested by EMS directors. Requested increases range between **0%** and **300%**, where **0%** indicates no increase and **300%** is a request for four times the current budget.

Vinnytsya oblast was the only oblast to say they were not underfunded and requested a **0%** increase. It is unclear why the EMS director from this oblast believes they do not need any funding increase.

Many factors may influence this judgement, including differing levels of finance received and workload faced by each oblast, the culture of the oblast's EMS workforce and the ability of the surveyed EMS director to make good judgements.

Health finance reform may help to resolve the disparity in perceived underfunding seen across EMS directors.

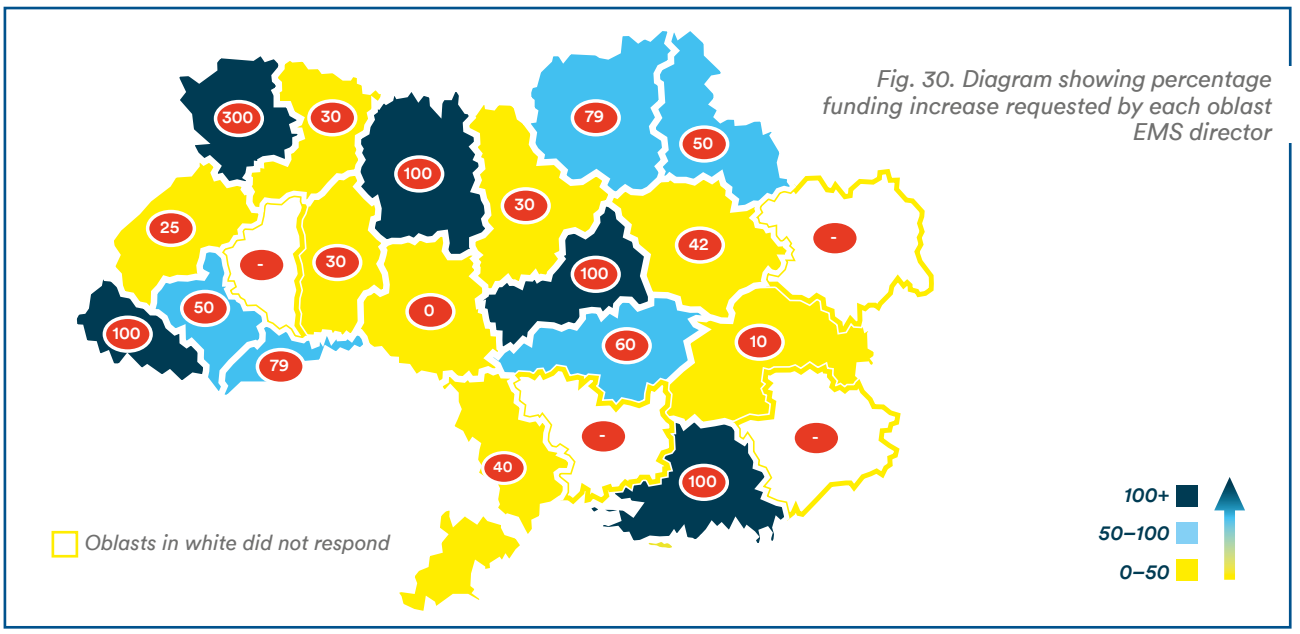


Fig. 30. Diagram showing percentage funding increase requested by each oblast EMS director

Financial planning

Oblast-level EMS directors and financial administrators agree that population density is the most common algorithm used to calculate funding. A number of other indicators were reported by different participants as also contributing to the decision, including:

- number of cases they were handling
- number of facilities in their establishment
- number of people
- number of teams
- institution needs
- number of already available ambulances
- geographical distribution
- facility distribution
- staff availability.

Oblast-level budget requests can be made to national level for further funding if necessary. This demonstrates the complexity of the present funding process. No clear standardized procedure was found for calculating an oblast's budget.

Resolution 228 of the Cabinet Ministers of Ukraine addresses the allocation of central funds to regional budgets.

Monitoring and evaluation of financing

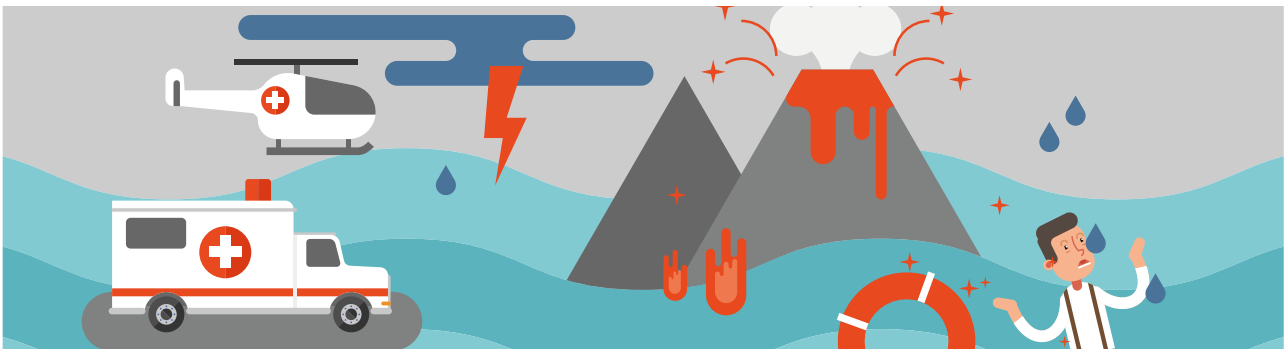
According to the Ministry of Health leadership, the number of requests from the field is used to ensure financing of EMS is sufficient. It is unclear how it is used and whether it is enough, and how the relationship with population density is being used to calculate the budget.

The Ministry of Health leadership acknowledged that at present there is no standardized system of EMS quality control that feeds into the process of ensuring the financing is sufficient. It is possible that the new Central 103 system reportedly under development will allow for this (Ministry of Health, 2018b).

Financial tracking mechanisms are in place across the country. One oblast reported not having a tracking mechanism in place, but it is believed that this might be a misunderstanding of the meaning of the question. Financial tracking generally takes place through reporting at oblast and establishment levels, but it is not clear how these reports are generated.

While **9%** of establishment-level financial administrators reported that there are no financial tracking mechanisms in their establishment, **16%** said there is no mechanism in place to verify that the funding of their establishment is sufficient. There is a difference between tracking finances and being able to make a sound judgement on whether they are sufficient.

Disaster preparedness



Emergency SOPs

The main service in Ukraine responsible for responding to disaster is the State Rescue Service. EMS, however, ensure routine response to medical emergencies at regional level. The Ministry of Health is involved only by providing legal regulation. Depending on the nature of the disaster, the police and military may also be involved in the response.

It is unclear from the Ministry of Health leadership whether the law regulates the state of emergency.

Ninety-one per cent of hospital doctors said that an emergency clinical protocol is available in their facility. Several identified this as the one produced by the Ministry of Health, though a number expressed dissatisfaction with the protocol.

Almost all hospital doctors (**97%**) said their hospital had a disaster plan. From analysis of the data and, especially, the financial reserve of the facility, the presence of an effective disaster plan is highly questionable.

> The study showed that in the case of local or nationwide disaster, the Ministry of Health responsibility for the response is diluted. The ministry role is either fragmented or weakened due to lack of governance. There is a shortage of emergency drills performed at both facility and prehospital levels due to a lack of funds.

CBRNE

All EMS directors said that they had a CBRNE plan, and **84%** of hospital doctors said their hospital had one. Doctors from hospitals in L'viv and Dnipropetrovs'k oblasts said they did not have a CBRNE plan, and doctors from hospitals in the following oblasts said they didn't know if they had one:

- two hospitals in L'viv oblast
- two hospitals in Kyiv city oblast
- one hospital in Kyiv regional oblast
- one hospital in Ivano-Frankivs'k oblast.

If all EMS directors believe a CBRNE plan is in place, then better communication of the plan is needed.

> CBRNE response plans exist, but the effectiveness of the plans is unknown, and their functionality needs to be tested.

Based on this information, it is suggested that a centrally led review of existing oblast CBRNE plans should take place regularly. In addition, intersectoral partnerships should be encouraged and interagency training programmes and simulation exercises that include local communities should be promoted.

Disaster drills

EMS directors believed in all cases that a drill had taken place in the last year. This was not agreed by hospital doctors, of whom only **74%** believed the last drill had taken place in the last year. It may be possible that these doctors missed the drill due to bad communication, or that they forgot they had taken part.

All EMS staff and their partners in public safety should receive comprehensive training. Active participation during the preparedness phase will facilitate team-based care when responding to disasters, including mass-casualty incident management. Interagency training programmes and simulation exercises, including CBRNE incidents and the management of mass casualties, should therefore be developed and rolled out.

Emergency budget

The Ministry of Health leadership said that EMS do not have their own budget reserve in the event of a disaster, but can use reserve funds of the Cabinet Ministers or Government.

Fewer than one third of oblast EMS systems surveyed have a budget reserve available in case of disaster. The budget reserve generally was very small, constituting 1% of the overall oblast budget on average (Page et al., 2013).

Sixty per cent of hospital emergency/admissions departments do not have a budget reserve in case of disaster.

Prevention of emergencies

Availability of prevention programmes

Ambulance staff, doctors and dispatchers highlighted a lack of community awareness about the EMS system mandate, including knowledge of when to call EMS, how to interact with EMS staff and when to reach out to a general practitioner rather than calling an ambulance. Participants recommended raising public awareness and improving access to primary health-care services.

A national plan to improve public awareness about when and how to access the EMS system should be developed and implemented; this in itself will create a more resilient civil society. Slots for social advertising on TV and social media could be utilized to educate the public.

Additionally, strengthening the primary health-care system is essential to reducing the burden on EMS, as the primary health-care system will be responsible for non-urgent cases. Several options could also be explored on how to strengthen and advertise alternative non-urgent transportation means and increase social participation in health.

The EMS study did not specifically investigate the availability of prevention programmes. An International Labour Organization report (2018) highlighted the absence of reporting and monitoring systems and prevention programmes as one of the main reasons for the high rate of occupational injuries in Ukraine.

Systematic collection and analysis of injury-related and noncommunicable disease data are needed to better understand the scale of the problem, not only for work-related injuries, but also for other types. The initiation of appropriate prevention programmes is recommended to act on the existing problem.

Patient feedback

Out-of-pocket payments

Out-of-pocket payments are recognized at the very highest management levels by one of the Ministry of Health leaders. Out-of-pocket payments are expected to be transacted mostly at hospitals, not during treatment from EMS. Data from the Health Index Ukraine survey for 2019 indicate that **86%** pf patients paid for inpatient care during their most recent hospitalization (Health Index Ukraine, 2020).

> The vast majority of patients surveyed did not have to pay anything during the process of receiving EMS services.

This is positive, as access to EMS is protected in law for everyone irrespective of personal finances. Those who did pay mostly paid for drugs or transport to a different hospital. There were other single cases where people reported that they paid, including a courtesy of some sort or for the stay in the operating theatre, or for disposable equipment. A standardized approach to funding these services should be found so that people can plan their personal finances and trust that they are being treated fairly by their medical service.

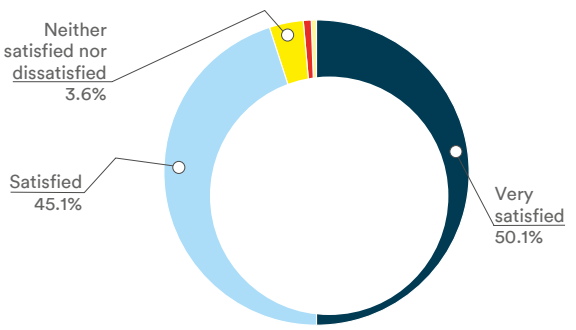
All oblast levels believe that access to emergency care is free of charge, yet two (Ternopil' and Zakarpattya) believed that patients still needed a copayment to access EMS. It is unclear what this copayment is. Further investigation should be undertaken to understand why and how this works.

At establishment level, almost all financial administrators believe that access to EMS is free of charge, but **14%** also say that a payment is required. One respondent, for instance, reported "EMS are free of charge, but they need to pay to access [care in the hospital]." EMS access is protected by law as free of charge for everyone, so this is deeply concerning.

Patient satisfaction

Fig. 31 shows overall levels of patient satisfaction with EMS.

Fig. 31. Overall levels of patient satisfaction with EMS



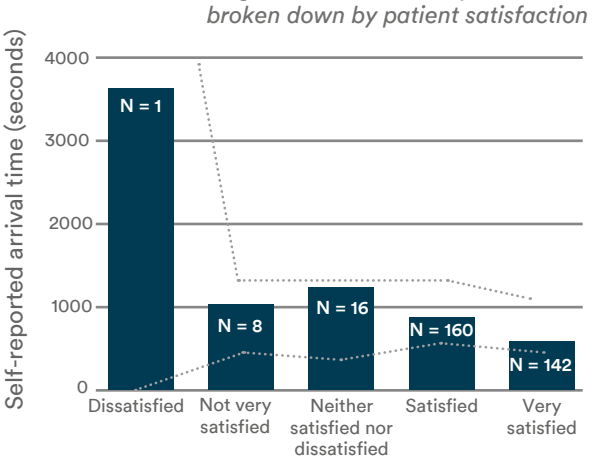
The results are overwhelmingly positive, with only **4.8%** saying they are not satisfied or very upset. This is to the credit of the Ukrainian EMS workforce and management.

Despite this, it is important to acknowledge that the Health Index Ukraine survey identified a negative trend in satisfaction with ambulance surveys, with **70%** satisfied in 2016 dropping to **60%** in 2019 (Health Index Ukraine, 2020). There are no data from other years to compare, so it is not possible to determine whether a similar trend can be seen in this study. Furthermore, it is important to acknowledge that the precise context of the survey can influence such subjective judgements significantly.

Fig. 32 shows patient satisfaction by self-reported ambulance arrival time. The bars show the median arrival time, which appear to increase with dissatisfaction. The dashed lines show the interquartile range (an estimate of certainty in the median arrival time). Since there was only one patient who declared they were extremely dissatisfied with their EMS experience, the interquartile range here is unspecified.

While at an initial glance the bars might suggest that high arrival times indicate poorer satisfaction, the spread of the data and the tiny number of dissatisfied patients means it is not possible to infer any relationship between arrival time and patient satisfaction.

Fig. 32. Ambulance response times broken down by patient satisfaction



Note: the dotted lines indicate the lower and upper quartile of the distributions. Patients who were very satisfied had the smallest average arrival time, and patients who were least satisfied had the largest. However, the sample sizes do not allow conclusions to be drawn on any statistically significant relationship between the variables.

Patients particularly like EMS personnel, the speed of the response, and the professionalism of the service. Almost half of the patients could think of no way to improve EMS. Most common suggestions for improvement related to staff service, roads, equipment and medicines, and the service speed. The need to improve roads and equipment are echoed by the EMS workforce, while suggestions to improve staff service and arrival times are issues that only patients might be expected to raise.

Time to the arrival of the ambulance

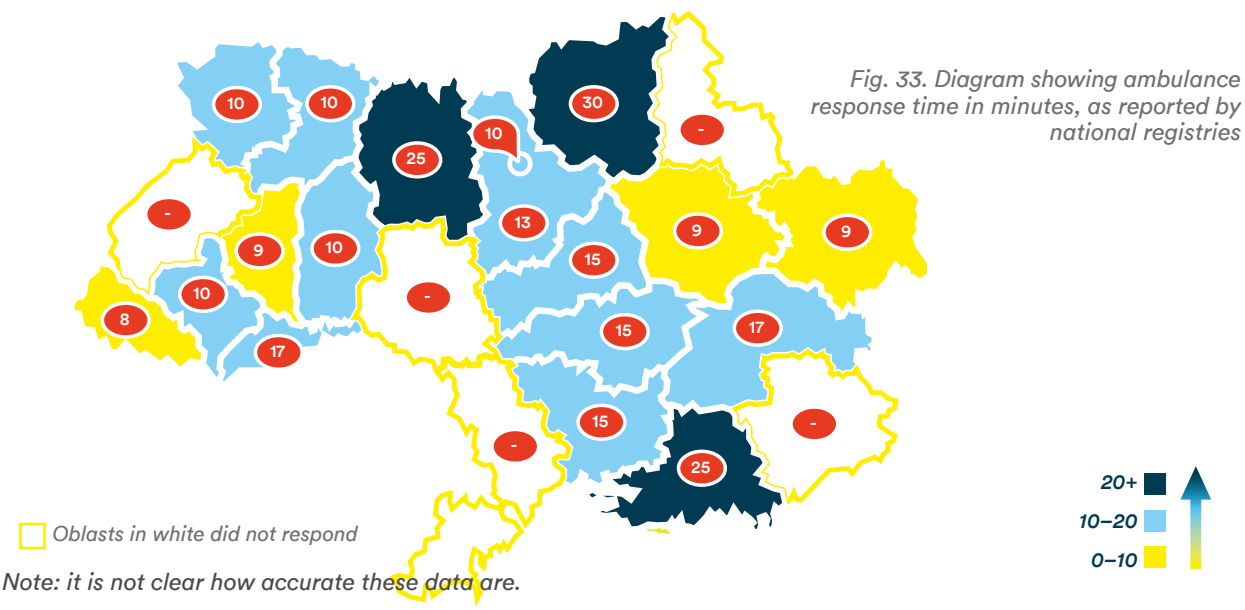
Patient-reported response times are not in line with published national targets. The mean patient-reported response time was **16.1** minutes (with a **95%** confidence interval of **14.6–17.7** minutes).

The registries reported an average response time of **14.1** minutes (with a **95%** confidence interval of **11.0–17.2** minutes). This figure, though smaller, is still broadly in agreement with the patient-reported response times. The patient-reported figure will be subject to a considerable amount of human error and guesswork, but allows a check on the registry data to be performed.

Fig. 33 shows the average arrival time as reported by oblast registries.

It is unclear how registries collected these data. It is unlikely that they have been collected with a computerized system in all oblasts, meaning that human error and bias cannot be ruled out.

Fig. 33. Diagram showing ambulance response time in minutes, as reported by national registries



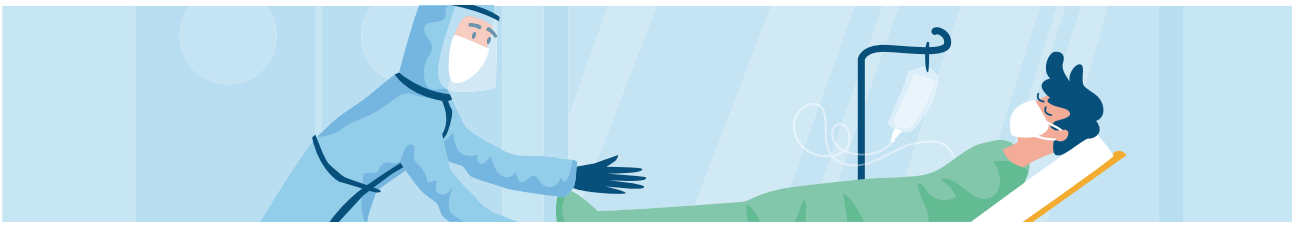
Note: it is not clear how accurate these data are.

Registries are only required to report on an annual basis the percentage of calls responded to in under **10** minutes within urban areas and under **20** minutes in rural areas. A computerized system would allow oblasts to report a complete distribution of response times, increasing confidence in the data and improving monitoring and evaluation at national level (see *Fig. 13* for a comparison of the median arrival times reported by patients and registries in the study against published data for other countries (dos Santos Cabral et al., 2018)).

Response times are used widely as a key indicator for EMS performance, but simply reducing the national average response time will not necessarily improve EMS quality and outcomes (Blackwell et al., 2009).

A more nuanced approach is required, placing response time alongside a wide array of other indicators to evaluate quality and outcome of EMS. Such a collection of indicators is proposed in *Annex 1.*

The burden upon EMS



Non-urgent calls

The EMS directors each reported a figure for the percentage of non-urgent calls their service responds to. On average, EMS respond to **48%** of non-urgent calls, according to the directors. The average of dispatcher estimates for the percentage of non-urgent calls was also **48%**.

It is important that the scope of EMS is defined clearly. If EMS are to provide non-urgent primary health care, their funding, training and staffing need to be adjusted appropriately. Most EMS directors believe that non-urgent calls should be transferred to a primary care physician, and many of the ambulance staff agreed.

Fig. 34 shows the maximum estimate from the dispatchers surveyed in each oblast of the percentage of non-urgent calls their service responds to by dispatching an ambulance. Some dispatchers believe they respond to

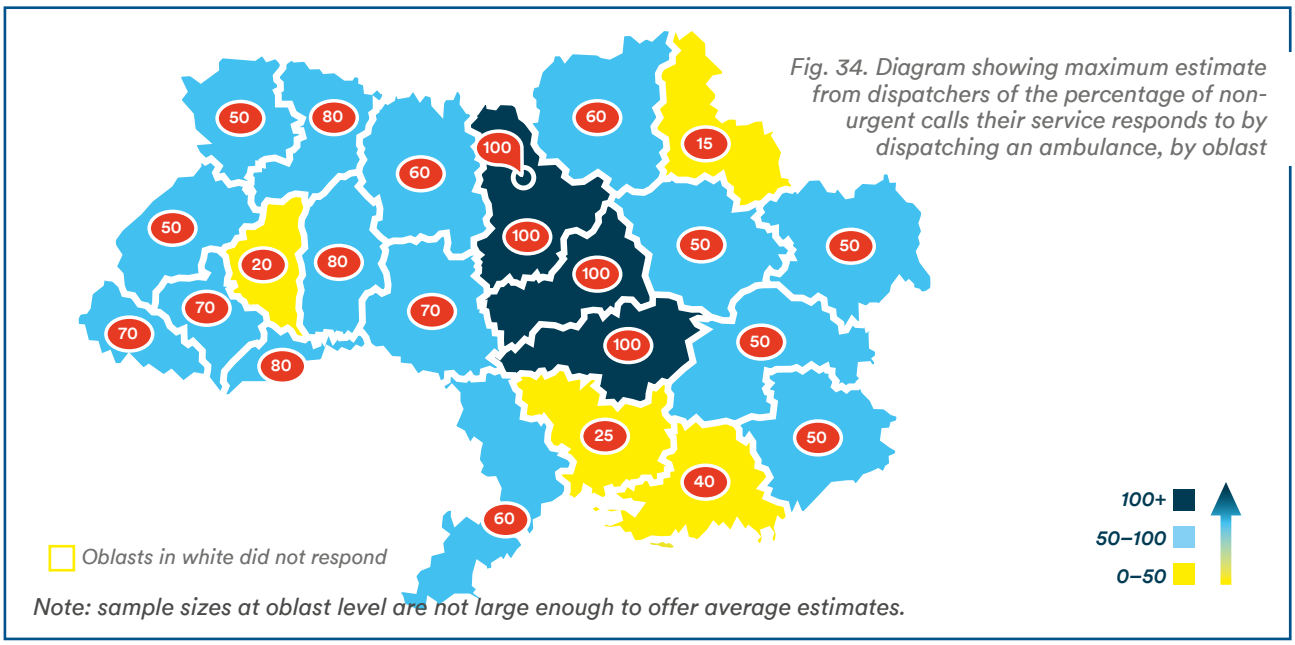


Fig. 34. Diagram showing maximum estimate from dispatchers of the percentage of non-urgent calls their service responds to by dispatching an ambulance, by oblast

Note: sample sizes at oblast level are not large enough to offer average estimates.

every non-urgent call, while others believe they respond to only **15%**. Further research could look at what factors are influencing these disparate figures.

These data may be influenced by many complex factors, including the workplace culture, the timing of the survey and emotional state of the participant. They nevertheless could be used as an indirect indicator of the distribution, mandate and performance of primary health care in Ukraine.

Common emergencies seen by staff

Table 6 shows the three most common types of emergencies seen by staff and reported by registries.

The registry data were particularly poor and showed no standardized classification of emergencies. Four oblasts said the most common emergency they saw was "sudden illness/conditions/deterioration of health", which relates nothing about the type of emergency.

Cardiovascular problems come out as clearly the most commonly reported emergency, with trauma/injuries the second most common.

The registries disagreed with staff on what the third most common emergency was. Staff believed it was central nervous system disease, while registries said that fever and infections, as well as abdominal disease and acute abdominal issues, were more prevalent. *Fig. 35* shows the most common emergencies reported by each oblast's registry.

Many oblasts failed to report any useful data. The oblasts in blue in *Fig. 35* reported cardiovascular disease as the most commonly seen emergency, in red trauma, in purple central nervous system disease, in light blue abdominal disease and acute abdomen, and in yellow, fever and infections. Oblasts in white did not report.

Table 6. Most common types of emergencies reported by dispatchers, ambulance medics and national registries

Source	Most common	Second most common	Third most common
Dispatchers	Cardiovascular disease	Trauma	Central nervous system disease
Ambulance medics	Cardiovascular disease	Trauma	Central nervous system disease
Registries	Cardiovascular disease	Trauma	Fever and infections

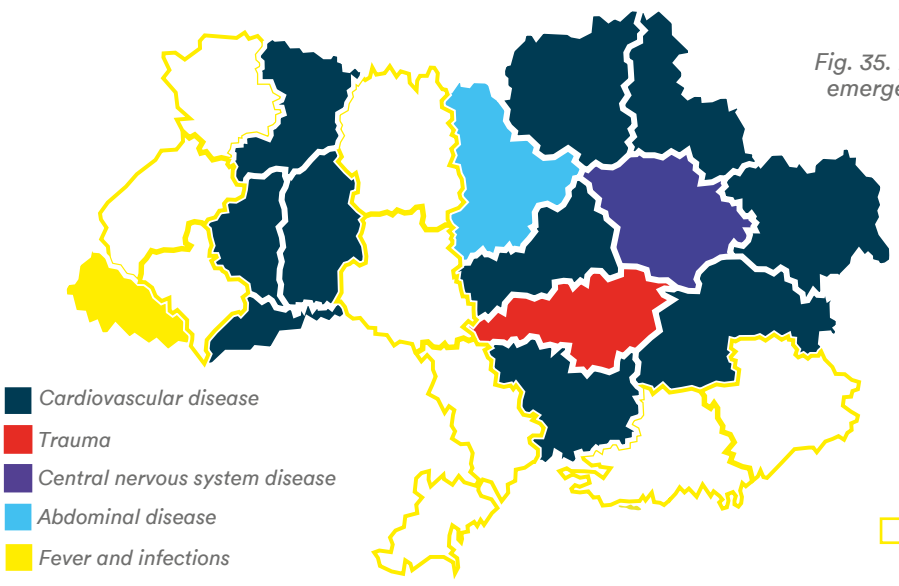


Fig. 35. Diagram showing most common emergencies reported by each oblast's registry

It is not clear why there are differences between oblasts. For instance, the yellow oblast (Zakarpattya) explicitly reported that hypothermia was the most commonly seen emergency (classified here under fever and infections), with 22 750 calls attributed to it during the last year. This far outstrips cardiovascular disease, coming in at third place in the oblast with only 15 807 calls. Data from Zakarpattya registry therefore seem at odds with most other oblast registries and the staff surveyed, who agree cardiovascular disease is the most common emergency seen.

Either the data quality from Zakarpattya registry is poor, or there is something more complex happening that is as yet unrecognized. Interestingly, Zakarpattya is a mountainous region of Ukraine that hosts mountaineering tourism. This could contribute to a rise in the number of hypothermia emergencies, but it remains surprizing that this could cause such a drastic effect in the data.

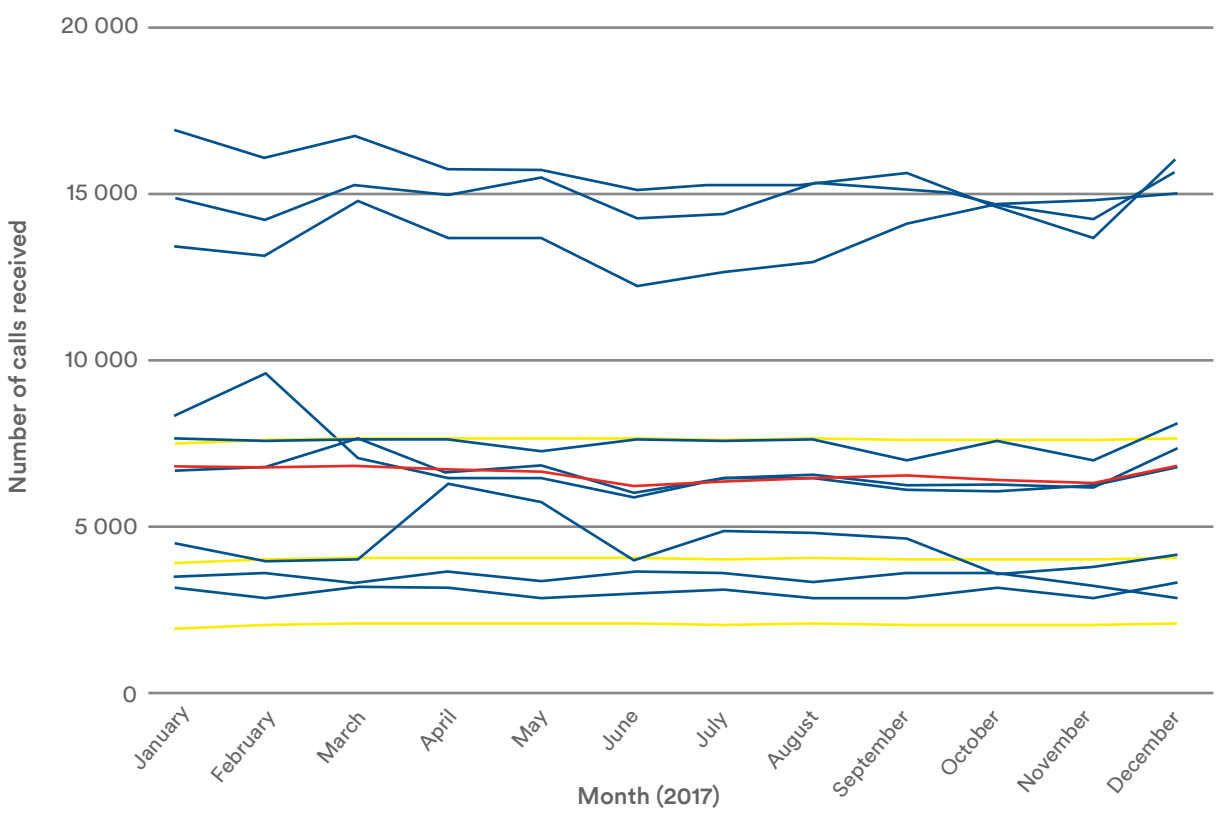
Number of emergencies

Fig. 36 shows the monthly trend of calls as reported by each oblast registry. Each blue line indicates a different oblast and the red line indicates the median of the oblasts. The graph shows that according to registry data the number of calls remains fairly steady throughout the year in yellow lines, with a small increase in spring.

Fig. 36 also points to the poor quality of oblast data, as some lines are almost perfectly horizontal, indicating that the monthly call numbers remained almost exactly the same through the whole year.

This clearly is wrong; the registry has submitted an estimate of the calls for each month, perhaps calculated by taking a yearly figure and dividing by 12. The standard deviation of figures from Cherkasy,

Fig. 36. Monthly trend in call numbers through 2017 as reported by each oblast

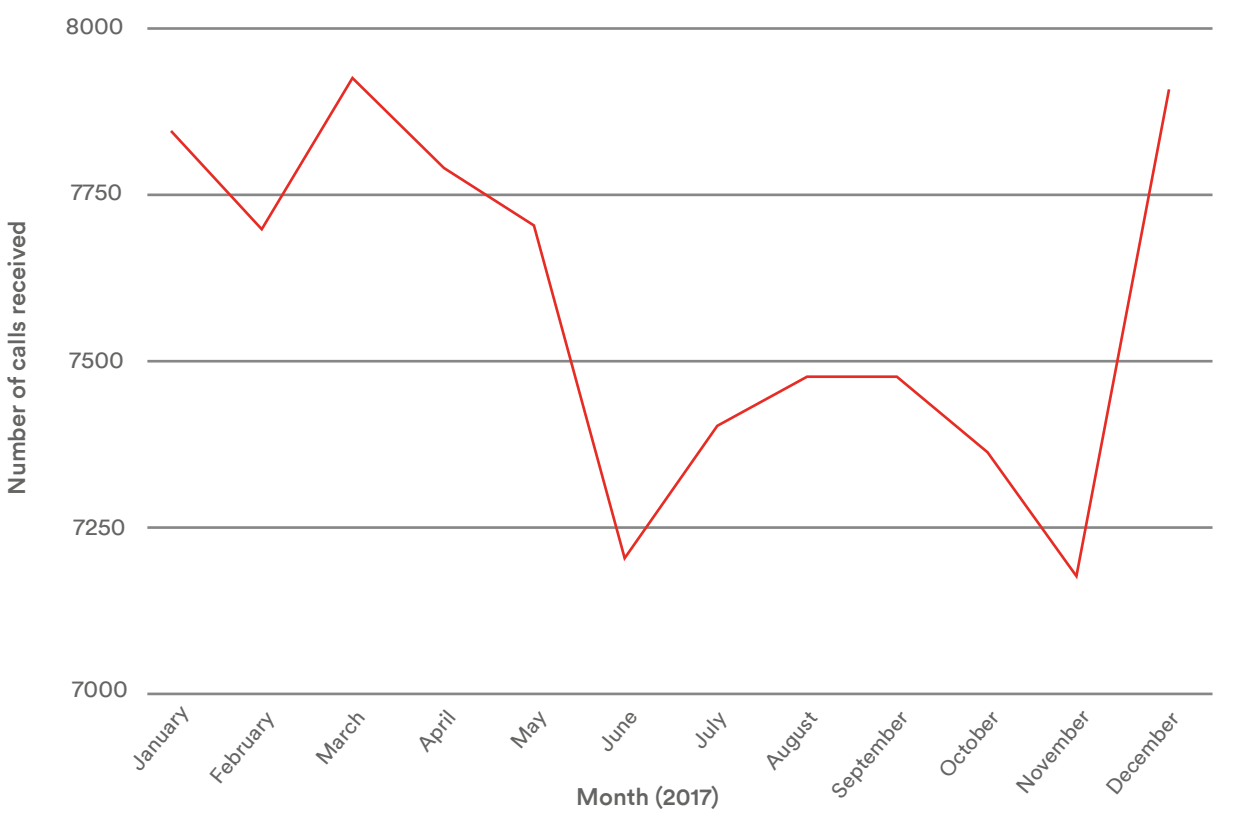


Note: there are clear inaccuracies in the data, as some lines are perfectly horizontal.

Krovohrad, Zhytomyr and Rivne remain at five calls or fewer per month, which is impossibly small, indicating that they have submitted estimated or fictitious numbers.

Fig. 37 shows the average (mean) monthly number of calls after removal of these erroneous data. It shows that the winter/spring months of 2017 were more pressured than the summer/autumn months, but in general, the number of calls remained fairly steady month on month, varying by up to +/– 5%.

Fig. 37. Monthly trend of call numbers for 2017 as reported by registries



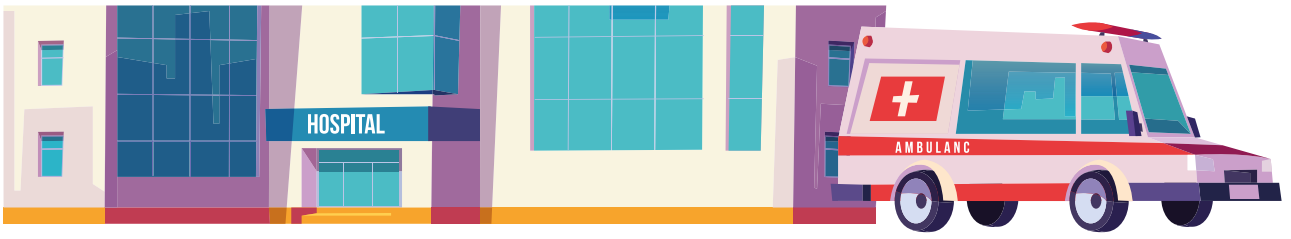
RECOMMENDATIONS

There is a window of opportunity given the current political will to reform the EMS in Ukraine.

As the reform has already started, this survey could serve as an evaluation of the process, providing decision-makers with the necessary information to adjust the design and regulations of the reform. Core gaps in certain areas in the reform design have been identified and diagnosed through this research.

Worldwide, EMS reform is a complex multistage process, and this study provides an initial key step in the process. The study steering committee decided to categorize the recommendations according to the six building blocks of the health system *(Annex 2)*.

Prehospital care



Dispatch centres

Access to, and availability of, the EMS dispatch service

A unified phone number (like E112) for calling dispatch centres should be set up in Ukraine. This would allow dispatchers to dispatch the required public services in a timely fashion. Tools to enable location of phone callers using GPS are now commercially available. The unified telephone number should be linked to GPS across Ukraine to speed up the dispatch process and reduce errors.

Coordination protocols used between dispatch centres

A coordination mechanism needs to be developed to ensure national, subnational and regional collaboration of the various EMS entities and enable an optimized patient referral system to be developed. In cases where EMS operate near oblast boundaries, it is unclear whether resources are shared and collaborations established between oblasts. Some dispatch centres are not connected within the oblasts, so it is unlikely that they are connected across the oblasts. To improve inter- and intra-oblast coordination among dispatch centres and EMS stations, a national and subnational coordination mechanism needs to be developed.

Communication and collaboration with police and fire services

A platform should be developed to facilitate interoperability between services and improve collaboration. Improved collaboration between services will lead to a decrease in violence against EMS staff and improve service performance. Where collaboration between health, police and fire departments occurs, it generally works well, with all dispatchers agreeing that when called upon, third party services arrive on the scene.

Only **10%** of dispatchers reported being able to call on voluntary services for support. Empowering volunteers and community members would improve access to essential services in difficult situations and promote efficiency and cost–effectiveness.

Call prioritization system (triage protocols at dispatch level)

Consideration should be given to introducing unified national triage protocols at dispatch level, based on which every EMS provider can tailor local triage protocols and integrate them in disaster-management plans. Eight of the **21** EMS directors surveyed believed there was a national dispatch-level triage protocol and that it was being used. The study's inference, however, is that the directors were referring to treatment protocols, so further investigation

by the Ministry of Health should confirm what they were referring to and why the other EMS directors and dispatchers were unable to confirm the use of a national protocol.

The triage protocol should include guidance on the urgency of cases and seek to improve the appropriate utilization of ambulances and referrals to non-urgent telemedicine services and primary health-care centres. This is essential to ensuring appropriate responses to non-urgent calls and avoiding deployment of ambulances for non-emergency situations.

Provision of telephone consultations for non-urgent cases

The number of non-urgent calls is identified by dispatchers as a major problem. All EMS directors said their dispatch centres provide telephone consultations to patients who do not require an ambulance response. This places a burden on the ambulance dispatch service that could be resolved by applying an efficient call triage protocol to identify calls that should be referred to a separate non-emergency telemedicine team, perhaps falling under the jurisdiction of primary care.

Additionally, a national plan to improve public awareness about when and how to access the EMS system should be developed and implemented with possible linkage to primary health-care services. Slots for social advertising on TV, including mobile alerts and social media, could be utilized to educate the public. Strengthening the primary health-care system is essential to reducing the burden on EMS by absorbing non-urgent cases. Several options could also be explored on how to strengthen and advertise alternative non-urgent transportation means.

Actions such as these would improve the Ukrainian primary health-care service and the efficiency of the EMS dispatch process, and ensure the integration of primary health care, family doctors and EMS in a health-care network. They would distribute the burden, allow better case management and better use of resources, and enhance monitoring.

Training and education of EMS dispatchers

Despite the Government's commitment to capacity-building of the health system as part of implementing reform, training should aim to cover a larger percentage of the workforce. Dispatchers should receive refresher training every two years, with the aim being to cover at least **90%** of staff. This should be regulated by decree.

The findings suggest that the guidelines for refresher training of dispatchers need to be reviewed across the country. Due to the ongoing reforms, health-care professionals working for EMS have to be trained regularly. The frequency of training can be expanded in due course to every five years provided standard training has been developed and is being implemented across the country.

Perceived usefulness of treatment protocols

The findings suggest that treatment protocols are acceptable to EMS staff (with reservations) and should be improved. A transparent feedback channel between people on the ground and senior management in EMS should be established and set up electronically. A universal system for collection of feedback from frontline practitioners for policy-makers should be developed to ensure protocols can be optimized and regularly tailored to the realities on the ground.

The main institution responsible for conducting research and setting standards in the Ukrainian EMS is the Ukrainian Scientific-practical Centre of Emergency Medical Care and Disaster Medicine of the Ministry of Health, which develops national EMS treatment protocols and publishes annual EMS statistics.

The results highlight a lack of coherence and consistency, indicating the need to review, update, endorse, distribute and monitor adherence to standard treatment protocols. This emphasizes that treatment protocols in hospitals need to be updated. Training programmes should be developed following endorsement of the standard treatment

protocols, with the required equipment being made available. The legal framework should include triage and treatment protocols at dispatch and hospital levels, operational aspects such as SOPs for ambulance maintenance, EMS financial management and pre-shift checklists. This would address many of the issues reported by the study participants.

Monitoring and evaluation of dispatch centres' performance

It is recommended that a standardized approach to evaluating the performance of dispatch centres be developed. The approach should incorporate output and impact indicators and ideally be built on a national computerized system to facilitate the dispatch workflow.

Despite the presence of some structure and process indicators, more emphasis should be put on EMS output indicators, such as survival rate, and computerization of the system, which should be put in place to improve the reliability of data-collection and monitoring.

Distribution and mode of operation of dispatch centres

At the time of the survey, **75%** of the EMS directors reported that their oblast operated with one centralized dispatch system, while others used a fragmented system with between seven and **24** dispatch centres. Further work should be undertaken to help these oblasts transition to a more connected and centralized system to ensure more efficient use and distribution of resources across oblasts.

There is a need to roll out a national computerized EMS system to facilitate management of dispatchers' work procedures. Dispatchers from Kharkiv, Zakarpattya, Vinnytsya and Mykolayiv reported using computerized systems to facilitate their work. The data suggest the computerized system did not affect arrival times in these oblasts. Further research should investigate the effectiveness of these systems to inform the roll-out of a national computerized system.

Real-time knowledge of available ICU beds as an indicator

An electronic system for monitoring available hospital resources should be introduced. There is no system or SOP for providing dispatch centres with real-time knowledge of available ICU beds or hospital occupency.

In the few cases where dispatchers or EMS directors believed there was real-time knowledge of ICU beds at dispatch, this was generally found to be through ad hoc phone communication. Further investigation is needed to assess this claim and to establish a computerized system to improve real-time knowledge of available ICU beds.

Emergency care provided in ambulance and on scene

Definition of emergency care

The Ministry of Health leaders reported having a clear definition of emergency care, but the study found that EMS also provide primary health-care functions and patient transportation, respond to people's mental health needs and deliver medicines.

The scope of the EMS service package should be reviewed to ensure the use of resources is optimized.

Any further study of EMS should acknowledge that ambulances in Ukraine have a broader scope of work than those in other countries.

Minimal number of procedures and treatment protocols provided by EMS

Almost all ambulance staff agreed that an EMS treatment protocol was in place, but there was no consensus on the source of the protocols and whether they were followed. Such practice can result in heterogeneity in treatment protocols and lack of consistency for health-care practitioners.

The Ministry of Health should ensure the availability of unified evidence-based

treatment protocols that are implemented and revised regularly by an independent committee of EMS practitioners and policy-makers. It is also recommended that a Ukrainian society of emergency doctors be established to develop a national protocol through a bottom–up approach. For health-care practitioners to provide optimal care, the Ministry of Health should put at their disposal a set of clearly defined protocols. These protocols should be standardized and disseminated across the country. Therefore, there should be a unified source for EMS staff to refer to the treatment protocols currently approved by the Ministry of Health. All EMS staff should know where these protocols can be found and how to apply them.

EMS staff must feel they have ownership over the treatment protocols for them to be useful. A new approach should be taken to reviewing and standardizing treatment protocols. The approach should be bottom–up, ensuring support from those responsible for implementing the protocols.

Regarding the current treatment protocols, the study findings reveal several gaps in implementation, and for a variety of reasons. There are gaps in skills, knowledge, training, medical supplies, monitoring and evaluation of EMS staff.

This is demonstrated by the insufficient number of EMS staff following protocols on minimum standards of care. According to international guidelines, these procedures must be carried out in a timely fashion by trained staff who have access to the required health supplies and equipment. The findings demonstrate the need for further investment to level up the quality of EMS care.

A scientific and operational review of the minimum standards of care provided by each oblast and their alignment with internationally approved guidelines should be conducted.

The EMS workforce should have access to unified postgraduate training, regular refresher training and on-the-job assessments to improve compliance with SOPs and treatment protocols.

Ambulances should be appropriately equipped and medical workers well trained and able to provide life-saving interventions.

An operational monitoring and evaluation mechanism should be developed to ensure the quality of health services provided.

Training and education of ambulance staff

The study finds that a great deal of specialist EMS training is provided across Ukraine to all staff groups. The law includes annual compulsory training on the management of emergency cases. Despite this, no standardized approach to the continuous training of EMS staff was found.

Training is available, but further research is required to assess overall training needs per ambulance-level health worker across the EMS workforce and to develop, implement and monitor a national training strategy that includes accredited training facilities and instructors, a standardized curriculum and independent testing.

Quality control of prehospital care

According to the findings, there is no standardized system of quality control for prehospital care beyond the analysis of registry data. The quality of the data provided by the registry is poor and incomplete. Many of the indicators are imprecise or inaccurate. The information management system is not computerized, so human error cannot be excluded.

A standardized system of quality control for prehospital care should be established at national level. It should incorporate improved data-collection and guidelines on how and when to collect and interpret data. Improving data quality improves evidence-based decision-making and therefore improves the quality of services.

On-scene triage

Despite the availability of a national triage protocol at prehospital level, the study

demonstrates that ambulance staff utilize different types of triage protocols.

A unified prehospital triage protocol should be developed at national level for adaptation at oblast level. The triage protocol should enable incorporation of the latter in disaster-management operational plans.

Pre-shift operational protocols used at prehospital level

Pre-shift operational procedures for EMS providers should be reviewed and updated. The vast majority of ambulance staff agreed that several pre-shift checklists exist, but the checklists are not standardized and lack consistency. Many found it difficult to identify the source of the protocols. It is recommended that pre-shift protocols are revised and streamlined across the country.

Prehospital patient routing and coordination between EMS and hospital

The results demonstrate a need to improve real-time communication across all EMS stakeholders. The operational communications platform should link all the components of the EMS survival chain. A common communications platform for dispatchers, ambulances and hospitals, for example, would improve situational awareness, decrease the time of arrival of ambulances and time to appropriate care, and reduce rates of unnecessary secondary referrals. All of this would be expected to reduce morbidity and mortality. Before such a system is set in place, SOPs should be developed, implemented and monitored to improve inter- and intra-sectoral communication. Currently, there is a clear lack of standard protocols for communication.

A common computerized operational communications platform should be established to enhance coordination and interoperability between EMS and hospitals. The platform must guarantee that all patient routings region-wide are managed by a single high-tech communication centre that monitors resources available, including specialists and diagnostics, in every health centre in the region and coordinates patient transportation to the appropriate and ready-to-receive facility **24** hours per day, seven days per week, **365** days per year.

Management of ambulance fleet, including ICU ambulances

Universal access of the population to type A ambulance services should be ensured. The study suggests that some oblasts, including Kiyv, Sumy, Poltava and Zhutomyr, do not have access to type A ambulances; this has been confirmed by national statistics and implies low use of type A ambulances in Ukraine. Further investigations are required to verify the situation because if true, policies need to be developed at oblast level to support the ambulance fleet with type B and type A ambulances to decrease strain on EMS budgets and staff.

The study found no consensus on the circumstances in which ICU ambulances may be used, or who is authorized to dispatch them. ICU ambulances incorporate specialist equipment at extra cost to EMS and their unnecessary frequent use is an abuse of EMS resources.

The management and distribution of ICU ambulances should be carefully coordinated, with a standardized protocol in place to improve survival rates.

Effect of communication on access

The lack of reliable communication means is likely to contribute to a lack of access to EMS in areas with unreliable mobile network coverage. Investment in radio communication to ensure backup communication is always available, especially during emergencies, is therefore needed.

First-aid responders

The Ministry of Health should consider a standardized national approach towards involving EMS staff in educating the public in first aid. Special focus should be placed on school teachers, drivers, police officers and civil servants.

A protocol for first-aid responders, charity and civil societies should be developed, regularly reviewed and rolled out nationwide, including a schedule for regular refresher training (every two years, for example). Sufficient resources should be allocated to ensure involvement of an appropriate number of qualified EMS staff and training venues are available to educate the public in first aid.

The so-called Good Samaritan legislation should be passed into law to give better legal protection to first-aid providers. This will help to engage more people in provision of timely first aid.

Hospital treatment package

Distribution of hospitals with emergency departments

The Ministry of Health has developed a plan to establish emergency departments in certain hospitals across the country. It is a move in the right direction to upscale emergency medical care.

Standardized indicators need to be developed by the Ministry of Health that will allow identification of the required number of these hospitals and where they should be located.

Access to emergency medical care is legally prescribed to be free of charge and open to everyone. Some facilities in the study nevertheless claimed that patients have to provide ID and financial coverage documents to access the emergency department.

Hospitals should be evaluated to assess whether local protocols have been developed for the admission of emergency cases that have to be covered by insurance.

To ensure efficacy and efficiency of use of, and access to, emergency departments in EMS, further investigation is required to assess the availability of emergency care services according to population density and international regulations and to propose appropriate solutions.

Emergency department/admission department

There is common misunderstanding regarding the function of admission departments and emergency departments in Ukraine.The emergency department concept should be introduced across the health-care system in Ukraine. The transition from the admissions department to the emergency department at hospital level of the survival chain requires an appropriate setup to avoid gaps in service provision and improve quality of care. Hospital emergency clinical protocols should be standardized across regions.

Ministry of Health leaders reported that there are no national standards of performance, health policies and clinical protocols for emergency departments.

Further work should define the role of emergency departments, including the ideal structure, related health policies, health protocols, supporting services, essential medicines and equipment, and standards of performance.

Triage at hospital level

The study demonstrated that the triage system is in place at hospital level, but there is a clear lack of standardization, training and skills. There is an urgent need to develop triage quality-control systems to improve triage outcomes and survival rates.

Delays in care

According to the study, patient delays in the admission departments of hospitals mainly were due to lack of specialists, staff and mass casualties. There is a need to integrate mass-casualty training and triage into the postgraduate training curriculum of hospital emergency care providers and introduce a unified team-based approach to triage in emergency departments/on admission, following the ABCDE framework.

Monitoring and governance

There is a need to establish an independent body to inspect medical facilities, including public and private hospitals, and assess their compliance with national law, standards, protocols and best practice. This body should carry out a study of access to health-care services to gather relevant information to provide appropriate recommendations, including on out-of-pocket payments at health-facility level.

National standards for hospitals

The study used adherence to national protocols by private hospitals and access to blood banks as examples of governance of emergency medical care. Private hospitals provide emergency medical care and follow Ukrainian law, but limited monitoring and quality control is in place. It is recommended that the Ministry of Health adopts a mechanism to monitor and evaluate the quality of services provided by private emergency medical care institutions. Further research into the role of private EMS institutions in Ukraine is required.

Access to blood banks is legally guaranteed, but further research is required regarding the process and time required to access blood banks.

Emergency department/admission department SOPs

National standards, including a monitoring mechanism to assess adherence to SOPs, should be developed and disseminated. The study demonstrated lack of governance, monitoring and internal communication regarding emergency department SOPs.

Qualifications of the emergency department workforce

A national board for certification of EMS providers should be established (facilities and individual practitioners), with a minimum package of compulsory training for staff working in emergency departments. There currently is no national board of certification established for emergency care; a national board of certification should be established to ensure harmonized and high-quality service delivery.

Hospital registry and information management

Electronic and interlinked hospital data management is recommended and should be rolled out nationwide. Three quarters of hospital doctors stated that their registries do not communicate with the registries of other facilities in the oblast. This is likely to increase secondary referrals, with avoidable morbidity and mortality. All hospital registries should be interoperable.

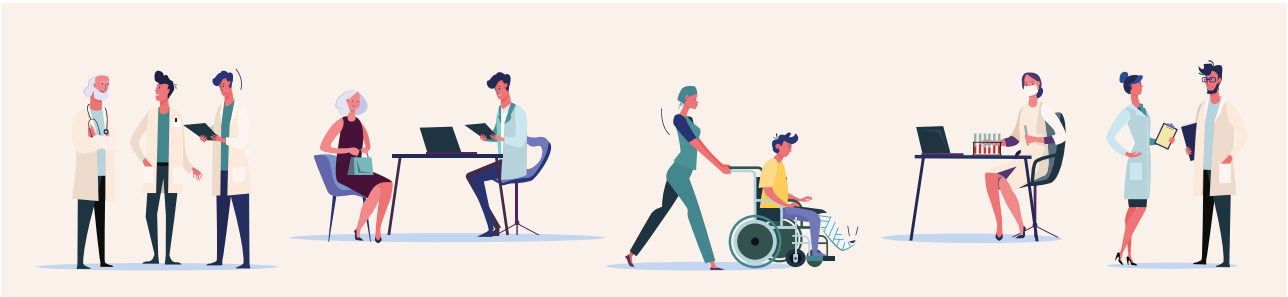
Secondary referral

A system for monitoring secondary referrals should be established; there is no standardized system in place to administer secondary referrals, which are often arranged in an ad hoc manner over the phone. The Ministry of Health should review whether patient transfers are a good use of emergency resources and whether recent changes from the NHSU as of 1 April 2020 have been implemented and with what consequences.

Mobile clinics

Most hospitals in the study (85%) do not provide mobile clinics, which could indicate appropriate coverage and access to EMS, but certain hospitals still provide them. Hospitals that provide mobile clinics could be indicating areas that are hard to reach or which lack access to certain health services, including primary health care.

Current EMS workforce



Professionalism and performance of the EMS workforce

The study found heterogeneity in the provision of essential emergency medical care across Ukraine. Seconds can mean the difference between life and death in emergency situations. It is important for EMS to monitor and evaluate arrival times properly, working towards targets that are drawn up with reference to other comparable countries.

Arrival time is a well established, yet indirect, indicator for measuring EMS quality, but it remains a very broad indicator. Broad indicators lack the granularity to measure the performance of EMS accurately, which may hide abuse of resources in emergency health services. Arrival times need to be correlated with the most urgent cases to highlight life-saving interventions and avoid causing an unnecessary burden to the system.

Patients overwhelmingly were satisfied or very satisfied with their EMS experience, which is essentially due to the professionalism of EMS personnel, but improving staff service was also the second most common suggestion from patients for improving their EMS experience (after improving vehicles).

Patients reported that EMS staff were much poorer than hospital staff at keeping them updated about the diagnosis and procedures they were receiving. It is recommended that all patients being appropriately and timeously informed by EMS health-care workers should be integrated into EMS protocols. Patients must be made aware of treatment options and protocols to be able to provide informed consent.

It is important that the Ministry of Health reviews how current protocols are communicated to staff, and that EMS staff are properly equipped to comply with the protocols.

There is a need to develop a set of indicators that can highlight the input, structure, process, outcomes and impacts of EMS *(Annex 1)*.

EMS staff well-being and protection

Violence protocols

The study demonstrates that violence against EMS staff is perpetrated most commonly by a relative of the patient or the patient. Violence must be prevented, which requires a comprehensive set of measures that includes legal protection, staff training and community awareness. Such protocols should also be developed and put in place for hospital staff.

Protocols for staff protection against violence should be reinforced. According to the Ministry of Health leadership, there is a protocol to protect dispatchers and ambulance staff from violence, but no such protocol exists for health-facility staff. Despite this, very few EMS staff are aware that the protocol exists.

It is important to ensure that EMS staff across the country are aware of the protocol. Good internal communication across the EMS workforce is essential, and protocols against violence should be included in regular staff training.

Mental health and psychosocial support should be available to the EMS workforce.

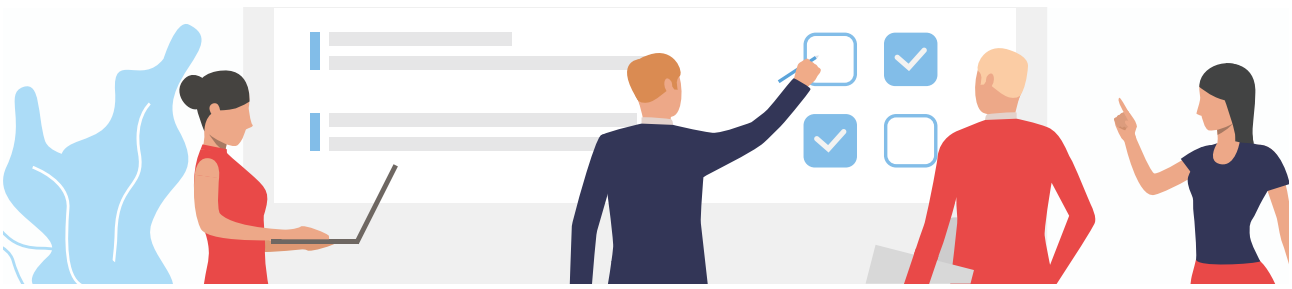
Coordination between hospitals and police and law enforcement forces

Working in EMS and in hospitals with designated emergency departments increases staff exposure to violence from patients, bystanders and family members. EMS health-care workers must be protected and have access to law enforcement while at work.

A coordination mechanism between EMS, including hospitals with designated emergency departments, the police, the fire department and other civil services needs to be established across regions and nationwide.

Working in EMS also puts health-care workers under time pressure to save people's lives. Having access to law-enforcement personnel allows them to address medicolegal concerns, ensures their protection and provides security during mass-casualties events.

Supply chains and resourcing



Resource allocation

Optimal supply-chain resources should be made available. There are significant shortages of needed equipment along the levels of the survival chain (dispatch, ambulances and hospitals). It is alarming that around **25%** of hospital doctors and over **50%** of ambulance staff stated they were lacking necessary medicines and equipment. The gap in needed equipment is significant and requires the establishment of a computerized supply chain to inform management when supplies and equipment reach critical levels. Further analysis is required to better understand whether it is diagnostics-related or treatment-related equipment that is missing, or both.

Replenishment of equipment

A significant proportion of the ambulance staff (**35%**) reported having bought medical or other items needed for their work from their personal expenses (out-of-pocket). Forty per cent of these respondents said they had bought uniforms and shoes, 22.5% had bought stethoscopes, 17.5% venous catheters and 17% medicines.

A computerized system when established will improve the performance of EMS supply chains and raise early warning alerts concerning stock shortages. This would improve the overall management and availability of resources.

Maintenance of ambulances

The study found that the age of the oldest ambulance varies by oblast from seven years in Kyiv to 36 years in Chernivtsi (the oblast with the third-lowest funding, according to the findings). Such discrepancies in the quality of ambulances and their equipment should not be observed. Patients and staff complained about the quality of ambulances, which is an important factor in ensuring a high standard of timely care. A standardized policy should be in place to determine when ambulances and equipment should be retired.

Ninety-four per cent of registries reported that ambulances are stored in garages, but 83% reported that they are also kept in open parks. Storing ambulances in the open air will significantly reduce their life span and introduce further maintenance costs.

Information management

Data significance

The Ministry of Health leadership reported that information management systems were in place, but the data lacked relevance. It was unclear how many of these systems were computerized.

A computerized system for the management of information and data should be introduced. The system should include private hospitals. It is essential for monitoring and evaluation purposes that the data in the national registry are accurate, complete and timely.

The national data repository (Central 103) that connects all regional EMS dispatch centres needs to be further strengthened to increase the efficiency of emergency medical care within its limited resources. It is recommended that the national data repository is designed to allow early detection of certain priority diseases (such as poliomyelitis, measles and haemorrhagic fever) collected by EMS. Such a repository will provide data not only to EMS, but also to other actors in the health sector, including public health and preparedness and response agencies.

Internal communication and data flow

To ensure consistency and timely sharing of correct information, it is recommended that a web-based tool be set up to communicate internally with the EMS workforce. This could be as simple as a blogging website that incorporates news updates for the workforce, longer articles and resources for career development and training and, crucially, provides centralized access to all important national documentation and protocols. An option to receive SMS and social media notifications from management would provide an efficient means of prompting staff about key updates.

Finances attributes

Disparity in funding

Ukraine is undergoing a major change regarding how health services are financed. Since 1 April 2020, purchasing of EMS has been planned on a capitation basis through direct contracts between the NHSU and EMS centres in each region.

The perceived disparity in per capita funding is significant and requires further investigation to gain a better understanding of the causes and how to address them.

Underfunding

According to the EMS directors, human resource salaries are suffering most from underfunding (**85%** of responses mentioned this), alongside ambulance maintenance (**69%**) and medical equipment (**44%** of responses).

Other areas that suffer from underfunding are the ambulance fleet (**42%** of responses), equipment (**14%**), staff numbers (**14%**) and medicine (**14%**).

Ninety per cent of establishment financial administrators believe EMS are underfunded. This demonstrates that most interviewees believe EMS are underfunded across all levels. It is therefore recommended that the newly allocated budget for EMS ensures that sufficient funds are made available for EMS to function according to international norms and standards.

Financial planning

Oblast-level EMS directors and financial administrators agree that population density is the most common algorithm used to calculate funding. A number of other indicators also contribute to the decision, including number of teams, institutional needs and number of facilities.

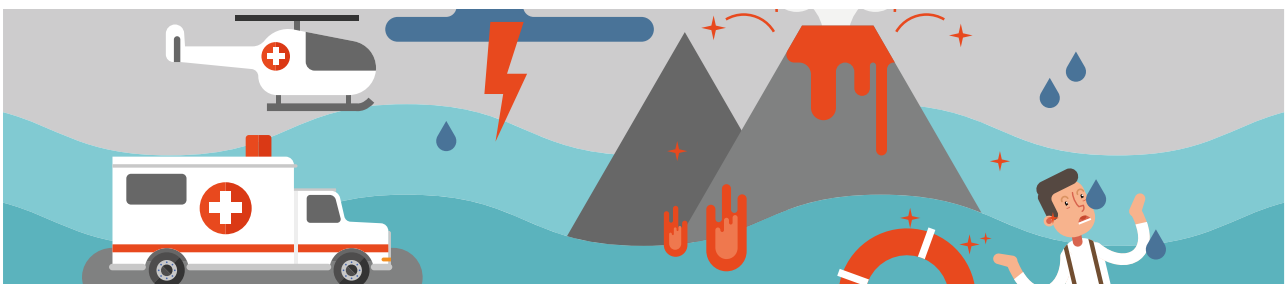
The new funding arrangements should be tested against each of the indicators to understand what the negative consequences of the financial allocations will be for each oblast. This will represent an important piece of financial planning to ensure a smooth transition to the new system.

Monitoring and evaluation of financing

The Ministry of Health leadership acknowledged that at present, there is no standardized system of EMS quality control that feeds into the process of ensuring that financing is sufficient. It is possible that the new Central 103 system reportedly under development will allow this.

It is recommended that a unified computerized system to improve financial accounting be developed, and that investment is made in SOPs and training for financial and other administrative staff. In addition to reinforcing the system, it is also crucial to build the capacity of administrative and finance staff. A computerized financial tracking system that includes an expenditure tracking system should be rolled out, with administration and finance staff trained appropriately.

Disaster preparedness



Emergency/disaster SOPs

The Cabinet of Ministers voted on the strategy for developing EMS in Ukraine in 2019. In the strategy, the Ministry of Health identified the following priority areas for improving EMS: building a comprehensive system of first-aid responders; improving EMS dispatching and prioritization of calls; ensuring a new scope-of-practice model for EMS personnel, with changes in their education; creating an EMS quality-management system; developing new principles in the organization of emergency hospital care; optimizing disaster preparedness and response; and preventing emergencies through EMS. Realization of this concept note is envisioned by 2023. National EMS operational standards should be reviewed and updated and a monitoring system for quality control implemented.

Disaster drills

The main service responsible for responding to disaster is the State Rescue Service. It is unclear from the Ministry of Health leadership whether the law regulates the state of emergency.

From analysis of the data and, especially, the financial reserves of facilities, the presence of an effective disaster preparedness and response plan is highly questionable.

Existing disaster plans should be reviewed and updated, and regular simulation exercises should be carried out. Sufficient funding should be allocated through a centralized emergency contingency budget.

All EMS staff and their partners in public safety should receive comprehensive training. Active participation during the preparedness phase will facilitate team-based care when responding to disasters, including mass-casualty incident management. Interagency training programmes and simulation exercises, including CBRNE incidents and the management of mass casualties, should therefore be developed and rolled out.

A national plan to increase public awareness of when and how to access EMS should be developed and implemented. Slots for social advertising on TV, including mobile alerts and social media, could be used to educate the public.

Emergency budget

The Ministry of Health leadership said that EMS do not have their own budget reserve in the event of a disaster, but can use reserve funds of the Cabinet Ministers or the Government. Less than one third of oblast EMS systems surveyed have a budget reserve available in case of disaster; of those that do, the budget reserve generally is very small, constituting 1% of the overall oblast budget on average. Access to emergency funding should be established for EMS providers, with operation mechanisms in place to ensure rapid allocation of funds.

It is recommended that each facility (EMS establishments and hospitals) has a budget reserve for emergency and disaster response (approximately **3–15%** of budget).

Prevention of emergencies

Availability of prevention programmes

Computerized collection and analysis of emergency care data, including current injury-prevention programmes and noncommunicable disease prevention programmes, should be developed at national level. This will allow a more thorough understanding of the burden of cases, provide the evidence required for the full cycle of a people-centred approach and improve the quality of emergency medical care.

Information-gathering and analysis of injury-related and noncommunicable disease data, including prevention policies, strategies and implemented activities, are needed to better understand the scale of the problem, not only for work-related diseases, but also for other types. Injury-prevention campaigns conducted by state institutions and ministries and some international and nongovernmental organizations are acknowledged.

Workforce feedback

Feedback reported by the current EMS workforce

The Ministry of Health should consider the following feedback from EMS workforce staff on policy-making and operational and strategic planning.

The health workforce at hospital level described their main challenges as being related to equipment failure. This could be improved through the establishment of an electronic inventory, medical engineering department and computerized procurement system. The computerized procurement system should be developed with a bottom–up approach to ensure EMS staff have a sense of ownership over the system.

Lack of staff was also highlighted. This can be addressed by conducting human resource assessments, improving working conditions, increasing salaries, improving access to continuous education and providing a better benefits package, including improved health insurance.

The following measures can be taken: decrease the number of non-urgent cases; develop community awareness; increase primary health-care coverage; and increase outpatient clinic capacity.

A legal framework to protect health-care workers from work hazards, including infectious hazards, stress and violence, should be developed. A staff mental health safety net should be established.

The main challenges for ambulance medical staff are poor road conditions, which could be solved by mapping road conditions and improving the infrastructure as part of a national development plan.

The lack of proper uniforms was reported by EMS staff. The Ministry of Health should ensure the EMS workforce has ongoing access to durable and safe uniforms.

False calls can be decreased through community awareness campaigns that include EMS staff.

Encounters with aggressive patients can be decreased by running community awareness campaigns, developing a legal framework to protect health-care workers, establishing anti-violence protocols for EMS staff and training staff in their use.

An inventory of ambulance numbers and conditions, including equipment, should be developed and a fleet-management structure established.

Concerns raised by ambulance drivers were similar to those of ambulance medical staff, with the addition of the difficulty of finding addresses. A GPS tracking system would facilitate access to patients. They also underlined that ambulances frequently break down, which could be solved by upgrading the car-maintenance system. The behaviour of drivers on the streets does not allow ambulances to pass through in emergency situations. This lack of consideration hampers ambulances in reaching their destination quickly. Law enforcement and increased community awareness campaigns can be helpful means of improving this situation.

Similar concerns were raised by EMS dispatchers. The number of non-emergency calls can be reduced by developing and disseminating triage protocols at the level of dispatchers. For cold cases, a national emergency number through which urgent

and non-urgent calls could be directed according to their specificity (needs) should be established, community awareness campaigns delivered, caller ID promoted, laws established and access to funding increased.

Dispatchers should be trained to manage aggressive callers.

The number of **4x4** ambulances should be increased to enable access to emergency care for people living in hard-to-reach areas.

Feedback from medical universities and potential future workforce on a reformed EMS

The Ministry of Health has been introducing EMS reforms since 2015, but the measures are not communicated appropriately to health workers, medical students and the population. A standardized means of communication should be established, including a feedback mechanism to allow the system to evolve and adjust to needs.

Ukraine has a functioning legal framework for EMS and currently is undergoing reform. Current EMS legislation needs to be reviewed and updated to align with health-care reform. Communication on related aspects of the reform (including managerial, financial, administrative, logistical and technical) should be improved to ensure broader understanding and promote adherence to new practices.

EMS courses at university should be enhanced to include simulations and improve the public image of EMS.

The students and lecturers emphasized that a focus on the quality of EMS teaching at university is needed, as are improvements in EMS in general to increase students' and lecturers' interest in the specialty.

Students' suggestions included more training, exercises and practice, additional information about EMS and study of contemporary technologies. Improvements related to EMS included scaling-up the EMS fleet, improving work conditions, raising salaries, ensuring appropriate supplies and equipment, and increasing public awareness.

Lecturers' suggestions were very similar, but with greater emphasis on increased practical sessions and developing an EMS course.

Based on these interviews, a review of teaching and practices regarding EMS in universities should be undertaken. Additional practical experience, including simulations, during university education is recommended.

Patient feedback

Out-of-pocket payments

Even though health care is provided free in Ukraine by law, there is a well developed system of unofficial payments (Stepurko et al., 2017). Some interviewed patients reported having paid for their health care, so further research is required to assess the magnitude of out-of-pocket payments and their impact on access to health services.

Patient satisfaction surveys

A transparent system for electronic feedback from EMS staff and patients should be established. The system should be linked with the quality-monitoring oversight body and should be nominal or anonymous. It is recommended that ambulance staff be included in public awareness programmes to improve public perceptions of the EMS system.

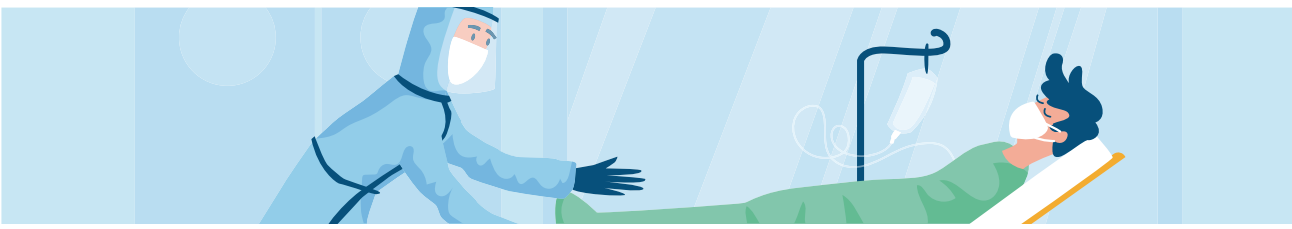
An explicit system of regular nationwide patient satisfaction surveys should be developed, and the results should be reflected in policies. This will enhance community participation in policy evaluation and formulation.

Time to the arrival of the ambulance

Arrival time needs to be reviewed as a main quality indicator of EMS. The establishment of a triage system at dispatch centres, classifying cases into imminent, urgent emergencies and non-urgent cases, will ensure an appropriate response time per category.

The study found a significant discrepancy between the arrival time reported in the registry and the average arrival time reported by patients. This again points to the importance of improving registry data quality. If ambulance arrival time is used as a key indicator, this indicator should be accurate. This is all the more important if it is used as a quality-control indicator and a means to distribute ambulances.

The burden upon EMS



Common emergencies seen by staff

All of the EMS directors and dispatchers agreed that almost 50% of the calls they receive are non-urgent. Most of the EMS directors and dispatchers believe that non-urgent calls should be transferred to a primary-care physician.

It is recommended that a standardized classification of emergencies should be adopted. This will allow the collection of accurate data on the different types of emergencies the health system has to respond to and can be used to inform policy-makers and senior management. It will also permit the allocation of sufficient resources for staff and their continuous education.

The study identified that the most common cases attended by EMS across the country at all levels are cardiovascular diseases, trauma and central nervous diseases (in order of magnitude). The Ministry of Health should develop community-awareness, prevention and response plans to mitigate the disease burden and develop plans to ensure a timely response and guarantee high-quality services.

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Annex 1

INDICATORS OF INPUT, STRUCTURE, PROCESS, OUTCOMES AND IMPACTS OF EMERGENCY MEDICAL SERVICES (EMS)

Group	Definition	Indicators
 Structure	 Components of EMS	**Number of ambulances per population or per 10 000:** • Type A • Type B • Type C • Percentage of functioning ambulances under 12 years • Number of ambulances equipped with essential equipment per population or per 10 000 • Defibrillators (with ECG) • Transport ventilators • Oxygen source (cylinder or concentrator) • Percentage of EMS teams operating with full compliance to standard list of supply **Number of EMS staff per population or per 10 000:** • Physicians • Feldshers/paramedics/ dispatcher • Ambulance medical staff • Drivers **Training** • Number of staff receiving trauma training in total per facility and region every year • Number of training sessions on infection prevention and control per facility every year • Number of CBRNE training activities conducted per facility and region every year • Number staff trained on CPR per facility and region every year • Number of yearly disaster drills (triage/mass casualty) **Standards of care** • Percentage of patients to whom the national standards of care applied • Proportion of EMS medical and managerial standards revised (updated) within the last two years

Group	Definition	Indicators
 Structure	 Components of EMS	**EMS timings** • Mean and 90th percentile of response time (by urgent/non-urgent) • Mean and 90th percentile scene time (by urgent/non-urgent) • Mean and 90th percentile hospital transport time (by urgent/non-urgent) **Number of intensive care hospital beds per 100 000 population** • Type 1 • Type 2 • Type 3 **Use of Emergency Medical Dispatch Protocol Reference System (EMDPRS)** • Dispatch triage protocol used • Number of regions functionally connected • Number of regional dispatch centres connected to Central 103 • Number of dispatch protocols including guidelines to indicate when to respond with lights-and-sirens • Number of dispatch protocols including guidelines to indicate when to send physician- or feldsher-led crew • Capability at dispatch level to track ambulance vehicles using GPS/GLONASS/ other technology • Percentage of EMS staff equipped with institutional communication means (not personal devices of staff) • The allocation of resources to ensure surge capacity for response (dispatch additional vehicles for mass casualty OR surge level of care if exacerbation of the patient's condition) and contingency response plans at dispatch level • Percentage of ambulances communicating with hospitals and mechanism of information exchange between ambulance, dispatch and receiving hospital • Availability of telemedicine capability per region • Establishment of electronic platform that provides real-time knowledge of available ICU beds per region **Finance** • Total EMS cost per capita • Percentage (or ratio) of local and (to) national funds • Mechanism of strategic and operational planning (forecasting tools, planning based on indicators and evidence, etc.) • Mechanism for rapid procurement in case of emergencies • Mechanism of rapid budget request for emergencies • Establishment of electronic financial tracking system at national and regional levels

Group	Definition	Indicators
Process	Sequence of phases to improve patient outcome	• Percentage of patients in respiratory arrest/distress received oxygen • Percentage of patients over age 35 with suspected cardiac chest pain received emergency ECG • Percentage of patients over age 35 with suspected cardiac chest pain received an aspirin • Percentage of patients with suspected cardiac complaint first referred to hospital with cardiac interventions capabilities • Percentage of cardiopulmonary resuscitation (CPR) started within eight minutes of the call to the dispatch centre on patients with cardiac complaints • Percentage of patients surveyed by EMS centre yearly to measure patient satisfaction/outcomes • Rate of EMS crashes per 1 000 responses • Prevalence of out-of-pocket payments for EMS care
Outcome	Decrease in: • death • disability • disease • discomfort • dissatisfaction • destitution	• Percentage of secondary referral of cases with cardiac disease • Percentage of patients satisfied with their EMS experience • Percentage of EMS staff satisfied with their job • Percentage of survivals in patients experiencing cardiac arrest after EMS response in first 72 hours • Fatality rate during EMS care • Prehospital case fatality rate for cardiovascular event • Prehospital case fatality rate for neurological event • Prehospital case fatality rate for major trauma event • Case fatality rate after CPR (or CPR survival rate) • Establishment of adverse incident reporting system at national level • Number of critical incident inquiries and the outcome of inquiries
Impact	Health status Mortality by cause Financial protection	• Under-5 mortality among EMS patients, divided by national under-5 mortality rates • Maternal mortality among EMS patients, divided by the national maternal mortality rate • Disability rate among traffic accident victims • Disability among survivals of cardiovascular events • Disability among survivals of neurological event • Death rate due to traffic accident divided by national death rate

Annex 2

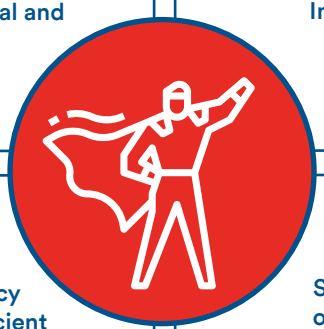
EMERGENCY MEDICAL SERVICES (EMS) RECOMMENDATIONS ACCORDING TO WHO HEALTH SYSTEM BUILDING BLOCKS

– LEADERSHIP –

Adapt legislation for EMS to provide the legal basis for the new policies and protocols adopted through the EMS reform

Establish a set of indicators (see *Annex 1*) and an independent body to monitor the quality of emergency care, inspect medical facilities and assess their compliance with national laws, standards, protocols and best practice

Create a network of acute care hospitals with emergency departments appropriately distributed across the territory of Ukraine. This will improve the provision of optimal referral and care for emergency surgical and medical cases, thereby contributing to improving patient outcomes



Develop emergency care system's capacity to respond to and withstand a major disaster. WHO tools, such as the Hospital Safety Index, can be used as initial assessment tools

Introduce a triage system to eliminate non-emergency calls and enable more efficient utilization of limited resources and a reorientation of non-emergency tasks. In parallel, the number of calls can also be reduced through increased public awareness campaigns educating the population on when to utilize EMS, on the available service package that will be provided by the EMS, and on how to access primary health-care services

Support the current efforts of the Ministry of Health to provide basic and advanced first-aid training and resources to a greater number of people in Ukraine. This will help build a more resilient community that is able to respond to emergencies when they occur

Establish a Ukrainian emergency care society that includes all health-care professionals involved in the survival chain. The society will develop, review, update and disseminate the emergency standard operating procedures and guidelines

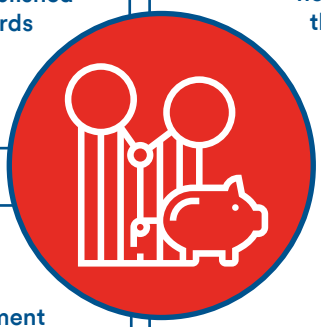
Review and update existing disasterplans, with regular simulation exercises being carried out among all actors. This will enhance the ability of the system to respond to disasters, including mass-casualty incidents, pandemics and chemical, biological, radiological, nuclear and explosive materials incidents

Establish a transparent system providing electronic feedback from the EMS. The system should be linked to a quality-control oversight body.

– FINANCING –

Review allocated budgets for emergency care to ensure that sufficient amounts of funds are available for providers to function according to established norms and standards within the new payment system

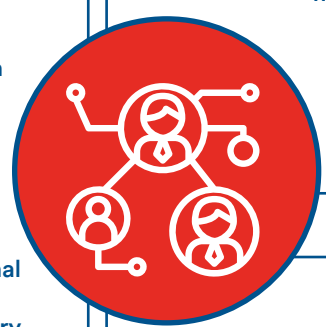
Establish a computerized financial management system, including an expenditure tracking system and a financial forecast



Currently, purchasing of emergency services is carried out on the per capita principle. This may not be enough to ensure sufficient funding to create the necessary changes in the patterns of emergency care delivery. Payments for emergency care may also need to include incentives to: reduce the time from call to the emergency department for acute conditions; ensure appropriate transportation of patients according to defined clinical pathways; and define reference points for patients with strokes or cardiovascular conditions, maternal and neonatal care. This may require the inclusion of results-based mechanisms for purchasing emergency care services, meaning payment regulations for emergency care may need to be revised

– WORKFORCE –

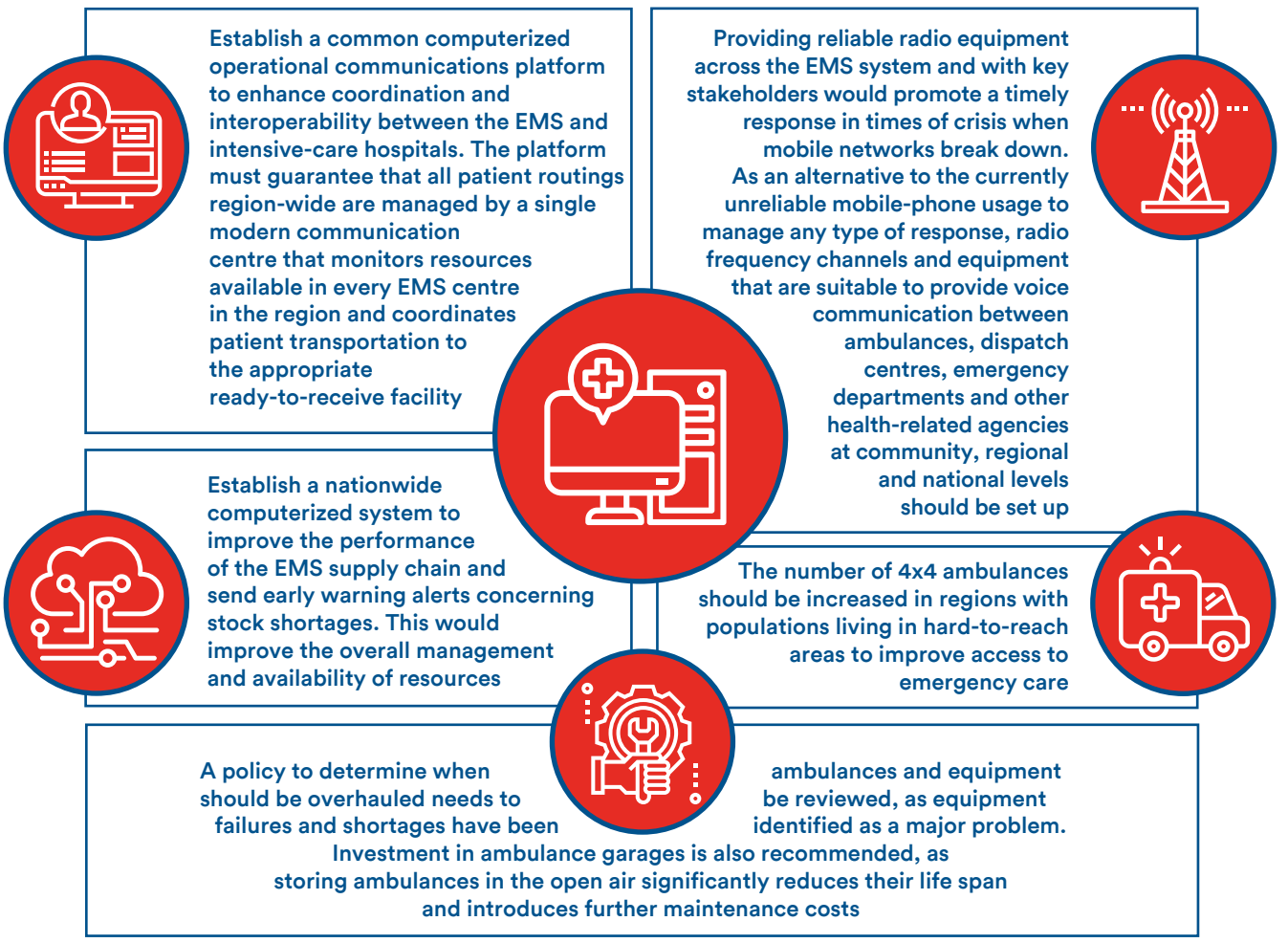
Review and update current EMS education standards to align professional curricula with the health-care reform. Include more practical training and training on all required skills to improve knowledge in emergency care, for example include advanced trauma training in university curricula. Support and expand the new continuous professional development model initiated by the Ministry of Health to include not only physicians, but all members of the emergency care workforce



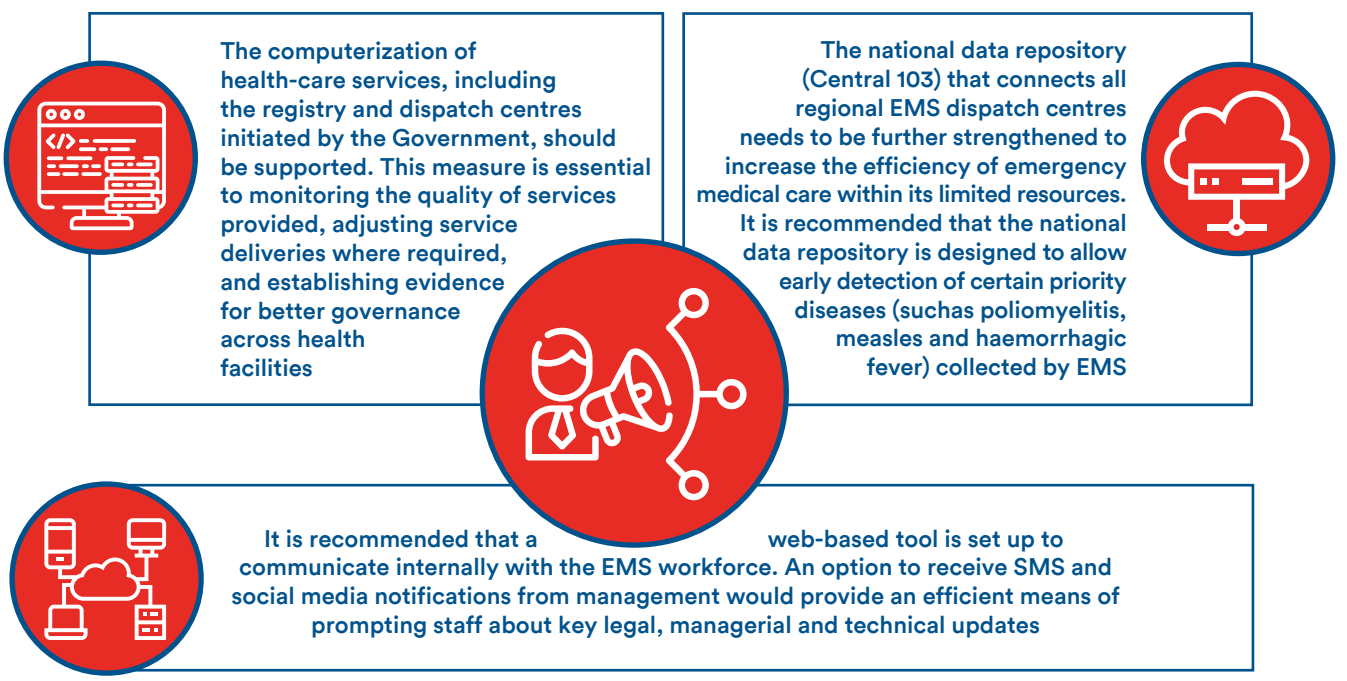
Working in the EMS or in hospitals with designated emergency departments increases staff exposure to violence and other occupational hazards. Emergency care workers should be trained and protocols developed on how to react to such situations, with prompt access to law enforcement while at work

Expand the availability of mental health and psychosocial support programmes for the emergency care workforce

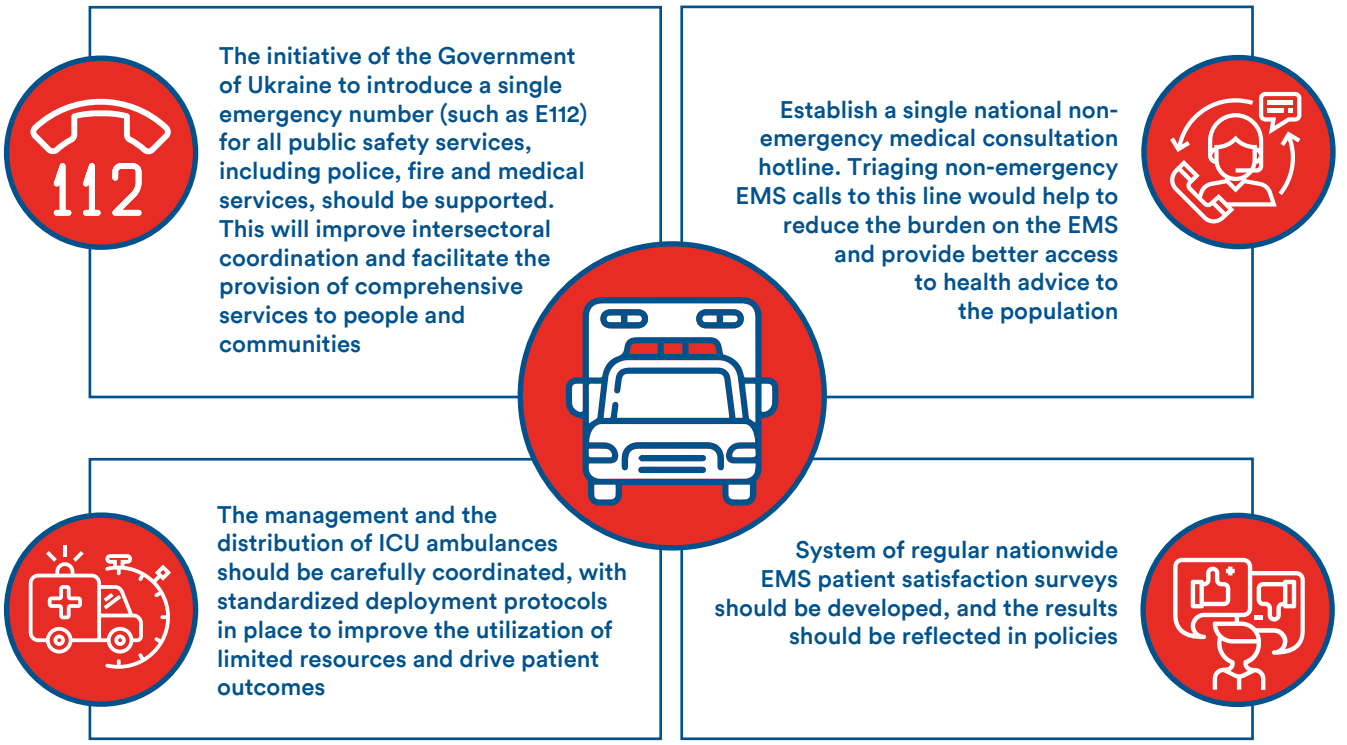
– MEDICAL TECHNOLOGY –



– INFORMATION MANAGEMENT –



– SERVICE DELIVERY –



WHO Regional office for Europe

The World Health Organization (WHO) is a specialized agency of theUnited Nations created in 1948 with the primary responsibility for international health matters and public health. The WHO Regional Office for Europe is one of six regional offices throughout the world, each with its own programme geared to the particular health conditions of the countries it serves.

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World Health Organization
REGIONAL OFFICE FOR Europe

World Health Organization
Regional Office for Europe

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