

19th ROAD SAFETY TECHNICAL COMMITTEE &

9th WBR SO Meeting

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EU for Serbia Project- Improving Road Safety

Component 4:

Establishing a data collection process on the MAIS 3+ injury scale and improving the capacity of health sector and the traffic police to exchange information on injuries in traffic accidents

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Activities on MAIS 3+



- Based on **Inception report from February 2020.**
- Conducted in the period **June 2020- March 2022.**
- **NKE team** included medical professionals from the field of epidemiology, public health and emergency care from the IPH Belgrade, IPH Vojvodina and City Institute for Emergency Care Belgrade, as well as Road Traffic Specialists

Activities conducted with the valuable help of representatives of the Public Health Institute of Serbia "Dr Milan Jovanovic Batut", Road Traffic Safety Agency and Traffic Police Administration

Activities of NKE team on MAIS 3+



1. Analysis of the existing procedures of injury evaluation and recording;
2. Analysis of the various aspects of collecting and exchanging data on RTA in the Republic of Serbia and other countries;
3. Assessment of the existing legislative, institutional, administrative, technical and technological aspects of introducing MAIS3+ injury scale in the Republic of Serbia;
4. Data base analysis on road trauma in the Republic of Serbia based on the hospitalisation report collected by the NPHI "Dr Milan Jovanovic Batut", and its network of public health institutes;
5. Evaluation of the time needed for manual processing of injury severity of trauma using the MAIS3+ injury scale;
6. Recommendations on data collection and conversion of previously collected data on serious bodily injuries into the MAIS3+ injury scale;
7. Proposals for: intersectoral data exchange, possibility of amending the legal provisions, education of medical staff on implementation of MAIS3+;
8. Development of supporting MAIS 3+ promotional material;
9. Conduction of introductory training of medical professionals on MAIS 3+;
10. Proposal of further steps in order to obtain sustainability of MAIS 3+ recording.

Injury evaluation and recording in Serbia



- The severity of a road injury at the crash scene is assessed by the Police and a **doctor from the Emergency Medical Service, while the final assessment is made by a doctor in a hospital**
- Serbia has still not adopted a definition for serious or slight injury in police records.
- The severity of a bodily injury is **most accurately assessed by forensic medicine experts**. Their assessment is based on the Criminal Law (article 121- Serious bodily injury and 122 -Slight bodily injury)

RTI data exchange between the Traffic Police and health institutions in the Republic of Serbia – existing situation



- During or immediately after RTA, a police officer makes a police report based on an oral information obtained from the doctor, concerning the qualification of injury severity.
- Based on the information on injury severity obtained from the doctor- RTA classified into three types:
(1) road accident with fatalities, (2) road accident with the injured,
 - **and (3) road accident with material damage only.**

Injury severity classification applied to a person in RTA, based on medical assessment:

- (1) a person died instantly, at the crash scene, (2) a person died while being transported to the medical institution, (3) a person died within 30 days, following the consequences of a RTA, (4) serious bodily injuries, and (5) slight bodily injuries.**

In addition, a person may be without any bodily injuries. These data are recorded by police officers in the Road Accident Database managed by the MoI – Traffic Police Administration (so-called “RA lists” database).

- RTSA populate the database on RTA, persons and vehicles, based on data entered by the Traffic Police into the database “RA lists”. Data concerning road injuries are entered into the **Unique Road Safety Database** - publicly accessible, limited range of RTA data, excludes „sensitive” data (Law on Personal Data Protection, “Official Gazette of RS”, No 87/2018).

RTI data exchange between the Traffic Police and health institutions in the Republic of Serbia – existing situation



- ✓ After the triage at the crash scene, the **injured is transported into the medical institution** where, depending on severity and type of injury, he/she **can be hospitalized** in various hospital wards.
- ✓ The administering doctor **may refer the patient injured in a road crash immediately to an intensive care unit**, if there are medical reasons for that.
- *Note: A patient with serious bodily injury, may be referred to treatment at home, according to doctor's assessment based on an outpatient's check-up or observation.*

RT INJURIES IN ICD-10



- Data in hospital records in the Republic of Serbia are **coded according to the ICD-10 system.**
- The ICD-10 list makes a distinction between a “road accident” (each accident involving a vehicle on the public road) and “non-public road” accident” (any accident of a vehicle occurring somewhere else, but not on the public road).
- The S00-T98 codes -used for coding injuries
- *RTA “a transport accident (V01–V99) is any accident involving a device designed primarily for, or being used at the time primarily for, conveying persons or goods from one place to another”.*

Data from the Hospitalization Reports are protected by the Law on Personal Data Protection as they contain extremely vulnerable data relating to the health condition.

TRAUMATISM IN SERBIA –MORTALITY DATA



MORTALITY DATA

one of the most important indicators for injury surveillance

Law on Registries

Minister of Internal Affairs

Minister of Health

Rules of Procedure of issuing and form of the death certificate

(DEM 2)

DEATH CERTIFICATE

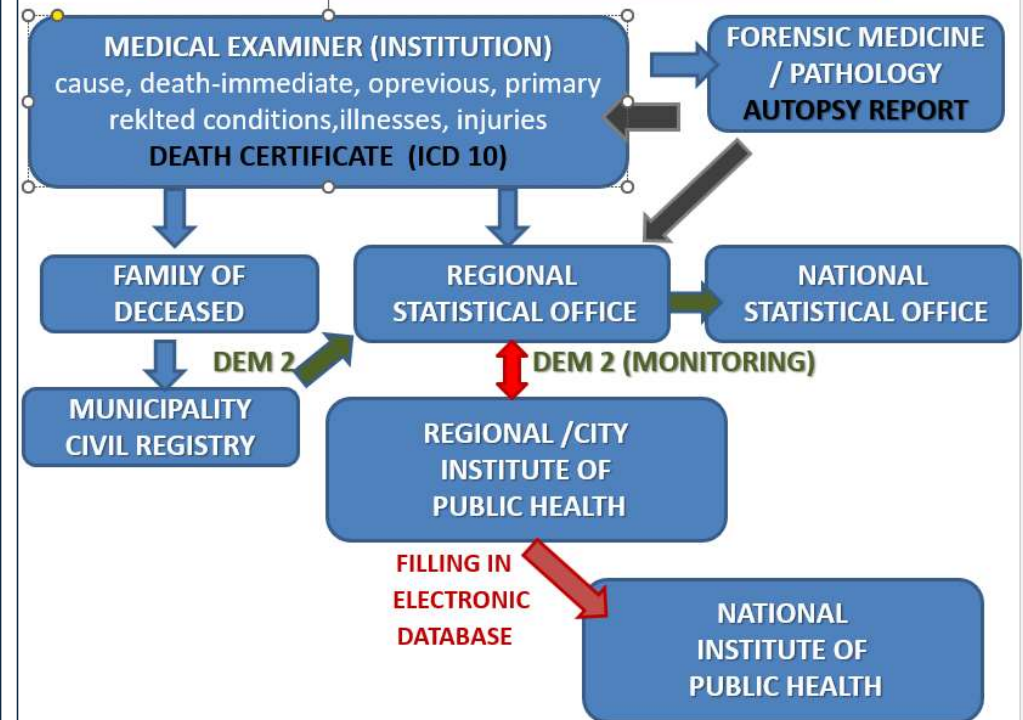
- Individual-

- Relevant data for epidemiological monitoring-

demographic characteristics, cause of death, mechanism, time, place, previous activities etc.

- Obligatory -

MORTALITY DATA FLOW

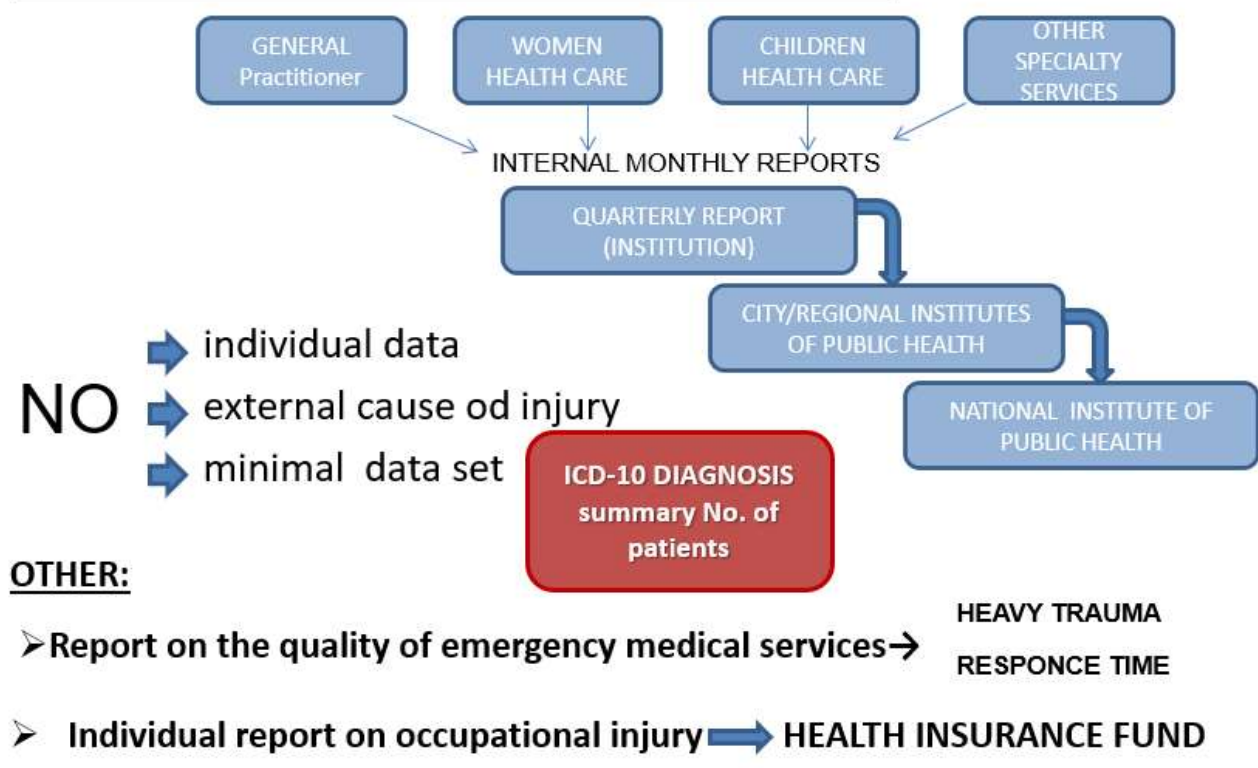


TRAUMATISM IN SERBIA – MORBIDITY DATA

PRIMARY HEALTH CARE

✓ According to the Law on registration in health care

SI –06 Report on diseases, conditions and injuries



TRAUMATISM IN SERBIA – MORBIDITY DATA



SECONDARY /TERTIARY HEALTH CARE

✓ According The law on registration in health care

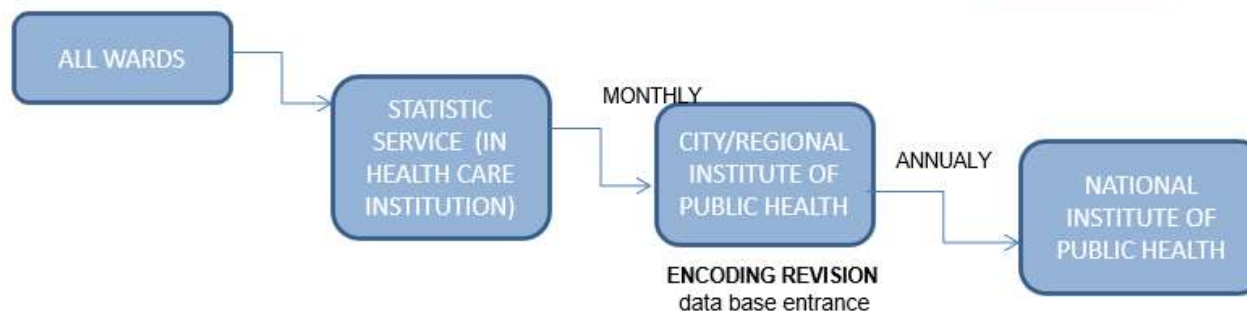
Report on hospitalization (hospital discharge record)

individual data

ICD-10
CLASIFICATION
4 digit encoding
INJURIES- 5 or 6
digit coding

- socio – demographic characteristics ,
- admission and discharge,
- the primary cause of hospitalization,
- accompanying diseases, complications
- interventions
- treatment outcome,etc

the external cause of injury, place,time



MANDATORY , ELECTRONIC FORM- first option

EMERGENCY DEPARTMENT



MORTALITY DATA - DEATH CERTIFICATE

MORBIDITY DATA

(depending on the severity of condition)

data on No. of traumatized persons in IR- no routine collection and analysis

IF INPATIENT TREATMENT

IF OUTPATIENT TREATMENT



data through



Hospital discharge record

(statistical importance)

for surveillance

ICD-10,
5 digit coding
obligatory

Patient protocol

(no statistical importance)

for survey



**If patient returns
to primary health care
(GENERAL PRACTITIONER)**

SI -O6 Report on diseases, conditions and injuries

(statistical importance)

IF NO RETURN
data lost for stat. evidence

NO REGISTRY
OF INJURIES

Reports of patients with RTA injury requiring hospital treatment



POST CRASH
RESPONSE

Hospitalization,
diagnostics,
treatment

Reports on
hospitalization -
HDR,
DEM-2

Collecting reports :
Regional IPH
National IPH
Statistical Office of RS
National Health
Insurance Fund

For every injured person in RTA **health care institutions are obliged** to inform Ministry of Interior

(Law on RTS, Art.169)

If participant in RTA **dies within 30 days of accident health care institutions are legally obliged to inform the Ministry of interior** , every death has to be recorded and data changed in the “JIS MUP”

ANALYSIS OF THE RTI HOSPITALIZED PATIENTS



Table 1. Number of post-crash hospitalized patients, according to an external cause of injury (2015-2019)

- Data obtained from the IPH Serbia “Dr Milan Jovanovic Batut” (RTI 2015-2019),

Analysis performed per:

- districts,
- cause of injury (external cause),
- anatomic localization of injury,
- gender and age of hospitalized patients

In addition, an analysis of the number of hospitalized patients per healthcare institutions and according to various levels of health care has been done.

| EXTERNAL CAUSE OF INJURY (ICD) | Year | | | | | Total for period 2015-2019 | Percentage in relation to the total number of road trauma |
|---|--------------|--------------|--------------|--------------|--------------|----------------------------|---|
| | 2015 | 2016 | 2017 | 2018 | 2019 | | |
| Car occupants (drivers or passengers), injured in transport accidents (V40-49) | 881 | 951 | 932 | 1099 | 985 | 4,848 | 31.0% |
| Pedestrians injured in transport accidents (V01-09) | 429 | 472 | 445 | 476 | 535 | 2,357 | 15.0% |
| Motorcyclists injured in transport accidents (V20-29) | 295 | 291 | 321 | 279 | 297 | 1,483 | 9.4% |
| Bicyclists injured in transport accidents (V10-V19) | 32 | 24 | 47 | 48 | 62 | 213 | 1.4% |
| Occupants (drivers or passengers) of a heavy goods vehicle, injured in transport accidents (V60-69) | 16 | 17 | 37 | 33 | 28 | 131 | 0.8% |
| Occupants (drivers or passengers) of a bus, injured in transport accidents (V70-79) | 58 | 27 | 52 | 48 | 50 | 235 | 1.5% |
| Other land transport accidents (V80-89) | 161 | 147 | 129 | 110 | 168 | 715 | 4.5% |
| Occupants (drivers or passengers) of a three-wheeled vehicle, injured in transport accidents (V30-39) | 48 | 40 | 47 | 45 | 66 | 246 | 1.5% |
| Other (other road trauma codes) | 1,039 | 1,008 | 1,276 | 1,191 | 1,085 | 5,599 | 35.4% |
| Total | 2,959 | 2,977 | 3,286 | 3,329 | 3,276 | 15,827 | 100% |

ANALYSIS OF THE TIME NEEDED FOR CALCULATING THE AIS/MAIS



Three doctors of various specialities -calculation of the AIS/MAIS score (1, 3 and 5) from the report on hospitalization of RTI patients, (from the hospital archives, by the random choice method)

Doctor No.1- specialist of urgent medicine, 30 years of work experience at the EMS, experienced in assessing injury severity

Doctors No. 2 and 3 –beginners in this area

Unexperienced doctors need 5-6 times more time for the calculation of serious injuries compared to experienced colleague.

Conclusions:

- The time needed for the calculation of injury severity **depends on the number of ICD diagnoses** that need to be processed.
- Doctor's inexperience is a significant factor affecting the time and accuracy** of calculation of injury severity.
- The time for calculating the AIS/MAIS can be reduced considerably and the quality of calculation improved **by implementing adequate training courses.**
- Doctor's subjectivity when assessing the degree of injury severity, is an inherent factor that cannot be influence – need to perform logic checks of calculations.**
- The quality of calculating the degree of injury severity **depends on the quality of the medical data** (correctly written and coded diagnoses according to the ICD classification).

Table 2. Time needed for calculating the AIS/MAIS score

| AIS/MAIS SCORE | Doctor No. 1 | Doctor No. 2 | Doctor No. 3 |
|----------------|--------------|--------------|--------------|
| 1 | <1 min | 2 min | 3 min |
| 3 | 2 min | 15 min | 15 min |
| 5 | 4 min | 25 min | 30 min |

Possibility of amending the legislation – recommendations



- ✓ Timely, continuous and adequate records **including road trauma** need to be kept by healthcare institutions, under the surveillance and coordinated by the NPHI “Dr Milan Jovanovic Batut”, with its network of public health institutes.
- ✓ Significance of **creating a unique information system**
- ✓ Necessity and importance of **adequate and continual multisectoral cooperation**
- ✓ **Necessity of adequate data exchange**(guaranteeing data security and confidentiality)
- ✓ After having considered all technical and legal aspects the **proposal is to amend the legislation at a later stage, after the results of the implemented training and analysis of the first results of recording MAIS3+ injuries have been considered**
- ✓ The proposal for an amendment that might be done in the future concerns the **amendment of the Rulebook on forms and content of forms for keeping medical documentation, records, reports, registers and electronic medical files**, (“Official Gazette of RS”, No. 109 /2016, 20/2019). This is where a set of mandatory data of importance for recording MAIS3+ data would be added within the section of history of present illness, or the Hospitalization Report.

Proposal for a method of collecting data on MAIS3+ injury scale



- ✓ **The location of recording the AIS, or MAIS3+ injuries - in-patient healthcare institutions providing post-crash care.**
- ✓ The administering doctor or a doctor appointed by the healthcare institution - when filling out the electronic form of the hospitalization report, **shall fill out the field that opens subsequently, i.e., the AIS/MAIS field**
- ✓ **This will be done after he/she has filled out the field relating to the external cause of injury**, if there is any trauma (S00-T98 block, group XIX Injury, poisoning and certain other consequences of external causes), and if that cause contains the V00-V89 and V99 codes according to the ICD-10, as well as the fields relating to the referral diagnosis, main cause of hospitalization, and all other accompanying diagnoses (four-character codes according to the ICD-10).
- ✓ The digit determining assessed injury score, **shall be entered manually into this field** -assessment of injury severity will be made according to the algorithm set , based on the previously completed training.
- ✓ **The process of recording MAIS3+ injuries should include all healthcare institutions providing post-crash care and hospital treatment to patients with road trauma.**
- ✓ **Monitoring of injury recording should be carried out by the NPHI “Dr Milan Jovanovic Batut”, with its network of PHI.**

Proposal for a method of collecting data on MAIS3+ injury scale



- ✓ Data from the institutions are to be submitted to regional PHI monthly, and generated in the database of the NPHI “Dr Milan Jovanovic Batut”
- ✓ It is recommended to **perform logic checks of the entered data, either by the competent regional PHI, or centrally, by the NPHI “Dr Milan Jovanovic Batut”** (ideally by using a software solution developed on the basis of the mapping tool, or a key for translating the ICD-10 diagnoses into the AIS/MAIS injury scale, for example, the ICDMap AAAM)
- ✓ To try to provide conditions in which the AIS/MAIS injury score assessment process **could be automated**, or the software solution for recognition and transformation of the ICD diagnoses into the AIS/MAIS, which could be implemented into the healthcare institutions, **with the possibility of entering manual corrections** of the final AIS/MAIS, in accordance with doctor’s assessment and experience.
- ✓ **The automation of the process and the software used to facilitate the translation of data should be the goal aspired by the health system of the Republic of Serbia in the future.**
- ✓ Doctors should be educated first into calculating manually the AIS/MAIS score, after which the manual entry and calculation of the AIS/MAIS score should start, until all the conditions for the automation of the process have been provided.
- ✓ **Making the process automated, if implemented, shall not exclude the necessity of training medical staff in providing manual calculation of the AIS/MAIS injury severity.**

Proposal for the intersectoral exchange of road accident data



- ✓ The exchange of road accident data (for the purpose of integrating them into a unique road safety database, managed by the RTSA) would be done between the Mol and MoH, or between Mol and the NPHI “Dr Milan Jovanovic Batut”
- ✓ The NPHI “Dr Milan Jovanovic Batut” **would send data on injury severity according to the MAIS3+ injury scale**, in an electronic form, either to Traffic Police or the RTSA, on a six-month basis.
- ✓ Data exchange would be done by **data matching, using the personal identification number (JMBG), as a uniform data, available to both institutions for their use**. (In the health sector, the JMBG number is the constituent part of the Hospitalization Report, and it is also present in police reports on road accidents).
- ✓ Therefore, the NPHI “Dr Milan Jovanovic Batut” and Mol should conclude an appropriate **agreement** to define in more detail how data will be exchanged, i.e., the method, dynamics and content of data to be exchanged.
- ✓ When concluding an agreement, and exchanging or consolidating data, all legal procedures and applicable legislation concerning data security and protection (Law on Personal Data Protection, “Official Gazette of RS”, No. 87/2018) should be considered.

Proposal for training of medical staff in recording MAIS3+



- ✓ Necessity to implement suitable national education of representatives of healthcare institutions, providing post-crash care or hospital treatment of RTI (doctors from the hospital admission ward, orthopedic and traumatology wards, intensive care units)
- ✓ **Ideally, the best way to implement the education on road injury severity assessment using the AIS/MAIS injury score, would be the international licensing of educators**, who will be able later on to carry out extensive and comprehensive training of administering doctors in the appropriate assessment of the degree of injury severity, calculation of the AIS/MAIS score and the use of licensed programs used to make a conversion of the ICD diagnoses into the MAIS injury
- ✓ **Before undertaking extensive implementation of education, a pool of medical experts from all the institutions providing post-crash care should be created, where they would be made familiar with the importance and the method of recording MAIS3+ injuries,**
- ✓ The doctors delegated by their institutions will undergo education during which they will acquire theory knowledge on the MAIS score and its importance and will be trained in practical methods to do the independent calculation of MAIS scores from diagnoses listed in the patient's discharge summary. **This education would pioneer the implementation and adoption of the MAIS3+ score inRS**

TRAINING OF MEDICAL REPRESENTATIVES ON MAIS 3+



- December 2021- March 2022
- **4 introductory one-day online workshops** were held with
- **112 designated representatives**
- **47 in-patient healthcare institutions** providing post-crash care of road trauma patients.

Goals of education:

- Introducing:

- the magnitude of the problem and the importance of RT injuries
- the state of traffic safety in the world, Europe and RS
- currently available data on traffic trauma in the RS
- the heterogeneity of the definition of serious bodily injuries and the MAIS 3+ definition,
- different examples of the qualification of serious bodily injuries in EU countries,
- methods of determining the degree of severity of physical injuries of participants in traffic accidents,
- the experiences of countries that apply the MAIS 3+ injury scale,
- application and method of calculating the AIS / MAIS 3+ score.



TRAINING OF MEDICAL REPRESENTATIVES ON MAIS 3+



IPH Serbia “Dr Milan Jovanovic Batut” has developed and piloted MAIS3+ data intake through their portal- **they have piloted the possibility of entering the MAIS3+ score in the report on hospitalization.**

Participants were given access to the IJZS "Dr. Milan Jovanović Batut" portal for entering MAIS 3+ data.

- Personal data that already exists in the system is displayed within the created hospitalization report, or a new hospitalization report is created that represents standard medical documentation in inpatient institutions.
- In the report, there is a part that refers to the existence of injuries and if it is marked that there is an injury, a drop-down menu opens from which the person entering the data should choose one of the offered MAIS 3+ scores (MAIS 3-6 and MAIS NFS for unmarked injuries) for a given patient.

Kreiraj izveštaj o hospitalizaciji

Polja označena sa * su obavezna.

Odeljenje na prijemu *

Broj istorije bolesti *

Datum prijema *

JMBG *

Proveri klijenta

Ime *

Prezime *

Datum rođenja *

Državljanstvo *

Povreda *

MAIS 3+ skor za povrede u saobraćaju

Spoljni uzrok povrede po MKB

Isprazni

Osnovni uzrok hospitalizacije *

Isprazni

TRAINING EVALUATION



52 participants filled out the evaluation form, and the education was rated with an average grade of 4.67 out of a maximum of 5.

- to 94.2% of participants training helped to better understand the state of RTS in the world, Europe and the Republic of Serbia;
- to 88.5% training helped to better understand the problems of recording and classifying injured persons;
- 90% with the help of the training better understood the heterogeneity of the existing definitions of serious bodily RTI and the adoption of the MAIS 3+ definition;
- 86.5% better understood the different principles of classification of injuries in traffic trauma in certain EU countries,
- 90% better understood the AIS / MAIS scoring system,
- 92.3% better understood the method of extracting coded medical diagnoses according to ICD10 as well as determining the AIS score ,
- 90.4% transform ICD 10 diagnoses into AIS codes,
- 86.6% classify injury severity using AIS scores 1-6,
- 94.2% determine MAIS scores based on AIS scores.
- **55.7 % said that they needed additional training in Statistical analysis and reporting on the severity of injured participants in traffic accidents by the AIS/MAIS score**
- **57.7% said that they need additional training in Analysis of the severity of injuries caused in traffic accidents was classified as serious bodily injury in the police vs. MAIS3+ injury in the hospital database.**

TRAINING EVALUATION



The most frequently mentioned reasons that **could hinder** the introduction of the MAIS 3+ score into the records are:

- ✓ lack of time and insufficient interest of the clinicians who should perform the evaluation, i.e. workload with current affairs,
 - ✓ generally poor education of doctors in the coding of hospitalization reports,
 - ✓ lack of code books related to MAIS,
 - ✓ lack of a unified information system,
 - ✓ manual determination of AIS without the help of a dictionary,
 - ✓ unwillingness of clinicians for additional records,
 - ✓ poor hardware support,
 - ✓ the absence of legal regulations that would oblige the entry of this data.
- **The participants also pointed out that every hospital or other health institution that deals with these types of injuries should have a code book as well as a couple of people in charge of coding and reporting such injuries.**
 - **The participants emphasized the need for maximum simplification of the AIS/MAIS score calculation procedure, as well as the need for automation of this process.**

DATA ENTRY EVALUATION



- In the database of the IPH „Dr Milan Jovanović Batut“ a total of 10 entries of persons hospitalized due to traffic trauma were made in 6 month period

https://hospit.batut.org.rs/hospitalityReport/admin

Hospitalizacija Početna Elektronska razmena podataka Evidencija Pomoć Odjavljivanje (test)

Uredi izveštaje o hospitalizaciji

Opciono možete da unesete operatore poredjenja (<, <=, >, >=, <= ili =) na početak svakog parametra pretrage kako biste odredili način poredjenja.

Pretraži

Prikazano 1-10 od 10 rezultata.

| Id | Datum prijema | JMBG | Datum otpusta | Parametar 1 | Parametar 2 | Parametar 3 | Parametar 4 | Parametar 5 | |
|----------|---------------|---------------|---------------|-------------|-------------|-------------|-------------|-------------|-------|
| 10189384 | 01.03.2022 | 3107967303217 | 13.03.2022 | | | | | | 👁️ 🗑️ |
| 10189383 | 01.03.2022 | 3107967303217 | 15.03.2022 | | | | | | 👁️ 🗑️ |
| 10189382 | 01.03.2022 | 3107967303217 | 16.03.2022 | | | | | | 👁️ 🗑️ |
| 10189381 | 01.06.2021 | 2206951772043 | 01.06.2021 | | | | | | 👁️ 🗑️ |
| 10189380 | 02.08.2021 | 2907006890000 | 04.08.2021 | | | | | | 👁️ 🗑️ |
| 10189379 | 13.12.2021 | 1904010895014 | 16.12.2021 | | | | | | 👁️ 🗑️ |
| 10189378 | 15.12.2021 | 2303010710014 | 17.12.2021 | | | | | | 👁️ 🗑️ |
| 10189377 | 08.12.2021 | 1111955321321 | 16.12.2021 | | | | | | 👁️ 🗑️ |
| 10189376 | 01.12.2021 | 3107967303217 | 15.12.2021 | | | | | | 👁️ 🗑️ |
| 10189374 | 29.11.2021 | 2802014820031 | 02.12.2021 | | | | | | 👁️ 🗑️ |

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Sva prava zadržana.

Uputna dijagnoza 000000 - Nema uputne dijagnoze

• Povreda Da

MAIS 3+ skor za povrede u saobraćaju 4 - Teška povreda

Spoljni uzrok povrede po MKB V03.99 - Pešak povređen udarom kola, dostavnog vozila ili kamiona, neoznačeni bilo saobraćajni bilo nesaobraćajni udes, u toku obavljanja nespecifičnih aktivnosti

Osnovni uzrok hospitalizacije S72.3 - Prelom tela butnjače

Pratece dijagnoze po MKB

Sifra procedure po nomenklaturi

Further steps in training of medical staff in recording MAIS3+



- To gain sustainability:
 - ✓ Accreditation for the training in MAIS 3+ by the Health Council of the RS and implementing it in the form of a continual medical education, as class-one national course, in accordance with the Rulebook on detailed conditions for implementing continual education of medical staff and medical associates (“Official Gazette of RS”, No. 2/2011, 23/2016, 31/2018).
 - ✓ **This would achieve a twofold benefit: acquiring theory knowledge and practical skills for the implementation of the MAIS3+ injury scale and ensuring points for the trainees necessary for renewing their working license.**
 - ✓ In line with the possibility of purchasing a licensed software or developing a software solution on the basis of the licensed mapper (proposal of the ICCMap AAAM), before amending the legislation, or introducing the AIS/MAIS scoring system into the mandatory dataset, to be submitted by the healthcare institutions, it is recommended to officially license a specialized educator for the implementation of the AIS/MAIS 3+ education.



THANK YOU!



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