Quality Improvement & Measures in EMS

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NIEM Workshop
Bangkok
December, 2015

Hippocrates Epidemics, Book I Section XI

As to diseases, make a habit of two things – to help, or at least **do no harm**.

To Err is Human
Institute of Medicine (11/1999)

- **Attitude turning point**
- **Meta analysis multiple databases**
- **Death toll: 44,000-98,000/y**
- **Cost: $17-29 X109**
- **Medical cost, disability, loss of income**

To Err is Human
Institute of Medicine (11/1999)

Types of Errors

Diagnostic
- Error or delay in diagnosis
- Failure to employ indicated tests
- Use of outmoded tests or therapy
- Failure to act on results of monitoring or testing

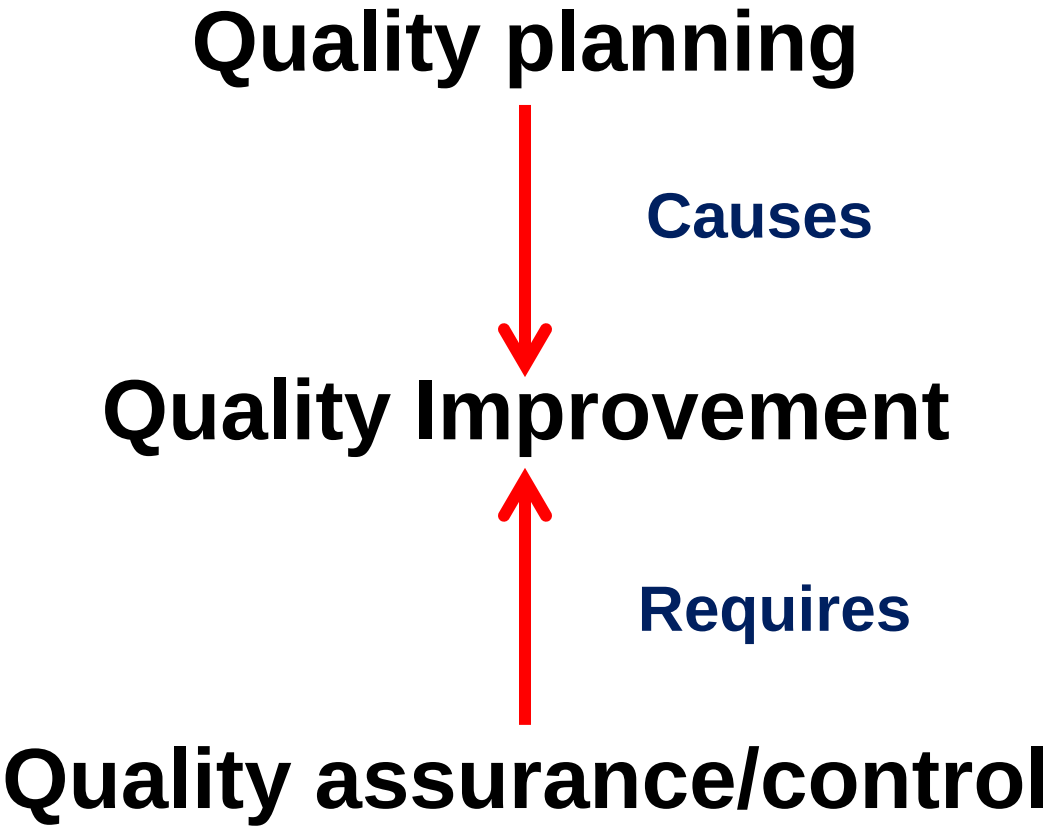
Treatment
- Error in the performance of an operation, procedure, or test
- Error in administering the treatment
- Error in the dose or method of using a drug
- Avoidable delay in treatment or in responding to an abnormal test
- Inappropriate (not indicated) care

Preventive
- Failure to provide prophylactic treatment
- Inadequate monitoring or follow-up of treatment

Other
- Failure of communication
- Equipment failure
- Other system failure

SOURCE: Leape, Lucian; Lawthers, Ann G.; Brennan, Troyen A., et al. Preventing Medical Injury. Qual Rev Bull. 19(5):144–149, 1993.

Quality Management



Infrastructure

Assimilation process

Communication Response time

Refined Data

System

Training Education

Professional

Information Technology

Utilities

Openness transparency

Leadership

Trust Commitment

Organizational Culture

Quality Definition
(Institute of Medicine - IOM)

- **The Degree to which health services for individuals and population increase the likelihood of desired health outcomes and are consistent with current professional knowledge**
- **6 Dimensions of Quality care:**
  - **Safe**
  - **Effective**
  - **Patient centered**
  - **Timely**
  - **Efficient**
  - **Equitable**

Quality & EMS
(Institute of Medicine - IOM)

- **System Design with a specific arrangement of personnel, facilities, and equipment that functions to ensure not only *effective* and *coordinated* delivery of health care services under emergency conditions but also high quality appropriate care.**

EMS Vs. Definition

- **Need →→ EMS (Conflicts, MVC, CPR)**
- **NOT predesigned infrastructure**

⇓

- **System Heterogeneity**
- **Data collection variation**
- **No validity agreement**
- **Numerous conditions**
- **Isolation of EMS Effect**

→ **≠ Evaluate Compare**

The Goal & Methods

- **Improve end product +↑↑satisfaction**
- **EMS end product ≡ Care at prehospital**
- **Quality Assurance (QA)**
  - **Basic**
  - **Static retrospective review**
- **Quality Improvement (QI)**
  - **Continuous**
  - **Improvement process/system/organization**
- **Total Quality Management (TQM)**
  - **Most advanced all organization**
  - **Leadership commitment**

Quality Measures

The NEW ENGLAND JOURNAL of MEDICINE

Table 1. Four Criteria for Accountability Measures That Address Processes of Care.

1. There is a strong evidence base showing that the care process leads to improved outcomes.
2. The measure accurately captures whether the evidence-based care process has, in fact, been provided.
3. The measure addresses a process that has few intervening care processes that must occur before the improved outcome is realized.
4. Implementing the measure has little or no chance of inducing unintended adverse consequences.

Chassin MR et al. N Engl J Med 2010;363:683-688.

5. Significance

Improvement in Performance

(2002-2009)

Table 2. Improvement in Performance on Accountability Core Measures from 2002 through 2009.*

Year	No. of Core Measures	No. of Accountability Measures	Median No. of Accountability Measures per Hospital†	No. of Hospitals Reporting†	No. of Opportunities to Provide Care in Accordance with Measures‡	Overall Performance on All Accountability Measures§	Hospitals with >90% Performance†§
						percent	
2002	16	8	5	3250	957,000	81.8	20.4
2003	16	8	5	3286	2,173,000	83.9	24.6
2004	25	16	12	3254	3,651,000	83.3	16.5
2005	25	16	12	3225	4,490,000	84.9	21.9
2006	30	20	12	3283	5,322,000	88.2	41.5
2007	34	24	12	3170	7,911,000	90.0	60.0
2008	31	22	16	3178	13,222,000	93.1	70.8
2009	31	22	16	3123	12,476,000	95.4	85.9

* Data are from the Joint Commission's hospital performance-measure data warehouse.
† For data in this column, in each year, hospitals are included only if they reported a minimum of 30 cases across all their accountability measures.
‡ The numbers in this column represent the sum of all opportunities across all hospitals and all accountability measures.
§ The temporal trends were similar when the analysis was restricted to the subgroup of 2662 hospitals that reported data on acute myocardial infarction, heart failure, and pneumonia for all 8 years.

Chassin MR et al. N Engl J Med 2010;363:683-688.

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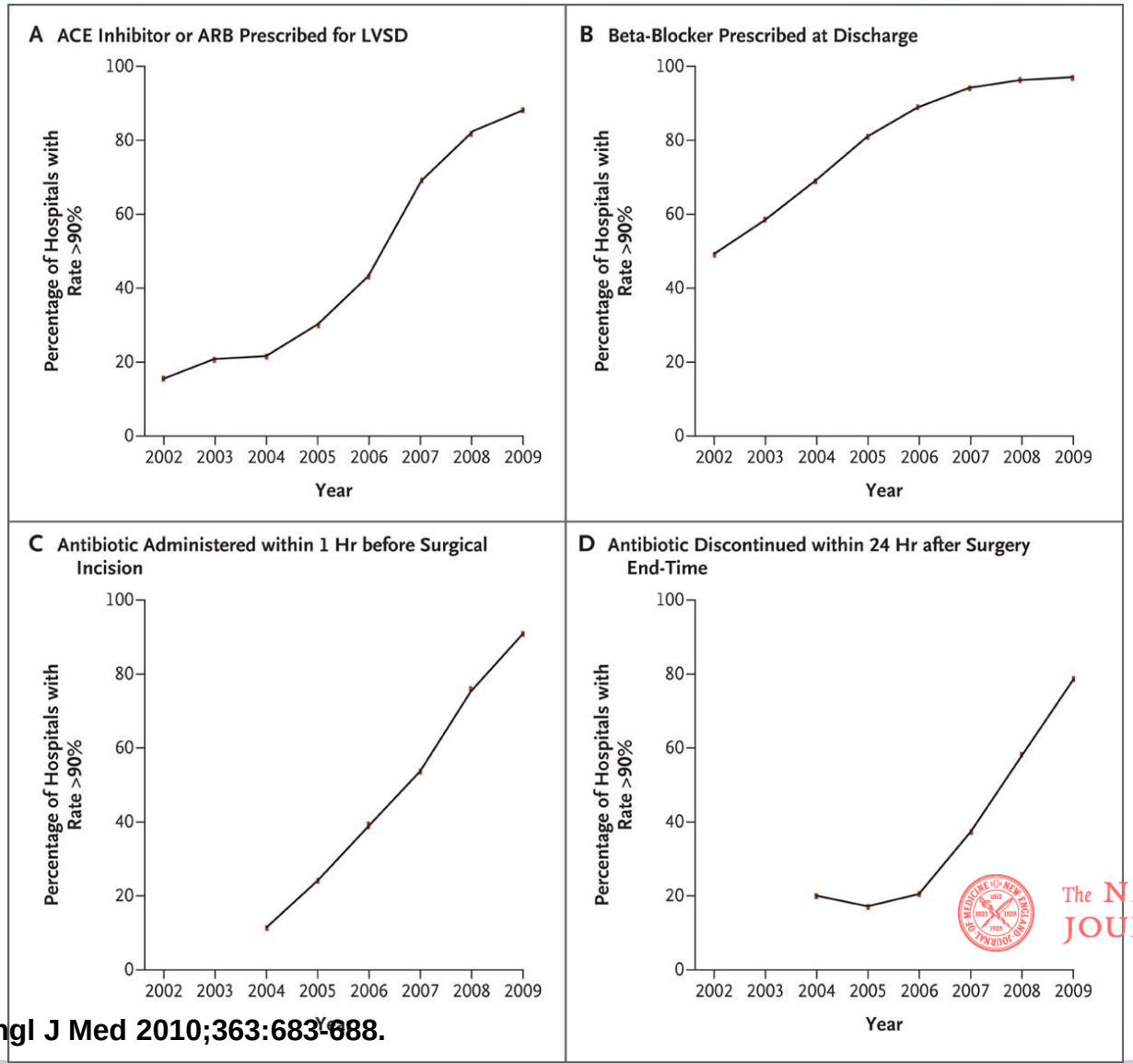
US Hospital Performance

Myocardial infarction

Surgery



The NEW ENGLAND JOURNAL of MEDICINE

Chassin MR et al. N Engl J Med 2010;363:683-688.

Structure-Process-Outcome Model for EMS Sys. PIs

Indicator Type	Definitions	EMS systems PI examples	Advantages	Limitations
Structure	Characteristics of the different components of the system	(i) Facilities (ii) Equipment (iii) Staffing (iv) Knowledge base of providers (v) Credentials (vi) Deployment (vii) Response times	(i) Standardized structural data allows for comparison between systems structure	(i) Indirect measure of quality (ii) Difficult to relate to outcome (iii) Problematic with EMS system design diversity
Process	Combination or sequence of steps in patient care intended to improve patient outcome	(i) Medical protocols (ii) Medication administration (iii) Transport to appropriate facility	(i) Direct measure of quality (ii) Specific input for improvement (iii) Easy to understand and to evaluate (iv) Does not require Risk adjustment (v) Easy data collection (vi) Best for technical skill evaluation (vii) Short-term evaluation	(i) Strict criteria for generalization (ii) Can become very complex with more advanced care (i.e., complex processes)
Outcome	Changes in health and well-being related to antecedent care *6 D's** (i) *Death* (ii) *Disease* (iii) *Disability* (iv) *Discomfort* (v) *Dissatisfaction* (vi) *Destitution*	(i) Out of hospital cardiac arrest survival (ii) Patient Satisfaction (iii) Improvement in pain score	(i) Easy to understand (ii) Feedback about all aspects of care provided (iii) Long-term outcomes	(i) Indirect measure of quality (ii) Requires Risk adjustment and standardization of data collection

Mazen J. El Sayed; Emerg Med Int. 2012; 2012: 161630.

Challenges

- **Complexity of EMS ⇒ Comprehensive evaluation**

Approaches

1. **Sets of mixed indicators**

2. **Tracer Condition = Focus on few high impact clinical conditions (bundles) (Similar IS/capabilities/data collection)**

EMS Performance Indicators

US clinical performance indicators*

Clinical condition	ST Elevation Myocardial infarction (STEMI)	Pulmonary Edema	Asthma	Seizure	Trauma	Cardiac arrest
Indicators or bundle elements	(1) Aspirin (2) 12 lead Electrocardio-graph (ECG) (3) Direct transport to percutaneous cardiac intervention (PCI) interval from ECG to balloon <90 minutes	(1) Nitroglycerin (2) Noninvasive positive pressure ventilation	(1) β_2 agonist administration	(1) Blood Sugar measurement (2) Administration of a benzodiazepine	(1) Entrapment time <10 minutes (2) Direct transport to trauma for patients meeting criteria	(1) Response interval <5 min for basic CPR and Automated external defibrillators (AEDs)
Outcome	NNT = 15 Harm avoided: A stroke, 2nd myocardial infarction, or death	NNT = 6 Harm avoided: need for an endotracheal intubation	Not Specified	NNT = 4 Harm avoided: persistent seizure activity	NNT = 3 or 11 depending on criteria used Harm avoided: one death	NNT = 8 Harm avoided: one death

UK clinical performance indicators#

Clinical condition	STEMI	Stroke/TIA	Asthma	Hypoglycemia	Trauma	Cardiac arrest
Indicators or bundle elements	(1) Aspirin (2) Nitroglycerin (3) Recording pain score (before and after treatment) (4) Pain medication (5) Transfer targets for thrombolysis/PCI	(1) Recording of Face Arm Speech Test (FAST) (2) Recording of blood sugar (3) Recording of blood pressure	(1) Recording of respiratory rate (2) Recording of Peak Expiratory Flow Rate (PEFR) (3) Recording of SpO_2 (4) β_2 agonist (5) Oxygen	(1) Recording of blood glucose before treatment (2) Recording of blood glucose after treatment (3) Recording treatment (4) Direct referral to appropriate health professional	Pilot indicators available only for patients with severe trauma (Glasgow Coma Score, GCS < 8) (1) Recording of blood pressure (2) Recording of respiratory rate (3) Recording of SpO2 (4) Recording of pupil reaction	(1) Return of Spontaneous circulation (ROSC) on arrival to hospital (2) Presence of defibrillator on scene (3) ALS provider in attendance (4) Call to scene response ≤4 min
Outcome	Improved assessment and management of STEMI with increased survival	Improved assessment and management of stroke	Improved assessment and management of asthma	Improved assessment and management of hypoglycemia	Not specified	Improved response to and survival from cardiac arrest

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Quality measures

The Israeli Experience

MAGEN DAVID ADOM
Saving Lives
Israel's Medical Emergency Service

State of Israel
Ministry of Health
משרד הבריאות, ישראל

National Measure Program
(NMP)

- Initiated 12 years ago
- Govern by the ministry of health
- All system (EMS, Hospital, Chronic, Psychiatry, MOH, Government, Privet)
- Mainly process and outcome measures
- Continuous process
- Total transparent to the public
- The quality measures in the health system act (2012)

NMP – EMS General

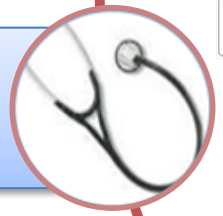
- **MOH ⇒ 2015 EMS join NMP**
- **MOH Committee for quality in EMS serv.**
  - **MOH Quality division**
  - **MDA**
  - **Professionals in the field + Academic**
- **2015 Pilot**
  - **Creating the culture for quality**
  - **Establishment systems for data collection**
  - **Declaring 6 quality measures as pilot**

NMP – Myocardial infarction

Administration of Aspirin for patient with ACS

Transfer of EKG to ICCU of patient with STEMI

Performing PCI within 90min of admission



Aspirin order on D/C for patient with AMI

NMP - Stroke

- Performing standard neurological evaluation at the scene

- Announcing to admitting hospital: “Stroke patient OTW”

- IVrt-PA for patient with Ac. Ischemic Stroke

- CT\MRI within 25min of admission for patient with Ac. Stroke

- US Doppler of Carotid art. Within 72 hours of admission for TIA

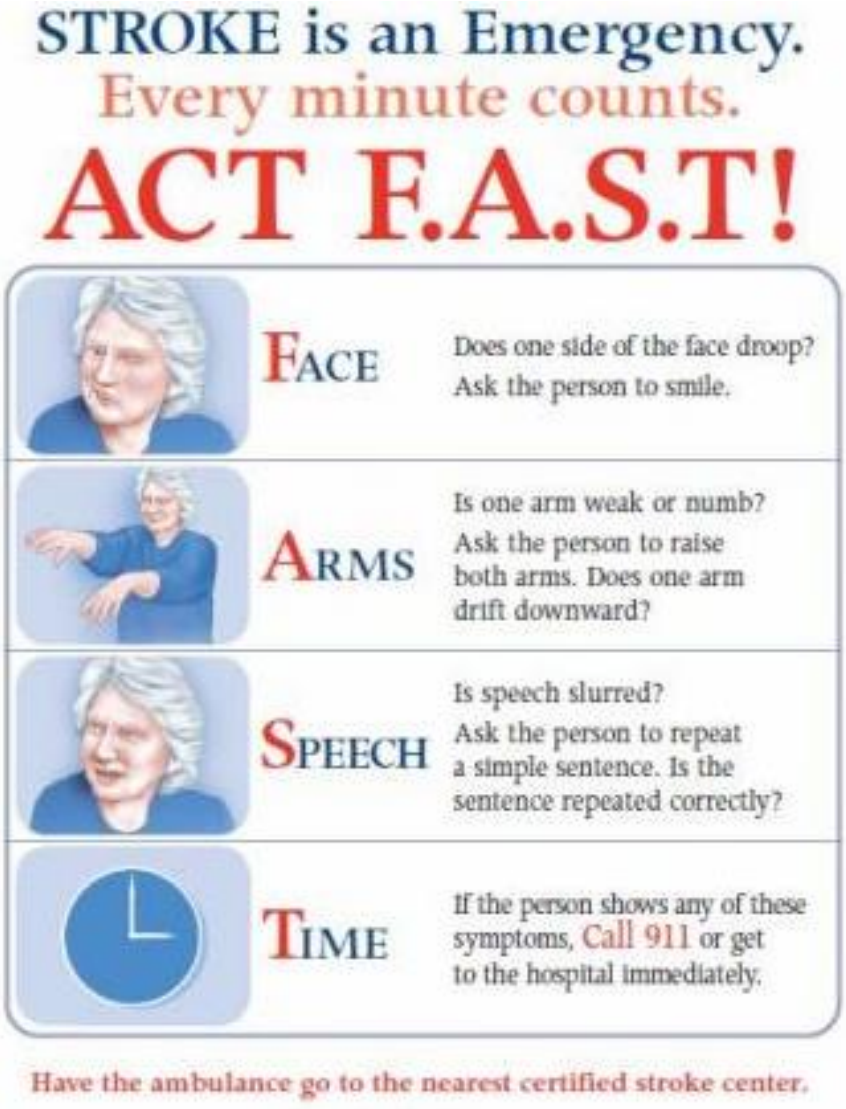
- Functional assessment (FIM) on admission and D/C to Rehab. Center

NMP – EMS Measures

- **Dispatcher – Bystander guidance to perform CPR**
- **Aspirin in Acute Coronary Syndrome**
- **Stroke - Recognition (FAST)**
- **Stroke – Hospital notification**
- **STEMI – Recognition and ECG Delivery**
- **Trauma – On-scene time < 10min**

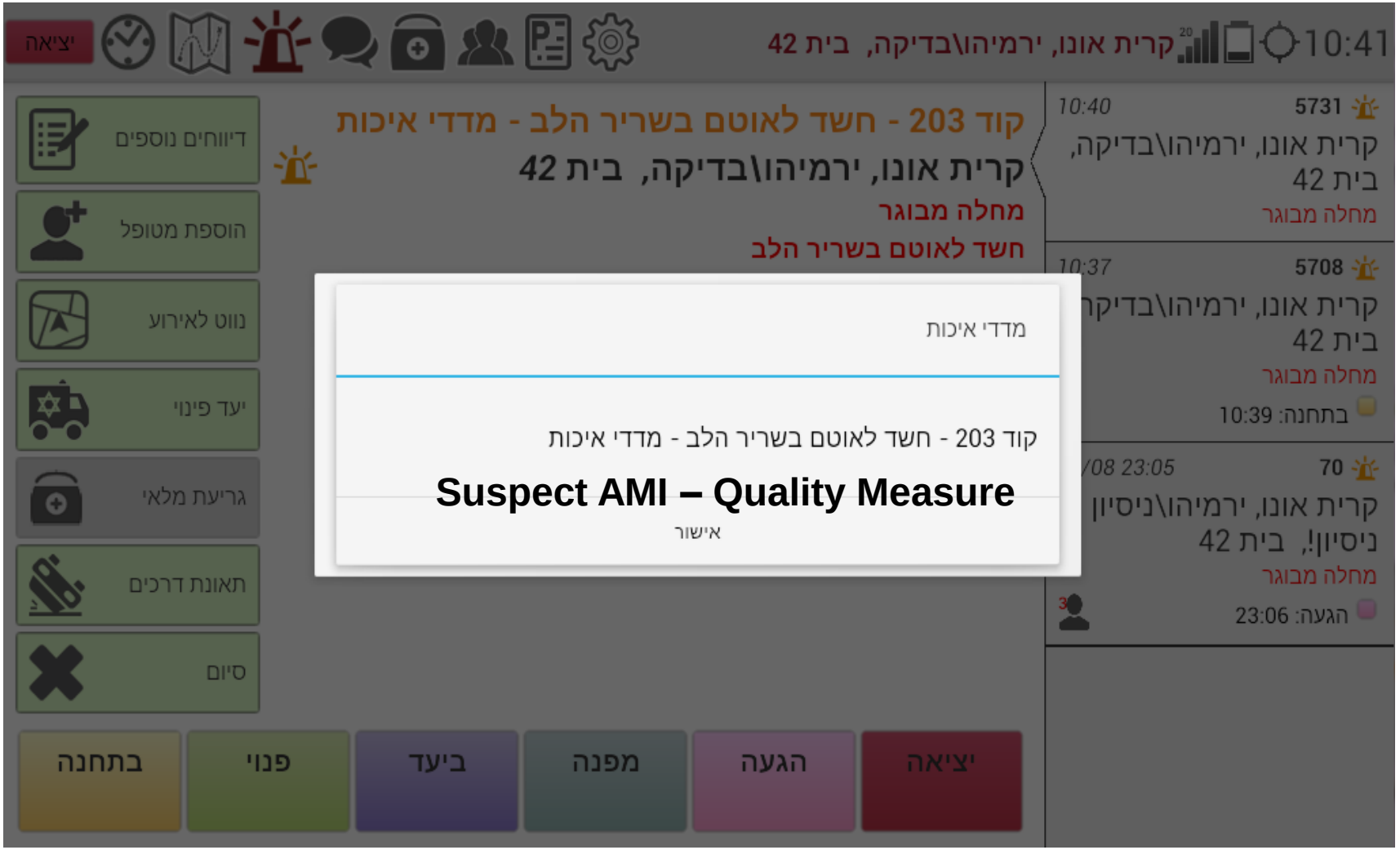
Neurological assessment

National Campaign

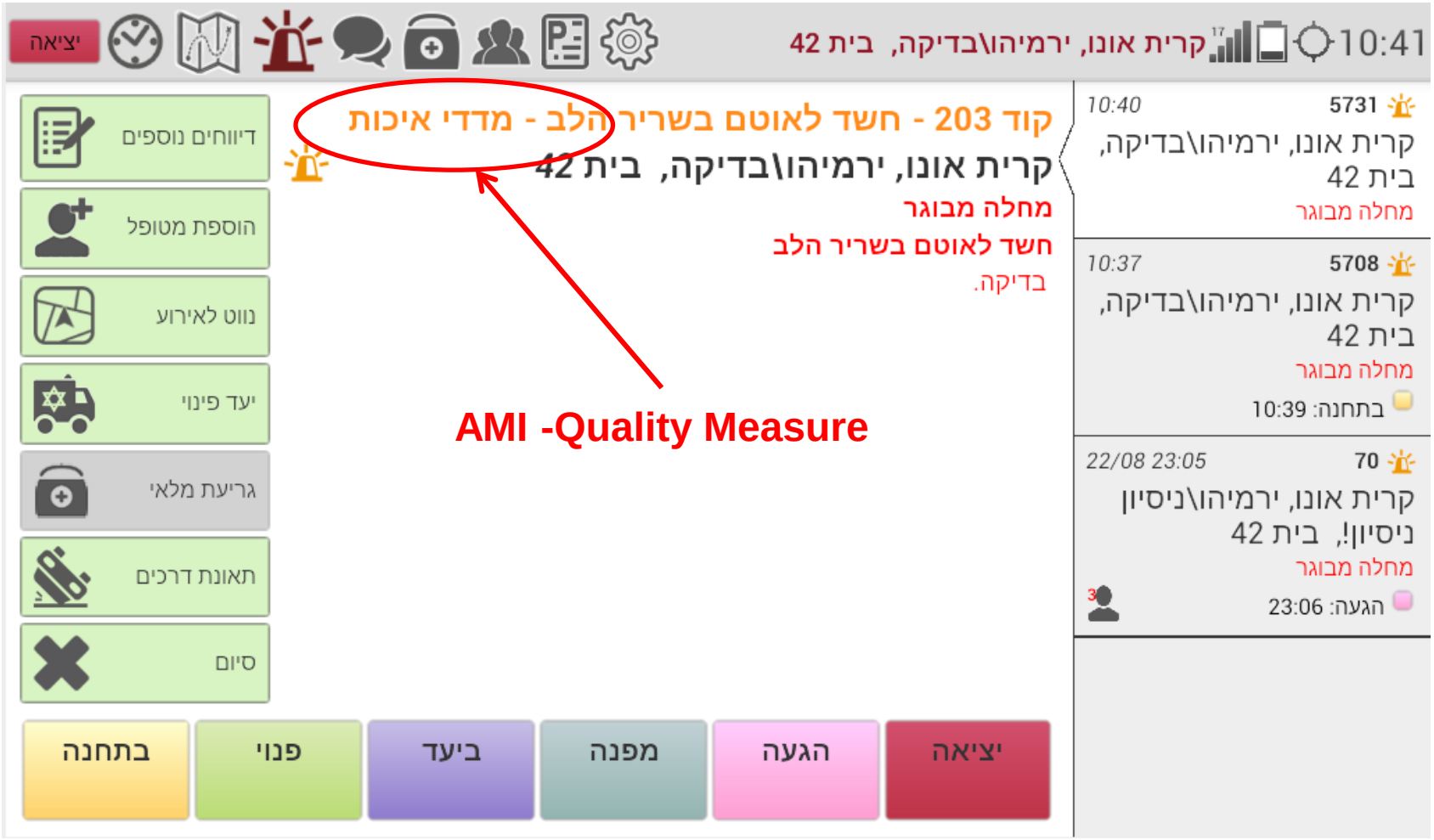


From Theory to Practice

When receiving a call in the tablet



From Theory to Practice



Stroke Sheet

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מדדי איכות - שבץ מוחי

Not Done			
לא בוצע	לא ידוע	Time 0	שעת הופעת הסימנים
לא בוצע		HR	לחץ דם
לא בוצע		BP	דופק
לא בוצע	low high	Glucose	סוכר
לא בוצע		Speech	נוירו דיבור
לא בוצע		Strength	נוירו כח גס
לא בוצע		Face	נוירו פנים
לא בוצע	דווח לביה"ח	נמסר ל:	

7	8	9
4	5	6
1	2	3
0		Del

העתק נתונים ממדידה רפואית

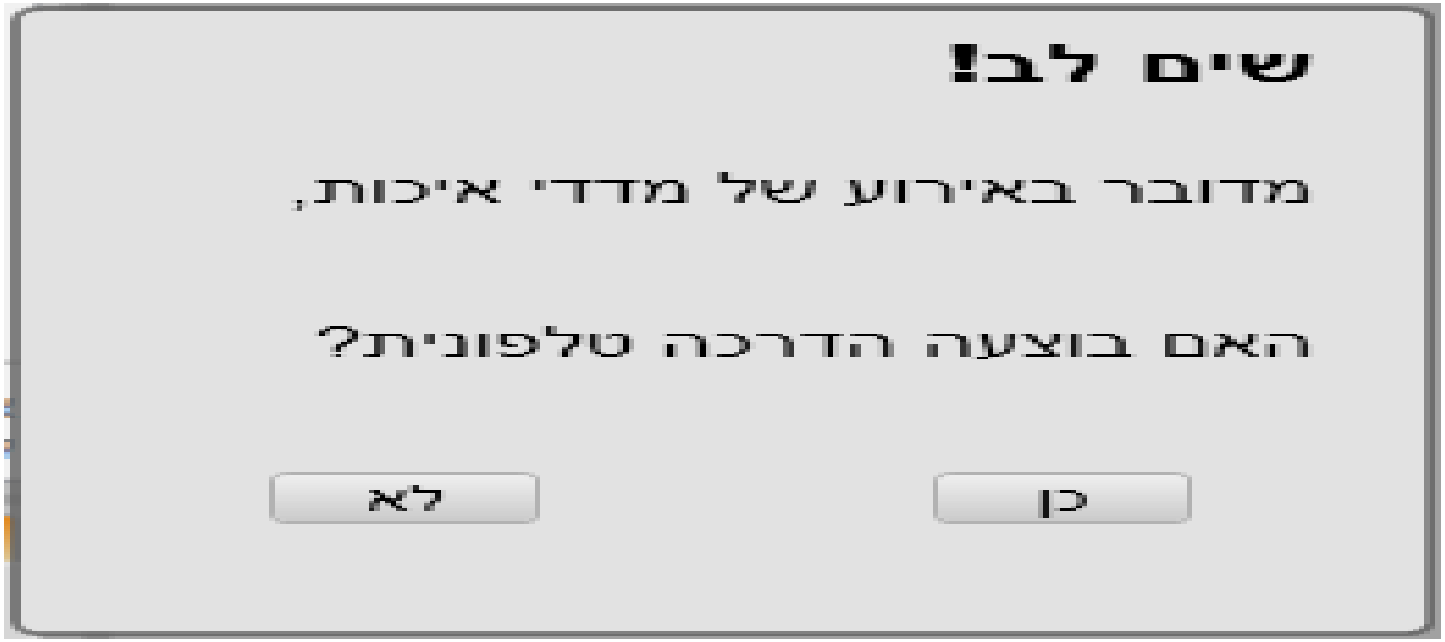
חזרה

Pre announced

המשך

Dispatch Cardiac Arrest

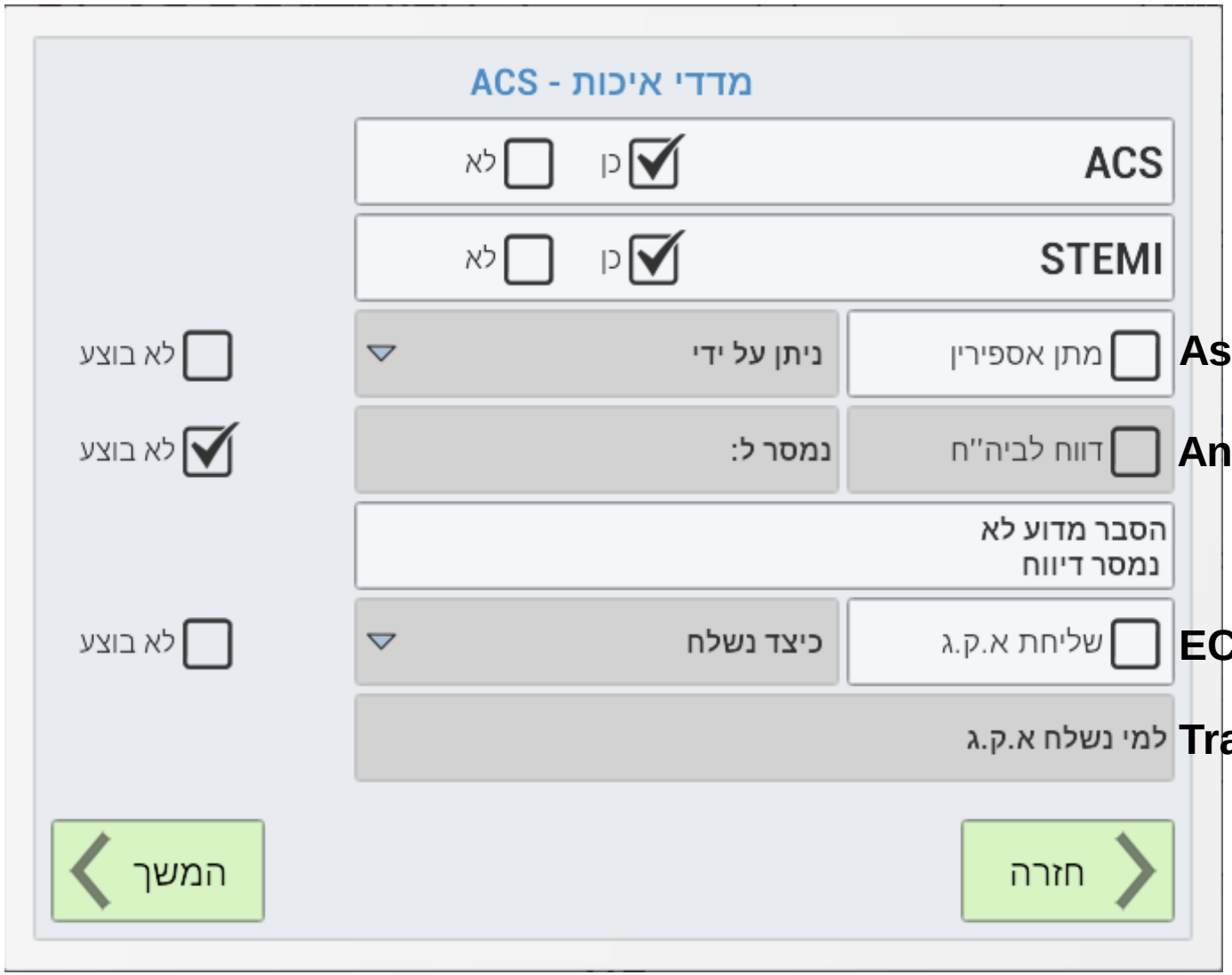
Attention
Cardiac Arrest – Quality measure
Was telephone instruction done?



Dispatch Cardiac Arrest

Full report

ACS / STEMI



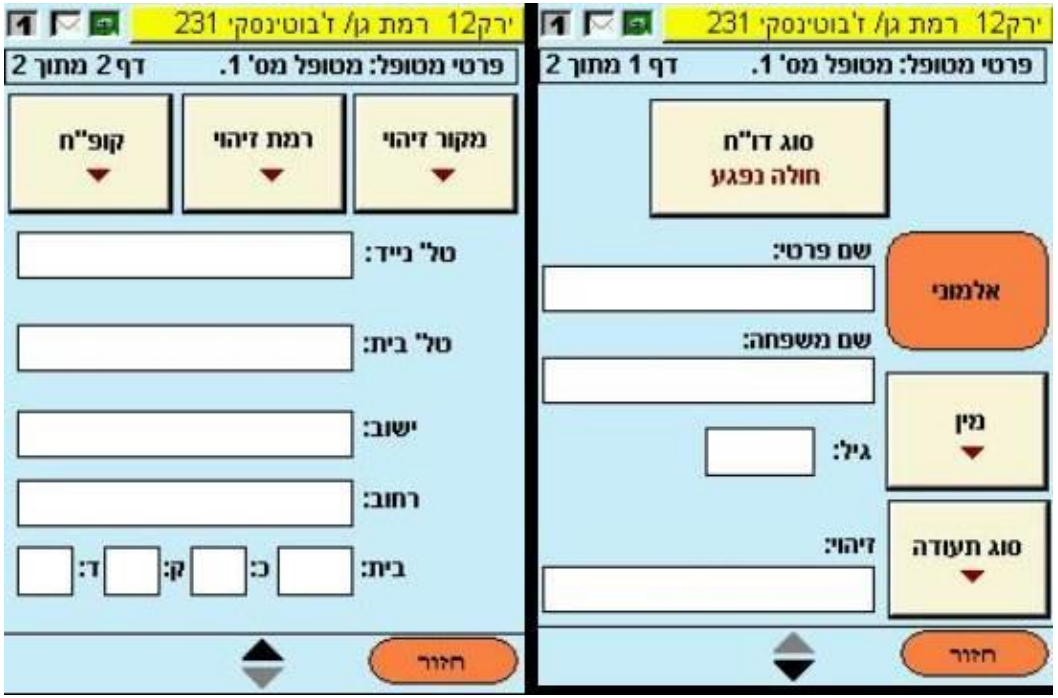
Aspirin

Announced

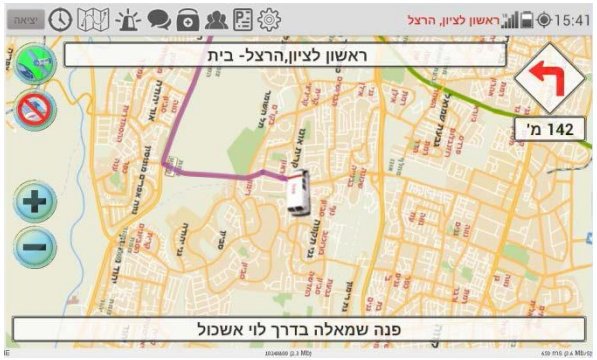
ECG

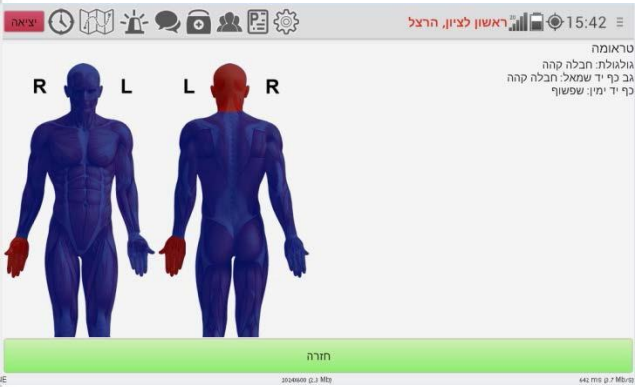
Transmitted

Medical documents



Tablet application





PDA application

Continuous Quality Improvement

- **Quality management organizational scale**
- **Performing inspections:**
  - director general
  - medical division
  - paramedic supervisor

investigating events → learning lessons ⇒ amending actions

The Goals

- **Improving the service**
- **Raising team awareness**
- **Improving processes within the organization**
- **Preventing future mistakes**

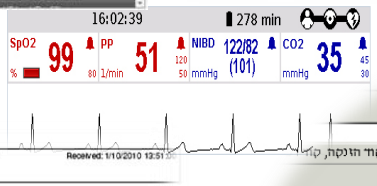
Quality supervision online

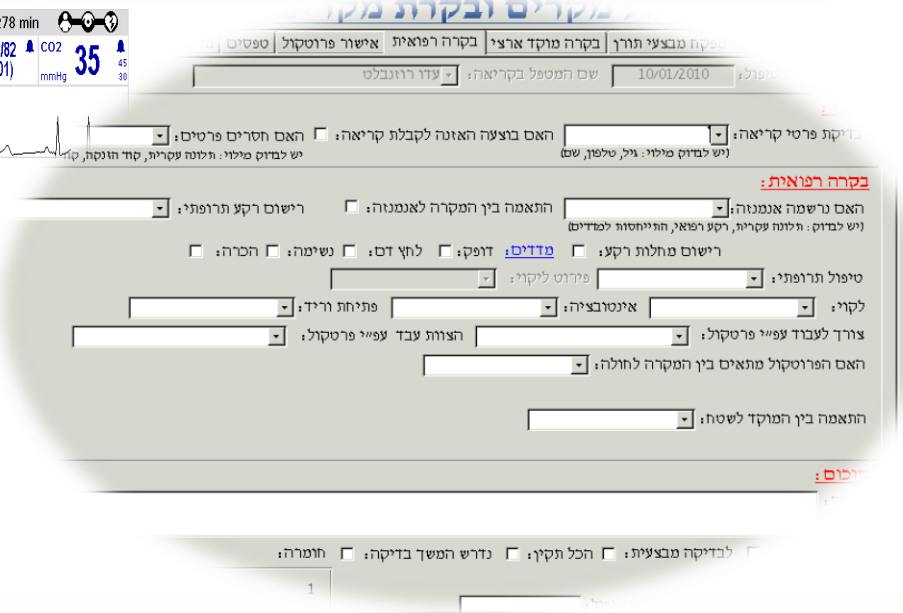
דוח בקרה למנהלים

At Destination > 20min	Delay launch > 2min	On Route > 13min		No MICU	Adverse Events	% Ambulance Occupancy	
20 ד'	20 ד'						
נסיעה 141 / 44 דקות		נסיעה 193 / 29 דקות -יצא לאירוע	נסיעה 48 / 49 דקות -יצא לאירוע	נסיעה 170	נסיעה 115	22.22 %	ירדן
דן 19 נטן		ירקון 40 לא דחוף	גלבוע 49 לא דחוף	דן 58 נטן	לכיש 898 נטן	15.38 %	גלבוע
ב: וולפסון חולון, שוהה: 44 ד.		מחלה מבוגר / בעיות רפואיות אחרות	מחלה מבוגר / כאבי גב	מחלה מבוגר / חשד לאוטם בשריר הלב	פציעה אחרת / פגיעת ראש	38.46 %	אשר
נסיעה 109 / 31 דקות		נסיעה 117 / 21 דקות -יצא לאירוע				50.00 %	כרמל
נגב 19 נטן		נגב 46 לא דחוף				28.57 %	שרון
ב: סורוקה-באר-שבע, שוהה: 31 ד.		מחלה מבוגר / בעיות בדרכי השתן				45.83 %	ירקון
נסיעה 99 / 28 דקות		נסיעה 175 / 20 דקות -יצא לאירוע				60.00 %	דן
לכיש 15 נטן		איילון 59 לא דחוף				56.52 %	איילון
ב: ברזילי- אשקלון, שוהה: 28 ד.		פציעה אחרת / פציעה קלה				28.00 %	ירושלים
נסיעה 110 / 27 דקות		נסיעה 177 / 20 דקות -יצא לאירוע				54.55 %	לכיש
נגב 63 דחוף		איילון 26 נטן				26.92 %	נגב
ב: סורוקה-באר-שבע, שוהה: 27 ד.		מחלה מבוגר / הפרעות קצב				100.00 %	שירותי דם
נסיעה 143 / 26 דקות							

Quality supervision online

Online Medical Control





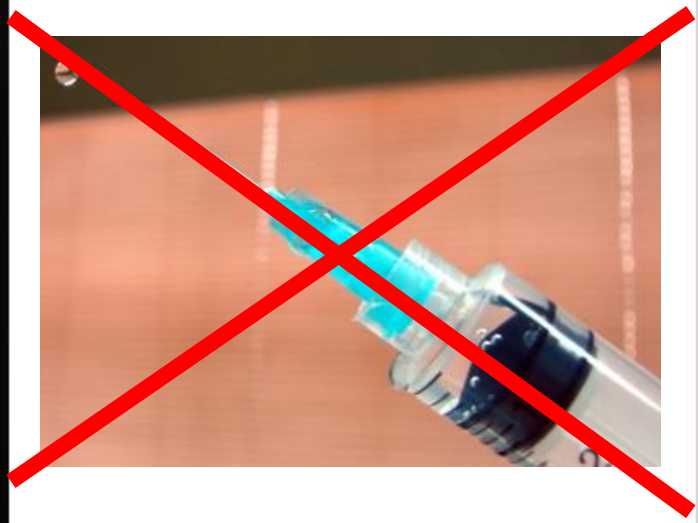
Event Inquiry

- **While treating a patient with intermediate pain, the paramedic asked the trainee to prepare him dypirone syrup (used PO)**
- **Meanwhile, he opened an IV line, and asked the trainee for saline (to “wash” the line)**
- **The trainee passed him the dypirone by mistake – and the paramedic injected it IV**
- **When he wanted to give the dypirone PO – he realized his mistake**

Process and Action items

- **Report** => the paramedic reported to the ER and the supervisor.
- **Inquiry** => the event was investigated in every possible aspect.
- **Publish** => the conclusion where published (“read and sign”) to all the teams
- **Implementation** => courses & trainings.
- **Prevention** => MDA bought special (brawn) syringes for PO/Inhal medications

The Syringe



No mistakes in medication injection


רכב פיקוד ושליטה
Command & Control vehicle
MAGEN DAVID ADOM IN ISRAEL


מגן דוד אדום בישראל


MAGUEN DAVID ADOM FRANCE
101
פאראמדיק סופרווייזר

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Thank you