

**Spitalul Municipal de Urgență Moinesti**

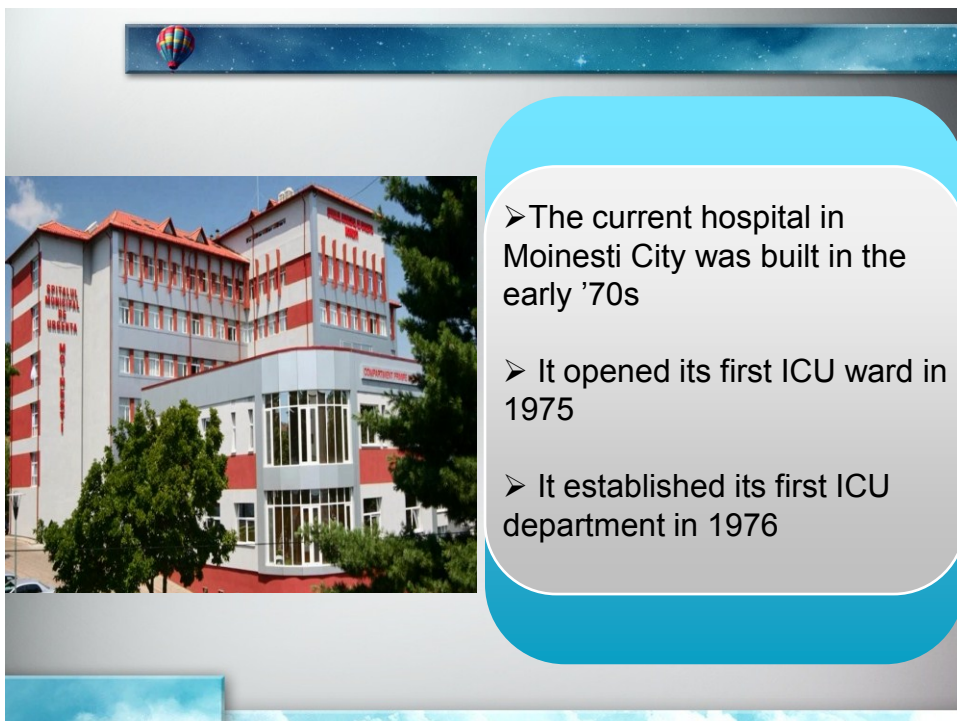
**UNIVERSITATEA „VASILE ALECSANDRI”  
DIN BACĂU**  
*Universitatea aproape de tine!*

## ***The use of telemedicine in intensive care unit wards***

### ***Case study from Emergency Hospital Moinesti***

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- The current hospital in Moinesti City was built in the early '70s
- It opened its first ICU ward in 1975
- It established its first ICU department in 1976

Since 1976, the hospital strategy focused on both medical and surgical specialties.



A collage of three photographs showing different hospital settings. The top photo shows a surgical suite with a patient on a table. The middle photo shows a patient in a bed being attended to by a nurse. The bottom photo shows a waiting area with several colorful chairs.

**Considering the continuous changes in the Romanian healthcare system**


**Changes in regional demographics**

**The hospital suffered a few important changes to the ICU activity**

- ❖ 2003 - new maternity department
- ❖ 2007 - it became an emergency hospital in the north-western part of Bacau County, serving a population of approximately 100,000.




- These changes led to the existence in the early 2010 of a complex structure of the ICU Department as follows :
  - 23 beds (13 for post-op intensive care, 7 for medical IC and 3 for post anesthesia monitoring),
  - a total headcount of 40 (4 physicians, 22 specialized nurses, 14 auxiliary staff)
  - covering 2 wards (in the same building).



- This led to the need of finding a proper solution for optimizing the available resources while delivering the best quality of service.
- In order to measure the quality of service there was one major performance indicators, which was observed and recorded before and after the implementation of the project:
 

**Mortality in ICU wards.**
- This indicator was chosen in order to assess any similarities between the impacts of the telemedicine use in our hospital compared with literature data available






**In addition, the use of the newly integrated system led to a series of other relevant indicators to be measured:**

- number of incidents that required immediate attention identified remotely,
- number of incidents for which the immediate measures were taken under remote physicians' supervision.
- Last but not least there was focus on any changes in the economical outcomes of the ICU Department in direct correspondence to the implementation of the project as already demonstrated in USA

## RETROSPECTIVE STUDY




➤ The ICU wards of EH Moinesti act as closed ICU wards (in which only the intensivist is allowed to admit patients to the unit).

Study variables were:

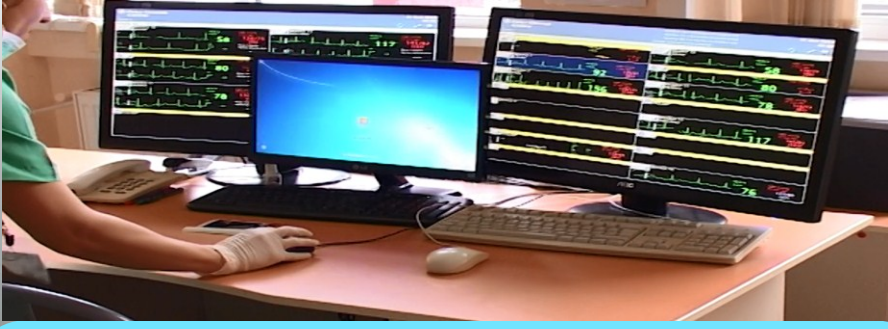
- Patient demographics (age, sex)
- ICU mortality

➤ Period starting January 1<sup>st</sup> 2010, until December 31<sup>st</sup> 2013.

The implementation of the project was carried out in a period of 4 weeks starting December 1<sup>st</sup> 2011. The telemedicine system became fully operational starting January 1<sup>st</sup> 2012.



The project consisted in implementing a software tool, which integrated all data from the patient, monitors in the entire ICU ward and which allowed all centralized data to be accessed both at ICU ward level and remotely using personalized and secured access.



**Two Principles:**

- ✓ remote monitoring
- ✓ interactive services.

**The system includes:**

- Digital monitoring terminals for vital functions (for every patient in ICU ward);
- One terminal which acts as a central station for monitoring all data collected from the digital terminals
- One central server (collects, stores and transmits all relevant data on permanent basis).
- The same data available on the Central Station can be permanently accessed using mobile/desktop devices.



### ***Measurements***

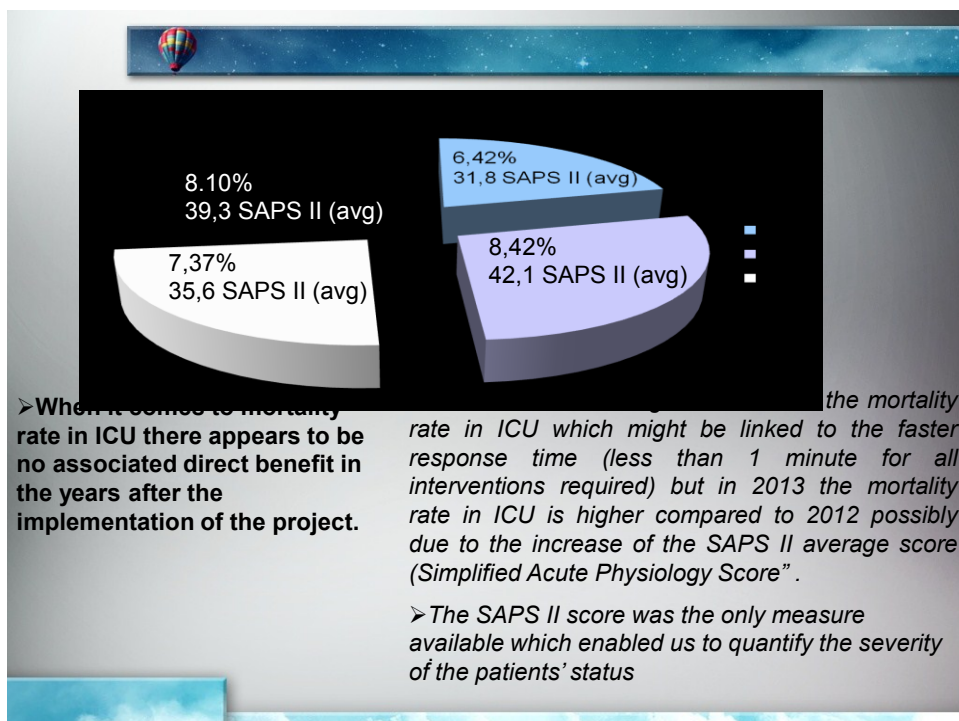
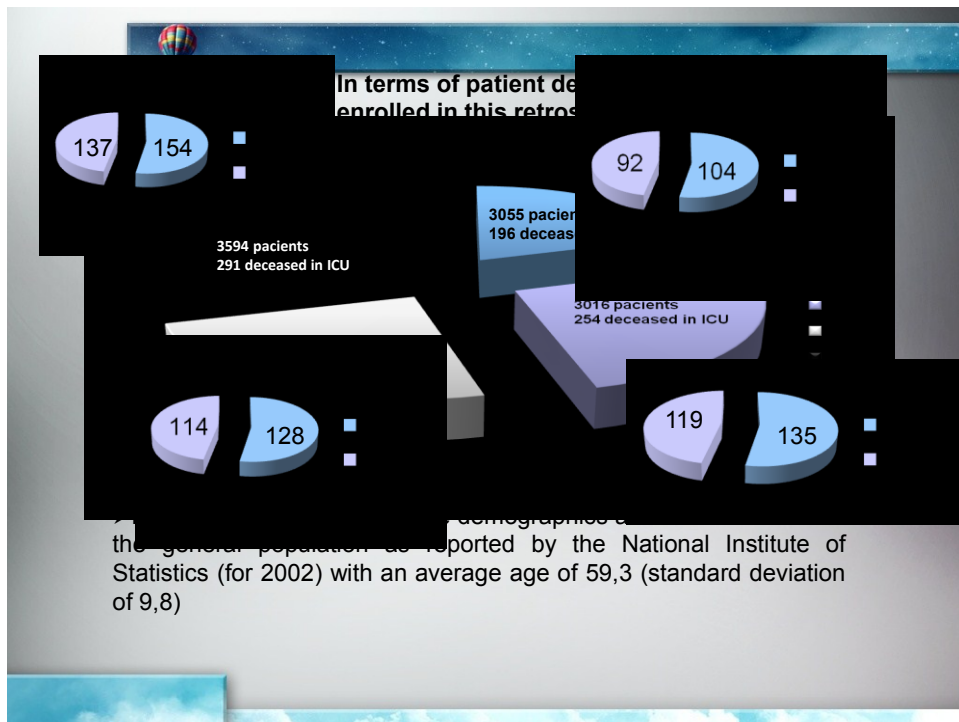
Retrospective measurements were made using the patient files, with focus on:

- patient demographics (age, sex),
- ICU mortality,
- SAPS II score,
- cost / day (in ICU).



### ***C. Statistical Analysis***

Statistical analysis was performed using MS Excel.







- The economical outcome was another indicator used to monitor the impact of the project implementation within the ICU Department.
- Although there was a decrease in total costs of the ICU Department it is directly linked with the decrease of cost of pharmaceutical products and it appears to have no direct link with the implementation of the project.



➤ The total number of incidents that required immediate attention identified remotely by the physicians was in total number of **136** (*5,94% of the total number of 2288 clinical events recorded in ICU after the implementation of the project*).

- This is an important measure that points out the need of permanent monitoring of the patients in ICU wards and brings up to the table of discussion two main topics with high impact on the quality of service:
  - ICU staff structure
  - ICU staff burnout

**which at this moment is a major distress factor among ICU specialized staff in Romania**



The results obtained for the adapted framework for assessing telemedicine were as follows:

| Domain                         | Question  | Answer |
|--------------------------------|---|--------|
| Clinical outcomes              | Does telemedicine facilitate a more rapid, accurate, and effective treatment plan?  | Yes    |
|                                | Does telemedicine reduce morbidity and mortality?   | Yes.   |
| Technical acceptability        | Is the quality of information acceptable for a given clinical application?  | Yes.   |
|                                | Is the system acceptable with regard to reliability, expandability, connectivity, safety, precision, compatibility, and interoperability? | Yes.   |
|                                | Is the system user friendly?  | Yes.   |
|                                | Are the physical environment and location conducive to the efficient and effective delivery of health-care services?                      | Yes.   |
|                                | Do patients and practitioners believe that telemedicine is medically useful and adequate for patient care?                                | Yes.   |
| Patient/provider acceptability | Are practitioners concerned that participating in telemedicine will interrupt their normal work patterns?                                 | No.    |
|                                | With telemedicine, do patients receive care that they would not have otherwise received?  | Yes.   |
| Access                         | With telemedicine, are the patients seen by a health professional sooner than if telemedicine were not available?                         | Yes.   |

- The framework was adapted by keeping all closed questions (which required a straight answer Yes / No) and was used as a questionnaire in relation with each member of the ICU staff. A total number of 40 questionnaires were applied individually.
- The answers were collected in the last week of the second year post implementation.
- The answer to the second question from the domain “Clinical outcomes” is yes although there are no relevant data to support the improvement of the outcome “mortality”.
- **This might be the result of the overall positive impact of the project in the daily ICU routine.**

## CONCLUSIONS



- *Implementation of telemedicine in the ICU Department was not associated with a reduction in overall ICU mortality for patients.*
- *The lack of apparent benefit may be attributable to the fact that only 5.94% of patients in the ICU were handled via telemedicine*
- *Other explanations may be discovered in varied effects across different types of patients.*
- *Given the reduced cost of the project implementation, further use of this technology is recommended.*
- *However, further analysis is required in order to carefully monitor and assess the patient outcomes and the relation with the use of technology.*

## Acknowledgment

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*Without their support, this project would have remained just an idea on a piece of paper.*



## References

1. L.B. Young & all, 2011, "Impact of Telemedicine Intensive Care Unit Coverage on Patient Outcomes – A Systematic Review and Meta-analysis, ARCH INTERN MED/VOL 171 (NO. 6), 2011, pg. 498-506
2. Jason R. Leong, Carl A. Sirio, Armando J. Rotondi. "eICU program favorably affects clinical and economic outcomes", 2005, *Critical Care* 2005, **9**:E22
3. J.M.Kahn et all, 2011, "The Research Agenda in ICU Telemedicine Chest" - Volume 140, Issue 1 (July 2011) pages 230-238
4. Jean-Roger Le Gall, MD; Stanley Lemeshow, PhD; Fabienne Saulnier, MD. (1993). A New Simplified Acute Physiology Score (SAPS II) Based on a European/North American Multicenter Study. JAMA. 1993; 270:2957-2963
5. Natalia Hagau, Raluca S Pop – " Prevalence of burnout in Romanian anaesthesia and intensive care physicians and associated factors", J Rom Anest Terap Int 2012; 19: 117-124

***Thank you !***

