ICU
MANAGEMENT & PRACTICE

ICU Volume 13 - Issue 4 - Winter 2013/2014 - Management

Tele-Intensive Care Medicine: High Potential of Enhancing Healthcare Outcomes

Prof. Gernot Marx, MD
******@***ukaachen.de

Director of the Department of
Intensive Care Medicine and
Intermediate Care - University
Hospital Aachen

Authors

Univ.-Prof. Gernot Marx, *MD, FRCA*

Head

Department for Intensive medicine and Intermediate care

University Hospital RWTH Aachen, Germany

Rainer Beckers, *MPH, MA*

Managing Director

ZTG Zentrum für Telematik und Telemedizin GmbH

Bochum, Germany

Ageing society will lead inevitably to a shortage of intensivists. Tele-intensivemedicine as an innovative solution grants future provision of care, addressing quality of care, outcome, and economics in intensive care.

Introduction

Intensive care medicine is facing an increasing demand for healthcare. Due to longer life expectancy, consecutively increasing morbidity, growing burden of chronic disease and refined treatment options demand is increasing on the one hand, while on the other hand the availability of intensive care professionals and graduates from medical universities constantly decreases. This will lead to shortages in the intensive care sector, due to scarcity of resources. In order to solve those problem intensive care specialists are striving for innovative solutions, of which one can be found in telemedicine.

Telemedicine is defined as the use of information and communication technology, in order to transfer medical services - independent of time and space - from healthcare professionals to patients. It is used if participants of medical services are separated by distance (Field and Grigsby

2002). It has the potential to positively influence this situation by transferring intensive care expertise to rural areas, with an additional supporting character for smaller intensive care units. Furthermore, this telemedical connection will lead to higher chances of success in terms of treatment as well as in saving more lives.

Aim of Tele-intensive Care Medicine

Tele-intensive care medicine has the capability of providing high-quality intensive care for patients and their families irrespective of where they live (EU 2008; Merkel 2012). Especially low volume intensive care units will benefit from an association with a telemedicine centre with higher volume, wide spectrum of 24/7 available subspecialities and a wide catchment area, Furthermore, tele-intensive care medicine interventions will prevent shortcomings in the number of intensive care professionals and will assure necessary standards. Therefore, the aim of tele-intensive care medicine is provision of high standards of care in every region, especially in rural areas, independent of the actual number of intensive care professionals and demographic situations.

Improved Outcomes by Telemedicine in Intensive Care Medicine

By means of telemedical solutions hospitals are supported by a university hospital or a telemedicine centre. These centres not only share routine and clinical expertise in uncommon diseases, but also an emphasis on standard preventive measures and care bundles. Furthermore, local hospitals and telemedicine centres amalgate into a virtual high-volume centre by connecting their units. As a consequence formation of such networks in intensive care units enables participants to achieve through teleintensive care:

• decreased mortality;

• decreased morbidity;

• decreased length of stay;

• decreased number of readmissions;

• improvement of diagnosis and therapy by interdisciplinary exchange;

• increased quality of after-ICU life;

• potential cost savings.

Coherent interaction of different technologies like audio- video-conference systems, continuous transfer of vital patient data, information exchange through patient data management systems, or automatically generated alarms lead to a holistic solution. Standardised therapy plans and consistent application of prevention policies (e.g. peptic ulcer prophylaxis, ventilator bundles) are certainly crucial factors for the positive effects mentioned above (Lilly et al. 2011). Telemedical intervention improved compliance with cardiovascular protection by 24%, and compliance with effective VAP-bundles (ventilator-associated-pneumonia) was improved by 54%. Of outstanding importance is the fact that additional, long-term effects of telemedicine led to a higher proportion of patients discharged to their own homes (53.4% instead of 45.9%) and less demand for long-term care, e.g. rehabilitation facilities or nursing homes (Lilly et al. 2011)

Currently, identification of individual factors contributing to favourable outcomes is a matter of ongo- ing research (Kahn et al. 2011). However, better availability of intensive care experts can be one conclusive explanation for better outcomes. Another potential success factor is participation via telemedicine in the expertise and routine of high volume centres. In conventional organisational models of intensive care, this factor was clearly identified as a determinant of success (Kahn et al. 2011; Kanhere et al. 2012; Peelen et al. 2007).

In established tele-ICU bases in the United States positive effects were observed not only during pilot projects but also in permanent operation. This could be demonstrated in small intensive care units as well as larger units with more than ten beds and within academic institutions (Lilly 2011). A reduction of mortality was found in several studies. McCambridge et al. (2010) stated a reduction by 4.3% (from 15.8% to 11.5%) of intensive care unit mortality. Risk-adjusted mortality could be significantly lowered by 29.5% compared to the control group (McCambridge et al. 2010). Lilly et al. (2011) discovered a significant reduction from 10.7% to 8.6%, which shows the positive effects of telemedicine in intensive care medicine. Another study by Zawada et al. (2009) reported a reduced mortality by 3.7% (from 9.6% to 5.9%).

All studies show a significant decrease in mortality and thus positive effects of telemedicine on intensive care units. Those effects and the above described clinical improvements and success factors, should lead to realistic cost savings in intensive care medicine.

Economic Effects of Tele-intensive Care Medicine

Tele-intensive care medicine can influence the cost of intensive care delivery in several perspectives. Resources will be used more efficiently, which in consequence will lead to a clear reduction of costs in intensive care medicine. Followup costs of ICU survivors will decrease due to higher quality of delivered care and fewer post-ICU sequelae including dependency on long-term care.

High additional implementation costs will decrease during dissemination of tele- ICU. On a mid-to long term view significant first-year costs can be compensated by a positive effect resulting in $3000 per patient savings. Besides the reduction of mortality, which is difficult to measure in monetary terms, telemedicine will result in more efficient use of resources in this sector and safeguard future access to and quality of care for the

whole population. Capacity problems and scarcity of resources will be tackled effectively. Possible savings caused by decrease of complications are substantial as well. For instance, early detection of complications leads to fewer renal replacement therapies and less mechanical ventilation.

Conclusion

Tele-intensive medicine as a new model of cooperation seems to be a promising way to influence outcome, workflow, efficiency and quality of care. Supported by outcome and economic studies we expect that quality aspects will enrich the intensivist's armamentarium by an additional organisational model of care. Promising results as well as progress in telemedical methodology will pave the way to routine use of tele-ICUs. It can be expected that consensus found in debate about preferable ICU organisational structure in terms of closed vs. open ICUs will repeat itself. Growing evidence of sound quality data will demonstrate efficiency and benefit of the tele-ICU.

Published on : Wed, 25 Dec 2013