Technology for Life

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Dräger drives forward the development of the intelligent intensive care unit

"Smart and Silent ICU" research project by Dräger and technology partners receives funding from the Innovative Health Initiative (IHI)[1]

- Investigation of the clinical benefits of interoperable networked medical technology and the connection of AI modules
- Studies at participating university hospitals in the Netherlands, Austria and Spain
- A total investment of around 18 million euros, half of which is funded by the EU research and innovation program Horizon Europe[2]

Many alarms in intensive care units can cause stress and alarm fatigue for both staff and patients. Up to 95 percent of them are considered clinically irrelevant.[i,ii,iii] This can affect the health of intensive care patients in particular and lead to longer stays in hospital.[iv] The "Smart and Silent ICU" research project focuses on a system architecture based on the ISO/IEEE 11073 SDC (Service-oriented Device Connectivity) standard. This can be used to analyze and reduce the burden of alarm overloads. These properties are to be investigated in everyday clinical practice.

Changes in the health of intensive care patients are difficult to predict. This is where another focus of the "Smart and Silent ICU" research project comes in: A system architecture based on SDC that would enable data from different devices and systems to be brought together centrally and then analyzed. Moreover, AI applications could then be able to determine patterns from this information. One aim of the studies is to prove the extent to which clinical staff can recognize changes earlier and receive support when making therapeutic decisions.

As part of "Smart and Silent ICU", Ascom, a provider of mobile workflow solutions, BetterCare, a manufacturer of clinical data management solutions, and Dräger are launching four study projects over a period of three years together with medical-scientific institutions in Europe.

[1] The Innovative Health Initiative (IHI) is a public-private partnership between the European Union, represented by the European Commission, and various industry associations, including MedTechEurope, from the healthcare sector.
[2] https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/horizon-ju-ihi-2022-03-03

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"We are delighted about the IHI's funding and see this as confirmation of the need for data-driven therapy support in acute care. At the same time, the clinical use cases of the "Smart and Silent ICU" project illustrate how important international standards such as SDC are for the secure exchange and use of data between different medical devices and IT systems. This enables pioneering applications for clinical practice, such as AI-based clinical decision support," says Michael Wilkening, Strategy and Business Development for Medical Technology at Dräger.

Application studies at European university hospitals

Two SDC-based application studies in the Netherlands are focusing on reducing unnecessary alarms in intensive care units. A study at Erasmus University Medical Center in Rotterdam is investigating the impact on the healing process of silencing bedside alarms and safely distributing them in order to provide a calmer environment for the patient. At the University Medical Center Utrecht, nurses and intensive care physicians are investigating the use of algorithms to assess clinical alarms based on clinical patient data in a simulated study. With the help of the newly developed rules, unnecessary alarms could be better identified and, if necessary, suppressed in future.

Two other research projects in Austria and Spain are focusing on possibilities in which the SDC standard can support AI applications. A research group at the Medical University of Vienna is developing and validating functional algorithms that can analyze the condition of intensive care patients in real time and detect PICS (Post Intensive Care Syndrome) indicators at an early stage. The early detection tool is intended to help doctors make better and earlier treatment decisions by providing recommendations and predictions. At the Hospital Clínic Barcelona and the Universitat Politècnica de Catalunya in Barcelona, the focus is on analyzing heart-lung interaction. In this collaborative project, algorithms are being developed and clinically validated to detect and indicate negative health developments and certain syndromes at an early stage.

SDC standard becomes established in everyday clinical practice

Medical devices and hospital IT need to be able to receive or send clinical data in an open, secure network infrastructure – regardless of the manufacturer. This is made possible by the SDC infrastructure developed by the non-profit organization OR.NET, which is compatible with the widely used hospital standard HL7. "Dräger is committed to improving acute care through technologies and services that contribute to therapy support and hospital automation. We are therefore investing in the innovation of digital system solutions and clinical IT infrastructures and have made a significant contribution to the development of the SDC standard. I am therefore even more pleased that the EU is supporting this commitment. This promotes the digital transformation in medical technology and

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confirms Europe as a leading innovation location in this sector," says Toni Schrofner, Chief Officer Medical Division at Dräger.

Note: The solutions for use cases are under development and are not currently commercially available. Their future availability cannot be guaranteed.

Image material

Photo
The future of the intensive care unit: digital, secure and networked across manufacturers.

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[i] Jones K. (2014), Alarm fatigue a top patient safety hazard. Canadian Medical Association Journal, 186(3): p.178
[ii] Koomen E. et al. (2021), Reducing medical device alarms by an order of magnitude: A human factors approach, Anestesia and Intensive Care 49(1), pp. 52-61
[iii] Nix M. (2015), Combating Alarm Fatigue, American Journal of Nursing, 115(2), p. 16
[iv] Clifford DG, et al. (2016): Editorial: False Alarm Reduction in Critical Care; Physiol Meas. ; 37(8): E5–E23, p.2

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