

Avera **eCARE**[®]

Rural Health:

**Delivering healthcare
through technology**

PHILIPS

Life Saving Support within the Great Plains

Between the Mississippi River and the Rockies are thousands of small farming, mining, and oil and gas communities dotted across an area as large as Western Europe. Towns in states within the Midwest can be hundreds of miles apart, separated by vast expanses of wheat fields and prairie.

Providing high quality care for the seriously ill is a huge challenge in this setting. In many communities there are critical access hospitals. These small but vital hospitals, located in rural areas, provide emergency and general care services to the local communities. They are small institutions and rarely have access to a deep or diverse pool of specialty clinicians to provide care for the many different medical situations they encounter. Nevertheless, they are vital to maintaining the health of the communities they serve.

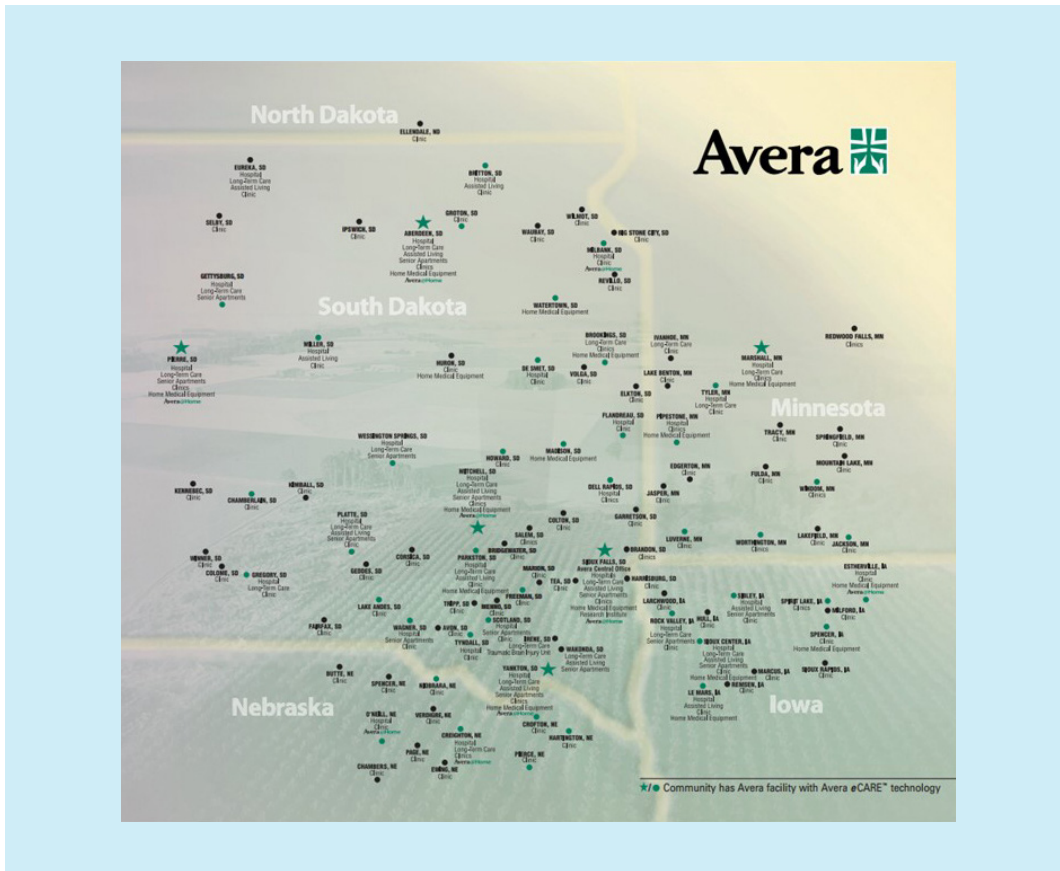
When someone becomes critically ill in an isolated community, the local care team at the critical access hospital, faces a dilemma:

Choice 1: The patient can be transferred to a tertiary care center in the nearest urban area. This usually requires an air ambulance transfer, with high associated costs, and often an extended transit time. Air transfers can be difficult for critically ill patients.

Choice 2: The team can continue to provide care in the critical access hospital – but with limited access to the expertise of intensivists, and critical care nurses.

Setting hard boundaries for when to transfer a patient is challenging, leading to clinicians agonizing over the best course of action. Sometimes, the choice is forced: for example, during frequent severe weather conditions on the Northern Plains, transfer may be impossible.





Avera Health Systems (Avera) is deeply familiar with this dilemma. Avera is an integrated healthcare delivery network (IDN) centered in Sioux Falls, SD. The network includes over 300 facilities spread across 72,000 square miles of western Minnesota, North Dakota, South Dakota, Iowa and Nebraska. Among these facilities are many critical access hospitals in small communities, as well as five rural regional hospitals with ICU beds and a central large tertiary care institution in Sioux Falls that is often the destination for transfers.

As a health system comprised of primarily rural facilities, serving 13 percent of the nation's critical access hospitals through eCARE, Avera has been focused on improving quality, ensuring access to necessary care, and supporting, recruiting and retaining health care professionals. While these issues can be complicated to solve, an important part of Avera's solution has been a unique model of telemedicine, Avera eCARE. While eCARE has evolved into many unique clinical service lines, its primary purpose is to use technology to provide convenient, on demand access to

board-certified intensivists, emergency physicians, geriatricians, hospitalists, critical care nurses, and pharmacists. Located in Sioux Falls, South Dakota, Avera eCARE's virtual health center houses clinicians and operational staff dedicated to providing 24-hour access to specialized services.

Very Remote Access

In 2004, Avera made a bold decision to address the challenge of providing critical care across a geographically dispersed network of mostly small hospitals without intensivists. Their solution to this problem was to implement a remote critical care program using Philips' eICU solution. Using the eICU technology enabled Avera to

pioneer a radical paradigm shift in providing critical care: **the eICU in Sioux Falls would provide remote intensivist support to non-intensivist physicians within the hospital setting.** From the eCARE ICU cockpit in the eCARE hub, intensivists can provide audio/video consultation and guidance to the local team, powered by a direct video link that facilitates communication and patient status evaluation, and complete patient monitoring information available on screen in the eICU. Investment to expand the services to five additional hospitals was supported by a USDA grant in 2005 and eCARE ICU has continued to grow and expand services to additional hospitals both in and outside Avera.

Improving Care Standards by Telemedicine



The Avera program resulted in immediate and important changes in how care was provided in rural hospitals. Reflecting on how the program impacted clinical outcomes, Pat Herr, Clinical Integration Director of Avera eCARE ICU identified several specific changes that improved care quality:

1. Non-specialist clinicians in rural hospitals were coached to adopt latest evidence-based care protocols, and stay up to date as they changed – in such areas as sepsis resuscitation and ventilator weaning.
2. In order to meet prescribed protocols, some rural hospitals leveraged the program as an opportunity to upgrade equipment and pharmacy formularies, improving the resources at hand.
3. Guidance from trained intensivists and critical care nurses led to improved clinical decision making throughout critical cases.
4. Patient triage assistance by the remotely located critical care experts led to earlier transfer of critically ill or deteriorating patients, while also allowing stable patients to recover in place.
5. 24/7 staffing of the eICU ensured immediate attention to patient needs by a skilled clinician.

Cutting Edge Technology

The digital availability of large amounts of data gathered from numerous diverse patients in a range of hospital settings drives continuing value in a tele-ICU environment. These vast information sets enable an evidence-based approach to tele-ICU and provide the basis for the constant evolution of both technology innovations and clinical practices.

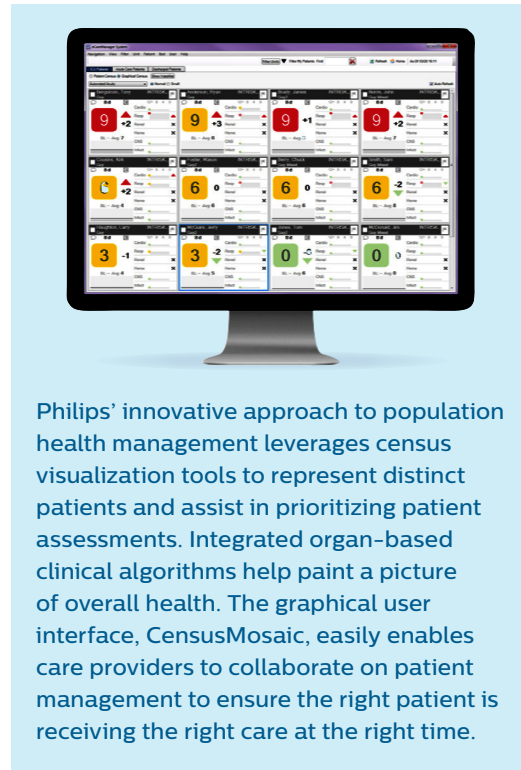
As the largest provider of tele-ICU platform technology, Philips, through its eICU Program, invests in extensive research and development efforts to utilize the data from its expansive installed base to improve performance and clinical functionality. There are a number of examples of new capabilities resulting from this evidence-based investment.

Interoperability

The opportunity to benefit from a tele-ICU implementation is not dependent on a preexisting use of a specific or limited set of hospital EMR (electronic medical record) systems. Through an HL7 interface, Philips eCareManager can access patient data housed in a range of EMR systems and configurations. Avera eCARE chose eCareManager as a key element of its technology platform because of its ability to address the fundamental challenge of engaging with a wide range of hospitals and systems.

Smart Alerts®

Smart Alerts is an algorithm-driven system which evaluates specific values or trends over time. Smart Alerts continuously reviews data from patient vital signs, medications, lab results and flowsheets. When a specific value meets a threshold or a negative trend over time is detected, Smart Alerts sends a prompt to the care team, enabling clinical evaluation.

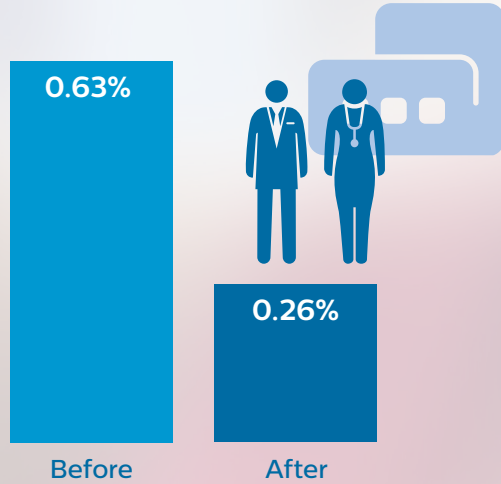


Philips' innovative approach to population health management leverages census visualization tools to represent distinct patients and assist in prioritizing patient assessments. Integrated organ-based clinical algorithms help paint a picture of overall health. The graphical user interface, CensusMosaic, easily enables care providers to collaborate on patient management to ensure the right patient is receiving the right care at the right time.

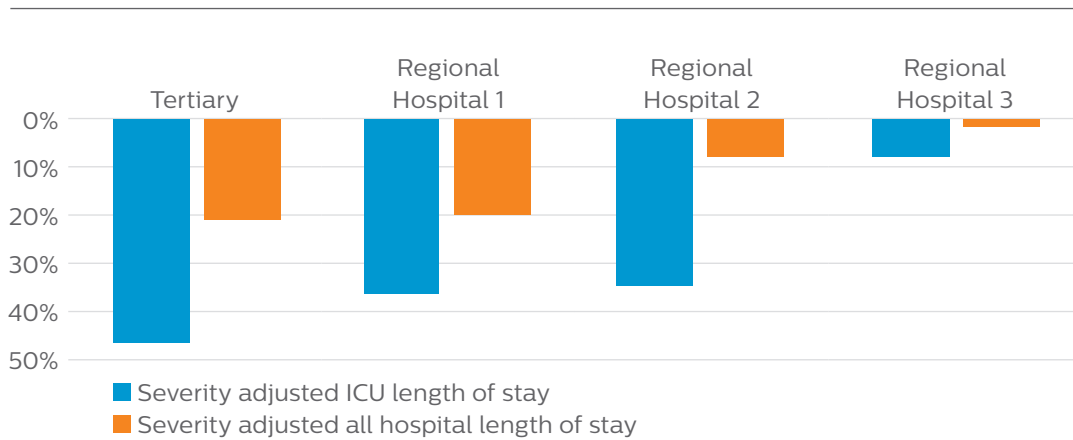
Automated Acuity Score

The Automated Acuity Score uses proprietary algorithms and graphics to reflect a patient's clinical acuity. It is an example of the care evolution available in a data-based system. This feature provides a total acuity score that is calculated from six clinical components (cardiovascular, respiratory, infectious disease, central nervous system, renal and hematology) and uses patient data. Each component value is calculated with a proprietary algorithm upon admission and again as new data are received. The Automated Acuity scores appear as a census option in which each patient is represented by a single graphic. Various filter and sorting options allow clinicians using Philips eICU Program technology to manage the census using the acuity graphic. When coupled with the visual display of the automated acuity census, this provides a powerful combination of clinical decision support with population management.

A 60% reduction in severity adjusted ICU mortality at the Tertiary Center at a lower cost



Decrease in severity adjusted length of stay



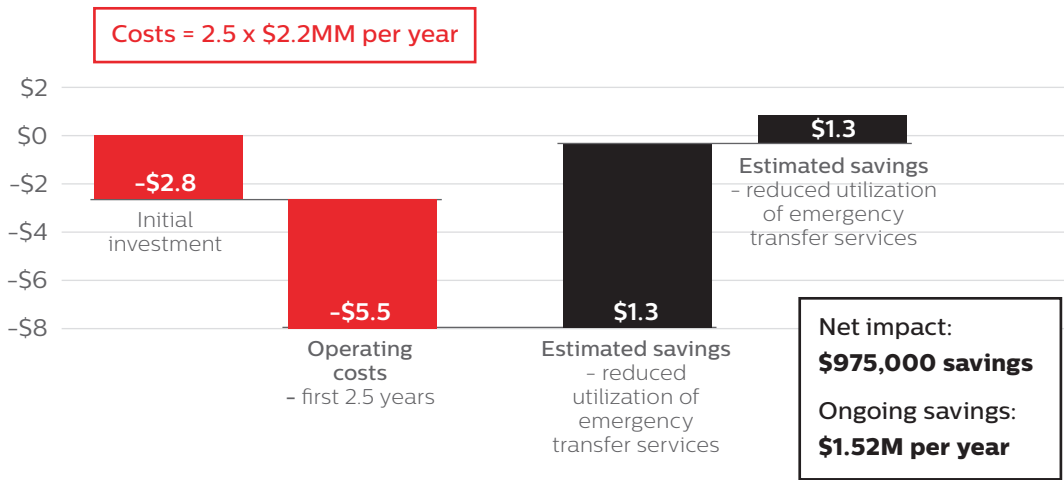
Source: Avera eCARE

Better Outcomes

Avera’s program produced strong results, improving outcomes and reducing costs. In 2009, the Avera eCARE ICU team published the results of the first 30 months of the program in Post Graduate Medicine¹. Compared to a year pre-eICU baseline, Avera achieved significant decreases in APACHE Severity Adjusted ICU Length of Stay (LOS) in regional hospitals, and in APACHE Severity Adjusted ICU mortality in the tertiary center. Positive impact on mortality in the tertiary care setting may have been the result of better and earlier management of critically ill patients in the regional and critical access setting. Thus, the tertiary center in Sioux Falls was receiving fewer transfers of patients with advanced clinical deterioration.

Positive ROI within 2 1/2 years

Costs and savings as estimated in 2009, \$MM



Source: Avera eCARE

Human Impact: Improved Patient and Clinician Satisfaction; Better Recruitment and Retention

As well as making an impact on ‘hard’ outcomes, telemedicine in the Great Plains has had positive effects on various ‘soft’ factors too. *“The goal is to keep patients in their own community wherever possible”* states Dr. Emily Hurst, eCARE ICU Medical Director. *“Recovering from illness in a local community, surrounded by family and friends, is a more comforting experience than recuperating 200 miles from home in a large tertiary care center. Conversely, patients and their families can have complete confidence in the care provided in their local community, secure in the knowledge that their local medical team has immediate back up and support from specialists and highly trained critical care professionals at the touch of a button.”*

Anecdotally, Avera has found that the program has enabled smaller rural hospitals to stay in operation, and provide effective care within tightly-knit communities. Having the telemedicine capability has helped in retaining skilled physicians in the rural setting, and facilitated recruitment of hospitalists and specialists to rural hospitals.

As part of the before and after study, Avera’s researchers polled the leadership of the critical access hospitals served by the initiative. 90% (9 out of 10) strongly agreed to each of the following propositions:

- The technology is easy to work with
- Patients & families are more comfortable staying in our hospital with the added care
- We are more comfortable caring for critically ill patients
- Families appreciate the benefits we are providing
- Quality of care for our sickest patients is improved
- Every small or critical access hospital should have this program

Recap – Impact of a Regional Critical Care Telemedicine Program



The numbers continue to grow as we add additional facilities and also expand to larger facilities.

Rural Telemedicine by the Numbers:		Average eCare ICU 2017
ICU bed days saved, 2005–2008	6,825	10,800
Estimated lives saved, 2005–2008	352	260
Estimated costs saved, 2005–2008	\$9.25M	> \$62M
Facilities served, 2008 - 16 sites	33	36
Number of different US states served, 2008	4	9

Source: Avera eCARE

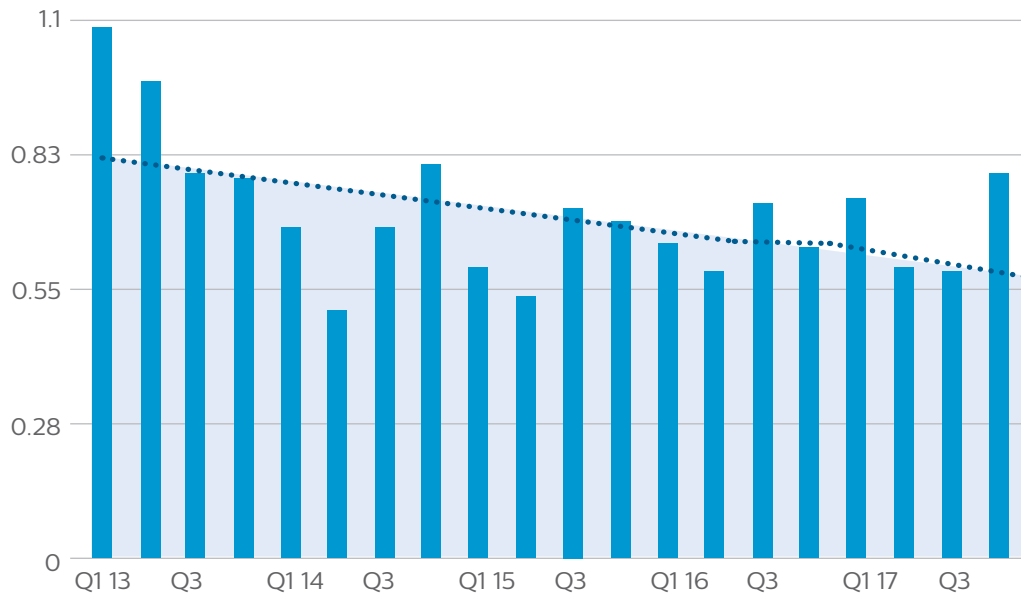
eICU can Improve Outcomes, and Save Money, by Leveraging Specialty Clinicians Across a Wide Network of Hospitals

Avera showed that a telemedicine program can improve severity adjusted mortality, while reducing costs to the program incurred by extended ICU stays and unnecessary transfers to a tertiary setting. In today's healthcare environment, in which facilities need to prioritize quality of care and cost containment, technology that can achieve both at the same time is of uncommon value.

Continuing to Make a Difference

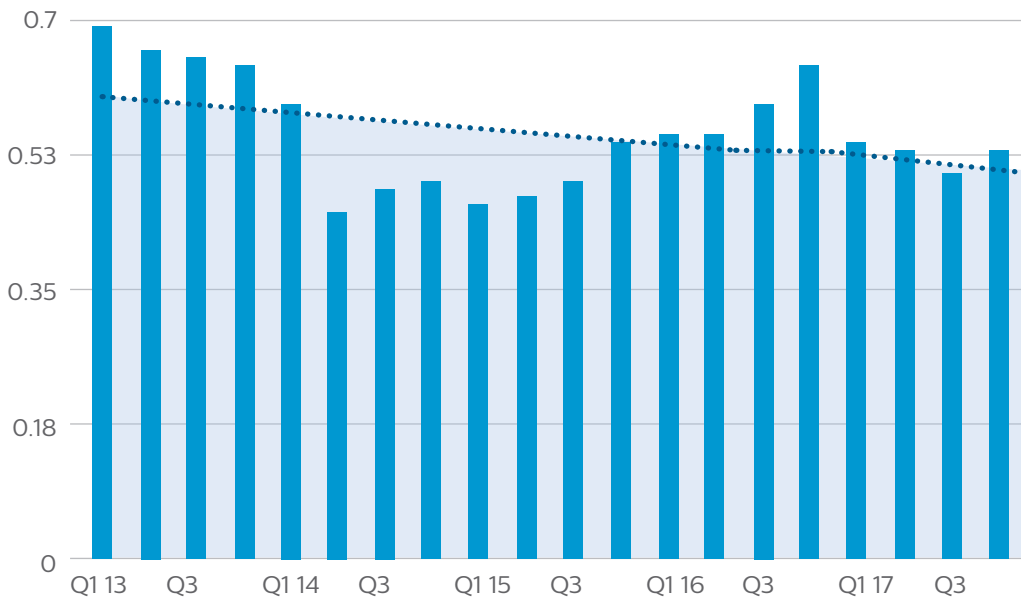
Avera eCARE ICU continues to collaborate with the bedside teams to improve patient care. One example is the care of sepsis patients. Most hospitals care for sepsis patients and many of them are challenged to consistently implement the sepsis bundles. eCARE ICU partners with their monitored hospitals to screen all patients for sepsis and review the plan of care for the patients. The eCARE physicians and nurses will reach out to the hospital staff regarding any additional care processes they feel will benefit the patient. The bedside staff can also initiate requests for help from eCARE ICU at any time. eCARE physicians will assist the hospital with some of the required documentation to enable hospitals to meet the bundle requirements. These efforts have resulted in decreased mortality and shorter ICU lengths of stay for sepsis patients.

Mortality Predicted/Actual for Sepsis Patients



Source: Avera eCARE

Actual to Predicted ICU LOS Ratio for Sepsis Patients



Source: Avera eCARE

Rural and Beyond

With proven outcomes in quality, cost, workforce support and care standards – the success of this program quickly spread and soon Avera eCARE was serving hospitals outside of their Midwest network. While continuing to support the rural communities, Avera eCARE also found need in urban tertiary facilities. Through eCARE's mission to make care accessible, the eCARE team extended care beyond the walls of Avera and rural communities, collaborating with several urban health systems across the country as a way to leverage expertise and extend resources. As of 2018, 36 hospitals are served by the eCARE ICU program, including 19 non-Avera sites within the states of Iowa, Kansas, Minnesota, Nebraska, North Dakota, New Hampshire, South Dakota, West Virginia, and Wyoming.

Based on the success of Avera's eCARE ICU program, Avera eCARE has expanded its telemedicine offerings to include – eCARE Pharmacy, eCARE Emergency, eCARE Senior Care, eCARE Correctional Health, eCARE, Behavioral Health, eCARE Hospitalist, eCARE Specialty Clinic, eCARE School Health, and the direct-to-consumer platform, AveraNow. Today Avera eCARE's virtual hospital reaches across sixteen states and nearly 400 communities, serves 13% of the nation's critical access hospitals, and partners with hospitals, clinics, schools, long term care communities and correctional facilities.



1. Impact of an intensive care unit telemedicine program on a rural health care system. Zawada ET Jr, Herr P, Larson D, Fromm R, Kapaska D, Erickson D. Postgrad Med. 2009 May;121(3):160-70. doi: 10.3810/pgm.2009.05.2016.
2. Critical care medicine in the United States 2000-2005: an analysis of bed numbers, occupancy rates, payer mix, and costs. Halpern NA, Pastores SM. Crit Care Med. 2010 Jan;38(1):65-71. doi: 10.1097/CCM.0b013e3181b090d0.

About Avera Health

Avera Health, the health ministry of the Benedictine and Presentation Sisters, is an integrated health system, located in Sioux Falls, South Dakota. Avera is nationally recognized for Avera eCARE, a telehealth model that is transforming care delivery by leveraging expert staff and innovative technologies by improving health care at the local level, keeping patients close to home. Avera eCARE's innovative care model offers access to specialists by supporting patients and clinicians in emergency rooms, critical care units, hospitals, long-term care communities, clinics, correctional facilities, and schools. Serving nearly 400 urban and rural communities in 16 states, Avera eCARE is supporting workforce, reducing healthcare costs and saving lives. To learn more about Avera eCARE, visit www.averaecare.org.

About Royal Philips

Royal Philips (NYSE: PHG, AEX: PHIA) is a leading health technology company focused on improving people's health and enabling better outcomes across the health continuum from healthy living and prevention, to diagnosis, treatment and home care. Philips leverages advanced technology and deep clinical and consumer insights to deliver integrated solutions. Headquartered in the Netherlands, the company is a leader in diagnostic imaging, image-guided therapy, patient monitoring and health informatics, as well as in consumer health and home care. Philips' health technology portfolio generated 2017 sales of EUR 17.8 billion and employs approximately 74,000 employees, with sales and services in more than 100 countries. News about Philips can be found at www.philips.com/newscenter.

© 2018 Koninklijke Philips N.V. All rights reserved. Specifications are subject to change without notice. Trademarks are the property of Koninklijke Philips N.V. (Royal Philips) or their respective owners.

www.philips.com

