Dear e/MTICs,

You may wonder whether this title applies to you, being an electronics, informatics, mathematics, physics, medical or non-technical student, engineer, PhD or PD Eng. Student, professor or member of the scientific staff? But it does!

And you may wonder whether you are a member of e/MTIC, the Eindhoven MedTech Innovation Centre while working in Catharina Hospital, Máxima Medical Centre, Kempenhaeghe, Philips or at the TU/e? But you are!

Building on a long term partnership for many years already, e/MTIC is now 1 year an official innovation organization in which many disciplines and the above mentioned organizations work together in HealthTech innovation. Apart from having specialist technical and clinical research in the area of cardio-vascular, perinatal and sleep, we very much look at how our research results can be applied much faster in the clinical practice and contribute to solving societal challenges in healthcare. This requires to link the various disciplines in the value chain, from research to patient and to measure our results in terms of patient outcome.

For individual researchers this may be a challenge but we can make a difference by building a collaborative and communicative community. That is why I am very pleased with this first issue of the e/MTIC regular newsletter.

The newsletter will inform you on the activities of individual researchers but also on the teams that support them in common subjects such as regulatory affairs, project funding opportunities, data platforms for data analytics and AI and educational programs. We also intend to strengthen a joint valorization team that can help researchers to put their work in a value based healthcare perspective in an early stage.

Via the newsletter we will also invite you to interesting events and you can use this as a platform to find partners that can help you in your research challenges.

And last but not least, we will inform you on the strategic directions we are taking in our collaboration to increase the relevance and success of e/MTIC and its partners.

I trust you will enjoy reading our newsletter and contribute to next issues, building a community of e/MTICs.

I hope to see all of you at the e/MTIC symposium ‘Technology meets Value-Based Health Care’ on October 11th, 2019.

You’re invited!

Kees van der Klauw
Ecosystem Manager e/MTIC

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Inauguration of prof. dr. Lukas Dekker at the Eindhoven University of Technology

On October 11th, 2019 the symposium 'Technology meets Value-Based Health Care' is organized on the occasion of the inauguration of prof. dr. Lukas Dekker at the Eindhoven University of Technology.

Technological innovations and value-based health care are considered the essential fundaments for sustainable, future healthcare. At this symposium physicians, medical technology experts and value-based healthcare experts will share their insights and knowledge in order to bring these worlds together.

This is an Eindhoven Medtech Innovation Center (e/MTIC) symposium, organized in collaboration with the Dutch Cardiovascular Alliance (DCVA).

Check out the Program and register now!
Doctoral research TU/e: putting the patient at the heart of cardiovascular care

August 28, 2019

How Value-Based Healthcare helps reduce mortality rate and the number of complications among heart patients

Treatment results for patients at the Catharina Heart Center in Eindhoven have improved considerably thanks to a new approach in quality management. This is the conclusion of PhD researcher Dennis van Veghel, care manager at Catharina Hospital and director of the Dutch Heart Registration. Van Veghel used the principles of Value-Based Healthcare, which put the value for patients at the heart of healthcare. His results show that measuring and evaluating the results for patients closely and using them as a guide for better care, leads to significant improvements in outcomes for patients. Van Veghel will defend his PhD thesis on August 29th at the department of Biomedical Engineering of TU/e.

As in many other countries, hospitals in the Netherlands focus primarily on volume and costs, due to the funding agreements they have made with health insurers. As a consequence there is less attention for treatment effects that matter most to patients, such as complications and re-interventions.

VBHC

In contrast, Value-Based Healthcare (VBHC) puts the outcome for patients at the heart of healthcare. "The core strength of VHBC is that all involved parties focus on what is essential in care: what health gains are there for the patient, and at what cost? We call this the patient value ratio. An important parameter in this is quality of life", explains Van Veghel.

Applying these principles at the Catharina Heart Center resulted in, among other things, more attention for pre-operative care, more multidisciplinary collaboration and the introduction of additional checklists, for instance in the operating room.

This new approach not only reduced mortality rates among patients, they also suffered less complications, and they needed fewer repeat interventions. The mortality rate dropped from 2.3 to 1.0 per cent within 120 days after a bypass intervention, and from 3.1 to 2.0 per cent within one year. The rate of reinterventions decreased from 5.0 to 3.2 per cent. Every year approximately 1000 patients undergo a bypass procedure at the Catharina Hospital.

And this is not only good news for the patient. It is also the hospital and the health insurers who benefit, as complications and reinterventions tend to be costly.
According to Van Veghel, to get this practice really off the ground, it is essential that healthcare providers and insurers put the outcome for patients at the center of the agreements they make with one another. He has drawn up a number of new models that help all parties involved to focus on what is important for the patient.

In the current system, hospitals tend to get less funding if they are successful in reducing the number of reinterventions. They are also no real incentive to improve the care in the whole chain of care.

The researcher proposes an alternative model, which makes the hospital performing the bypass responsible for the long term results, even after the patient has left their care. This encourages hospitals to seek quality improvements with doctors who take over from them in the recovery phase. Especially in complex interventions like bypasses, patients often spend only a limited time in the center that performs the surgery. Aftercare is usually provided in a hospital closer to the patient’s home.

Innovation

VBHC holds much promise, says Van Veghel, since the methodology can act as a guide for policy decisions, for instance in determining the value of technological innovations at an early stage. He also sees an increasing role in VBHC for Artificial Intelligence, because it can provide much smarter data analysis.
More information

Dissertation Dennis van Veghel

Related articles (Dutch only)

NOS: ‘Sterftecijfers hartpatiënten omlaag, hartcentra werken beter samen’
Qruxx: ‘Beloon ziekenhuizen voor optimale uitkomst voor patiënten’
Catharinaziekenhuis: ‘Uitgekiend verbeterprogramma zorgt voor betere overleving hartpatiënten’
Why a wristband will not solve your sleeping problems (yet)

Many people suffer from sleep problems, and yet sleep research is not at the level where it provides the best advice for all these people. At the Sleep Medicine Center Kempenhaeghe, somnologist Sebastiaan Overeem investigates new techniques to measure sleep, ultimately to provide better treatment for patients with sleep disorders such as insomnia and sleep apnea.

Part of his research focuses on wearables that measure sleep. In a full-fledged sleep examination many parameters are recorded; brain activity, heart rate, leg movements, breathing rate, eye movements, muscle activity, and even more. A wearable can only provide a fraction of all this information.

For healthy sleepers, wearables are a promising means to measure sleep, provided they are scientifically validated, which most of these commercial products are not. For people with sleep disorders such technologies are not reliable enough, but in the e/MTIC sleep group important steps are taken to change this in the future.
Philips researcher offers babies, parents and nursing staff the prospect of calmer intensive care for premature babies

Rohan Joshi, researcher at Philips Research, obtained his PhD (cum laude) last week at the Eindhoven University of Technology (TU/e) on his thesis ‘Towards Automated Solutions for Predictive Monitoring of Neonates’. The aim is threefold: to reduce alarm fatigue among nursing staff, develop methods for contactless monitoring of (new) vital signs and to demonstrate the physiological importance of bonding between parent and baby.

For the neurodevelopment of premature babies, hearing the continuous beeping sounds of alarms is unhealthy. Further, Joshi, who analyzed millions of alarms from two neonatal intensive-care units (NICUs), discovered that three quarters of these alarms do not provide any relevant information for nurses. Among other things, he developed algorithms that can help in triggering only useful alarms, while still ensuring that the vital functions of the premature babies are safely monitored.

Potential danger

The researcher used machine learning for this purpose. Machine learning algorithms build a mathematical model based on data, in order to make predictions or decisions. For example: algorithmically recognizing whether changes in vital signs are pathophysiological or innocent? The arithmetic models used by Joshi can link physiological changes to previous situations and use them as a basis for setting off an alarm or not.

This research shows how data driven solutions and algorithms based on machine learning can optimize clinical decision making and improve the workflow within NICUs. A contactless monitoring solution that was also developed by Joshi offers new ways of reliable monitoring, which are both comfortable for premature babies and a source of new physiological information. Finally, his research provides quantitative and visual evidence of the benefits of parent-baby bonding. Within Philips Research, Joshi is working on the same topics. The ultimate goal is: silent intensive care units (silent ICUs).
Collaboration

In addition to Joshi’s promoters, Máxima MC, Philips Research and e/MTIC were also involved in this research. e/MTIC is a collaboration between TU/e, Philips, Máxima Medical Centre, Catharina Hospital and Expertise Centre Kempenhaeghe. This should lead to more technical innovation in healthcare. Within the consortium, about one hundred TU/e PhD students are working together with a similar number of experts and scientists from TU/e, the hospitals and Philips. Over the past 15 years, the parties have been working bilaterally on projects with different focus areas. The partners expect that the intensive cooperation between clinic, science and industry will considerably shorten the development time of research as a result for the patient.

Joshi’s research has appeared in the media several times in recent weeks: he was interviewed by NemoKennislink [Dutch only], Smarthealth [Dutch only] en NOS [Dutch only]. TU/e also paid attention to his research (English).

Access to PhD thesis is via the portal of TU/e website
Perinatal data access – collaboration Philips MMC

Máxima Medical Center and Philips have developed a procedure for clinical data access with pseudonymized perinatal data. This solution allows collaboration on the development and validation of stratification algorithms using clinical data, while matching all security, legal and privacy regulations.

The Health Data Board is investigating a data platform to facilitate data access between e/MTIC partners. However, as this platform is not yet available, a pragmatic solution was established for a specific Perinatal research project between Philips and MMC.

To this end, alignment between ethical, legal and security officers of both partners has taken place, resulting in guest status for two specific Philips researchers at MMC. These two persons receive access to pseudonymized data, using CTcue on dedicated MMC laptops, with the purpose to develop and validate algorithms for stratification of patients at risk for gestational diabetes and/or hypertensive disorders of pregnancy. Data does not leave MMC; study results will be published by MMC and Philips.

The detailed procedure for data access has been documented and can be shared upon request, contact Beatrijs van der Hout (MMC) or Sima Asvadi (Philips).
Towards ultrasound scans for prostate cancer diagnosis

On 19 July, Rogier Wildeboer received his PhD degree with the distinction cum laude for his research on ultrasound imaging of prostate cancer. In his research, dr. Wildeboer established the feasibility of an accurate ultrasound-based imaging strategy that would allow a considerable reduction of required biopsies in prostate cancer diagnosis.

With around 12,600 diagnoses annually, prostate cancer is the most prevalent cancer among Dutch men. The current diagnosis largely relies on blindly taking twelve needle biopsies covering the entire gland, and there is a high clinical demand for a reliable imaging-driven approach. Compared to MRI-based techniques, ultrasound has the advantage of being cost-effective, practical to the urologist, and readily available all over the world.

The novel ultrasound strategy dr. Wildeboer developed is based on the meaningful combination of multiple advanced algorithms: multiparametric ultrasound. For this, conventional ultrasound, elastography (which assesses the stiffness of tissue) and contrast-enhanced techniques (that assess the blood flow) were examined and extended into 3D. Automatic combination of these physics-driven algorithms through artificial intelligence substantially increased the diagnostic potential of the scans. Moreover, doctors were able to locate significantly more tumor hotspots using multiparametric ultrasound compared to single-parametric ultrasound.

Dr. Wildeboer’s research, entitled Multiparametric and Multidimensional, was supervised by his promotors prof. M. Mischi and prof. H. Wijkstra, and co-promotor dr. R.J.G. van Sloun. He worked closely together with Philips Research within the e/MTIC program, and Amsterdam Academic Medical Centre, the Jeroen Bosch Ziekenhuis, the Martini Clinic in Hamburg and the Second Affiliated Hospital of the Zhejiang University in China as clinical partners. Due to the high clinical interest, the methods are currently further developed in close collaboration with the clinic.

Learn more about e/MTIC? Contact us at info@emtic.nl or +31 (0)40 247 3288  www.emtic.nl

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