Artificial intelligence in radiology comes of age

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Artificial intelligence (AI) is the hot topic these days in a host of industries as well as in medicine and especially radiology. It certainly was the major theme at RSNA last November which opened with an insightful President address focusing on the rise of technologies such as AI and machine learning and their impact on the future of radiology practice. Naturally, ECR couldn’t be outdone on the subject, so AI will be at least as prominent in Vienna this year as it was in Chicago a few months ago. Indeed, interactive exhibits, trainings and a plethora of scientific sessions (a record number of 44 covering 317 presentations) will be devoted to AI at ECR 2019. In addition, the AIX Theatre - located in the heart of the AI Exhibition (AIX) inside the X1 hall - will feature interactive panel discussions and 8-minute pitches from over 20 innovative companies in the field. Thanks to the explosion in the stock of medical images in recent years, combined with the exponential growth in computing power as well as the availability of enormous storage capacities, AI is on the verge of gradually transforming, not just radiology but the entire practice of medicine in the coming decade. This is creating tremendous opportunities for the big vendors (the likes of Siemens, GE and Fujifilm to name but a few) but also for a larger number of smaller technology companies, some of which will enter into partnerships with the big players.

There are two opposing views about how the deployment of AI will affect the radiologist’s job. The conventional opinion is that AI will relieve radiologists from part of the burden – both physical and visual - of reading images of as many as 100 examinations per day (this translates into interpreting a new clinical image every 3 to 4 seconds), a busy radiologist being able to read about 20,000 studies a year. With the number of examinations continuing to grow far more rapidly than the number of radiologists in most countries, radiologists, thanks to AI, will become even more productive as they will no longer need to look at all the images but in many cases (especially for the most routine exams) will simply validate the outcomes provided by the algorithms. The other, more ambitious but potentially controversial view is that AI will radically transform the function of radiologists so that they will in future act as clinicians rather than pure image readers and spend more time in noninterpretive and more patient-centric activities such as interacting with colleagues in other specialties. The question is, are radiologists prepared for this new role?
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Dose reduction in CT - universal set of standards is achievable, says new study

Since its introduction in 1973, X-ray computed tomography (CT) has become a leading modality for diagnostic imaging. The advantages of CT are manifold. Above all, they include rapid scanning and small spatial resolution, which allows for relatively quick and accurate diagnosis of injuries and disease. CT has also been an imaging tool of choice for the staging and treatment follow-up of cancer.

Growth in use, but variations between countries

Overall, CT use has grown rapidly. The total number of scans in the US is estimated to be in the region of 80 million a year. In England, the National Health Service (NHS) reported 4.8 million CT scans in 2016/17, which is 40 percent more than the 3.4 million MRI scans done during that year. CT usage has also been growing rapidly – in England at about 8% annually, compared to just 1.5% for X-rays and 5% for ultrasound. Nevertheless, there are significant variations between countries in the intensity of CT use. According to data from the Paris-based Organization for Economic Cooperation and Development (OECD), the annual rate of CT scans per 1,000 inhabitants ranges from a high of 225-230 in the US and Japan, to a low of 37 in Finland. The rate is about 80 in Italy, 90 in the Netherlands, 110 in Spain, 140 in Germany and 200 in Belgium and France.

Differences in radiation dosing practice

Though large, such divergences are considered to be less significant than differences in radiation dose to which patients are exposed, for the same condition. In December 2007, a study published in ‘European Radiology Supplement’ had found dosage could have been halved in many cases without impacting on image quality. Another study two years later revealed a 13-fold difference between the lowest and highest radiation doses used for identical CT procedures by four clinical sites in the neighbourhood of San Francisco.

Concerns about such issues have been dramatically highlighted after a major new international study, which attributes differences in dosage to the person doing the scanning rather than to patients or equipment. The study, published in ‘The British Medical Journal’ (BMJ) in January 2019, found that patient characteristics, make and model of scanner, and type of hospital where the CT scan was done had little effect on the amount of radiation used.

Analysis of 2 million CT scans in 151 institutions

The BMJ study was based on a massive effort by a research team led by Dr. Rebecca Smith-Bindman, a professor in the Department of Radiology and Biomedical Imaging at the University of California San Francisco (UCSF). The researchers analysed dose data for over 2 million CT scans of the abdomen, chest and head, at 151 institutions in seven countries.

Their findings are likely to resonate strongly, given the association of radiation with cancer. Although CT scans account for a minority of diagnostic radiologic procedures, they use large amounts of radiation per image. Some estimates suggest that CT contributes nearly half the US population's radiation dose from all medical examinations. The figure in England is higher, at 68 percent, although plain radiography is used five times more often than CT in the country (22.9 million procedures in 2016/17 versus 4.8 million).

Cancer risks of CT

The association with cancer has been controversial, especially when predictions of the impact of CT scanning have been based on a linear-no-threshold dose-response model. Some have argued that CT radiation doses are too low to produce any health effect.

There is also uncertainty about how to calculate risk accurately. This is because of a host of factors. Firstly, radiologists are not necessarily familiar with CT radiation exposure descriptors (volume CT dose index and dose length product). Secondly, there have been a series of revisions about the relative sensitivity of organs to radiation. Finally, radiation dose in units such as millisieverts (mSv) are used to estimate population risks based on generic models, not individual patient calculated dose. Indeed, the radiation dose in a typical CT scan (1–14 mSv depending on the exam)
is similar to the annual dose received from natural sources, such as radon and cosmic radiation – which typically varies from 1 to 10 mSv, depending on where a person lives.

**Even small risks justify search for solutions**

Nevertheless, the current consensus is that, even if the risk of cancer from CT imaging is small, the economic burden of treatment of the proportionately reduced number may well be significant, given the high prices of cancer treatment. Neither does anyone question the logic of attacking even a small cancer risk. In December 2009, a report in ‘The Archives of Internal Medicine’ made a detailed assessment of projected cancer risks due to CT scans in the US. The study was conducted by a team from the Radiation Epidemiology Branch of the National Cancer Institute (NCI), and argued that changes in practice might help to avoid the possibility of reaching an attributable risk of 29,000 cancer cases based on CT scans in the year 2007. The authors also observed that the impact would be largest in abdomen, pelvis and chest CT scans in adults aged 35 to 54 years.

**Unnecessary scans**

One of the most vexatious issues concerns CT scans which are not medically necessary, especially when it concerns repeat imaging of a particular patient – and the ensuing enhancement of cancer risk. According to one estimate, unnecessary scans could account for as much as 30 percent of CTs in the US. In Europe, such a figure is also likely to be high in countries such as Belgium and France where per capita CT scan levels are close to those of the US. Though the US state of California has passed a law requiring documentation in a patient’s medical record of radiation dose used for every CT scan, compliance has been inconsistent. Perspectives in Europe are problematic too. For example, the European Union collects dose levels in Europe, but there are major differences in definitions and data collection techniques.

**Progress in pediatric dosing**

Until the NCI study at the end of 2009, the emphasis on reducing CT cancer risks had largely been on pediatric scans. The authors of that paper noted there was evidence of pediatric doses being reduced as a result of social marketing campaigns such as Image Gently. The latter was launched in 2008 by the Alliance for Radiation Safety in Pediatric Imaging.

**Lessons from the pediatric dose control campaign**

One of the key recommendations of Image Gently was to promote standardization of pediatric dose measurements and display across vendor equipment. This is precisely what the recent BMJ study proposes to do for all patients. The authors of the study assessed mean effective doses and proportions of high dose examinations (defined as CT scans with doses above the 75th percentile defined during a baseline period) for abdomen, chest, combined chest and abdomen, and head CT. These were classified by patient characteristics (sex, age, and size), type of institution (trauma centre, 24x7 care provision, academic and private hospital), practice volumes, machine manufacturer and model, country etc. The figures were adjusted for patient characteristics, using hierarchical linear and logistic regression. For example, after taking into account patient factors, a fourfold range in radiation doses still existed in abdominal scans. Similar variations were found for chest and combined chest-and-abdomen scans.

**Huge variations in dose**

The BMJ study found that variations in radiation dose across institutions and countries were huge. For abdomen CT examinations, the mean effective radiation dose differed by a factor of four, with a 17-fold range in the share of high dose examinations (4 to 69%). Variations in mean effective dose for chest scans and combined chest plus abdomen scans were also close to four times, while the share of high dose exams varied from 1 to 26%, and 2 to 78%, respectively. For head CT, the differences were less spectacular (with the range of mean effective doses less than 1.5 times and the share of high dose exams ranging from 8 to 27%).

**Achievable and universal standards**

However, when the UCSF group adjusted for technical parameters, that is, in terms of the way CT scanners were used by medical staff, the variations in doses nearly disappeared. The researchers conclude that it is possible to optimize doses to a “single set of achievable quality standards” and apply this “to all hospitals and imaging facilities.” They also noted that the choice of “appropriate CT protocol parameters might be less complex than widely believed.” The key to protocol optimization lies in updating physician awareness and recalibrating expectations about what constitutes a diagnostic CT scan. The latter will be based on a better alignment of CT protocol parameter choices with diagnostic image quality requirements. One interesting finding was that institutions with lower average doses shared scanning approaches. These institutions tended to limit the number of protocols, with each relying on the minimum dose required to answer the clinical question. They used multiple CT scanning infrequently, had lower settings for tube current and tube potential, and used higher pitch for most, if not all, imaging indications.

**The way ahead**

The road to CT dose reduction and standardization will vary by type of institution and country. This is due to differences in the make and model of CT scanners as well as medical cultures, in terms of radiologist preferences and personnel support. There are case studies of protocol overhauls taking a year or more, and needing to be kept up-to-date with new CT software and scanner upgrades. Examinations with higher radiation exposure generally give more acceptable images than those where exposure is lower. The challenge is to optimize a ‘correct’ minimum dose for different patient sizes, ages and conditions. Continuing improvements in scanning technology will undoubtedly also be part of the process of optimizing protocols. On their side, some companies have been experimenting with artificial intelligence algorithms to position patients correctly in a CT scanner. Of course, all CT scans can expose patients to much higher levels of radiation than necessary.
Study could lead to safer and cheaper 3D medical imaging

A new study led by ANU has discovered a promising way to significantly lower doses of X-rays that has the potential to revolutionize 3D medical imaging and make screening for early signs of disease much cheaper and safer.

The research team, which involved the European Synchrotron Radiation Facility and Monash University, built upon an unconventional imaging approach known as “ghost imaging” to take 3D X-ray images of an object’s interior that is opaque to visible light.

Lead researcher Dr Andrew Kingston said the study was the first to achieve 3D X-ray imaging using the ghost imaging approach, which has the potential to make 3D medical imaging much cheaper, safer and more accessible.

“The beauty of using the ghost imaging technique for 3D imaging is that most of the X-ray dose is not even directed towards the object you want to capture - that’s the ghostly nature of what we’re doing,” said Dr Kingston from the ANU Research School of Physics and Engineering.

“There’s great potential to significantly lower doses of X-rays in medical imaging with 3D ghost imaging and to really improve early detection of diseases like breast cancer.”

Too much radiation from medical X-ray imaging can increase cancer risk, which limits how often patients can be tested with CT systems, 3D mammography for breast cancer screening and other 3D X-ray approaches.

“A variation of our approach doesn’t require an X-ray camera at all, just a sensor - this would make a 3D medical imaging setup much cheaper,” Dr Kingston said.

The proof-of-concept approach took a 3D ghost image of a simple object of 5.6mm diameter at a relatively low resolution of about 0.1mm.

The researchers devised a new ghost imaging measurement system that used a series of X-ray beams with patterns. Each beam was then split into two identical beams. The pattern was recorded in the primary beam, which acted as a reference since it never passed through the object that the researchers were imaging. The secondary beam passed through the object, with only the total X-ray transmission measured by a single sensor.

The researchers then used a computer to create a 2D X-ray projection image of the object from these measurements.

This process was repeated with the object at different orientations to construct a 3D image.

“Our most important innovation is to extend this 2D concept to achieve 3D imaging of the interior of objects that are opaque to visible light,” Dr Kingston said.

“3D X-ray ghost imaging, or ghost tomography, is a completely new field, so there’s an opportunity for the scientific community and industry to work together to explore and develop this exciting innovation.”

Co-researcher Professor David Paganin from Monash University said the team’s achievement could be compared to the early days of electron microscopes, which could only achieve a magnification of 14 times.

“This result was not as good as could be obtained with even the crudest of glass lenses using visible light,” he said.

“However, the microscope using electrons rather than light had the potential - realised only after decades of subsequent development - to see individual atoms, which are much tinier than an ordinary microscope using visible light can see.”

Australian National University
https://tinyurl.com/y7xeap7k

High-contrast imaging for cancer therapy with protons

Medical physicist Dr. Aswin Hoffmann and his team from the Institute of Radiooncology – OncoRay at the Helmholtz-Zentrum Dresden-Rossendorf (HZDR) are the first researchers to combine magnetic resonance imaging (MRI) with a proton beam, thus demonstrating that in principle, this commonly used imaging method can indeed work with particle beam cancer treatments.

This opens up new opportunities for targeted, healthy tissue-sparing cancer therapy.

Dr. Aswin Hoffmann and his team installed an open MR scanner in the experimental room at the National Centre for Radiation Research in Oncology – OncoRay. Conducting various experiments, the HZDR researchers were able to demonstrate that MRI can be combined with a proton beam.

Radiation therapy has long been part of the standard oncological treatment practice. A specific amount of energy, called dose, is deposited into the tumour tissue where it will damage the cancer cells’ genetic material, preventing them from dividing and ideally, destroying them. The most commonly used form of radiation therapy today is called photon therapy, which uses high-energy X-ray beams. Here, a substantial portion of the beam penetrates the patient’s body, while depositing harmful dose in healthy tissue surrounding the tumour.

An alternative is radiation therapy with charged atomic nuclei, such as protons. The penetration depth of these particles depends on their initial energy. They release their maximum dose at the end of their trajectory. No dose will be deposited beyond this so-called “Bragg peak”. The challenge for physicians administering this kind of therapy is to control the proton beam to exactly match the shape of the tumour tissue and thus spare as much of the surrounding normal tissue as possible.

Before the treatment, they conduct an X-ray-based computed tomography (CT) scan to select their target volume.

“This has various disadvantages,” Hoffmann says. “First of all, the soft-tissue contrast in CT scans is poor, and secondly, dose is deposited into healthy tissue outside of the target volume.”

On top of this, proton therapy is more susceptible to organ motion and anatomical changes than radiation therapy with X-rays, which impairs the targeting precision when treating mobile tumours. At present, there is no direct way of visualizing tumour motion during irradiation. That is the biggest obstacle when it comes to using proton therapy.

“We don’t know exactly whether the proton beam will hit the tumour as planned,” Hoffmann explains. Therefore, physicians today have to use large safety margins around the tumour. But that damages more of the healthy tissue than would be necessary if radiation were more targeted. That means we are not yet exploiting the full potential of proton therapy.”

Hoffmann and his team want to change that. In cooperation with the Belgian proton therapy equipment manufacturer IBA (Ion Beam Applications SA), his research group’s objective is to integrate proton therapy and real-time MR imaging. Unlike X-ray or CT imaging, MRI delivers excellent soft-tissue contrast and enables continuous imaging during irradiation. “There are already two such hybrid devices for clinical use in MR-guided photon therapy; but none exists for particle therapy.”

This is mainly due to electromagnetic interactions between the MRI scanner and the proton therapy equipment. On the one hand, MRI scanners need highly homogeneous magnetic fields in order to
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generate geometrically accurate images. The proton beam, on the other hand, is generated in a cyclotron, a circular accelerator in which electromagnetic fields force charged particles onto a circular trajectory and accelerate them. The proton beam is also steered and shaped by magnets, whose magnetic fields can interfere with the MRI scanner’s homogeneous magnetic field.

“When we launched the project three and a half years ago, many international colleagues were sceptical. They thought it was impossible to operate an MRI scanner in a proton beam because of all the electromagnetic disturbances,” Hoffmann explains. “Yet we were able to show in our experiments that an MRI scanner can indeed operate in a proton beam. High-contrast real-time images and precise proton beam steering are not mutually exclusive.” Many experts predicted another difficulty to occur from proton beam behaviour: when electrically charged particles move in the magnetic field of an MRI scanner, Lorentz forces will deflect the beam from its straight trajectory. However, here, as well, the researchers were able to demonstrate that this deflection can be anticipated and thus corrected for.

To explore these mutual interactions, Hoffmann and his team used the experimental room at the National Centre for Radiation Research in Oncology – OncoRay. This joint research platform operated by HZDR, TU Dresden and University Hospital Carl Gustav Carus was founded in 2005 as an innovative centre of excellence. Since the UPTD (University Proton Therapy Dresden) was established in 2014, patients have been receiving proton therapy in the OncoRay facility. Today, more than 120 scientists at OncoRay conduct research on innovative approaches and technologies for radiation therapy.

“Our mission is to individualize proton therapy biologically and to optimize it technologically towards its physical limits,” says Hoffmann, head of the research group on MR-guided radiation therapy at the HZDR. OncoRay has its own cyclotron to deliver the proton beam into the therapy room as well as into the experimental room. Hoffmann and his colleagues used the latter for their research activities. With the support of IBA and the Paramed MRI Unit of ASG Superconductors SpA, they installed an open MRI scanner in the path of the proton beam, realizing the world’s first prototype of MR-guided particle therapy. “We are lucky to have an experimental room that is large enough to accommodate an MRI scanner. That is one of OncoRay’s unique features.”

**Human images from world’s 1st total-body scanner unveiled**

EXPLORER, the world’s first medical imaging scanner that can capture a 3D picture of the whole human body at once, has produced its first scans. The brainchild of UC Davis scientists Simon Cherry and Ramsey Badawi, EXPLORER is a combined positron emission tomography (PET) and X-ray computed tomography (CT) scanner that can image the entire body at the same time. Because the machine captures radiation far more efficiently than other scanners, EXPLORER can produce an image in as little as 1 second and, over time, produce movies that can track specially tagged drugs as they move around the entire body.

The developers expect the technology will have countless applications, from improving diagnosis to tracking disease progression to researching new drug therapies.

The scanner has been developed in partnership with Shanghai-based United Imaging Healthcare (UIH), which built the system based on its latest technology platform and will eventually manufacture the devices for the broader healthcare market.

“While I had imagined what the images would look like for years, nothing prepared me for the incredible detail we could see on that first scan,” said Cherry, distinguished professor in the UC Davis Department of Biomedical Engineering. “While there is still a lot of careful analysis to do, I think we already know that EXPLORER is delivering roughly what we had promised. Badawi, chief of nuclear medicine at UC Davis Health and vice chair for research in the Department of Radiology, said he was dumbfounded when he saw the first images, which were acquired in collaboration with UIH and the Department of Nuclear Medicine at the Zhongshan Hospital in Shanghai.

“The level of detail was astonishing, especially once we got the reconstruction method a bit more optimized,” he said. “We could see features that you just don’t see on regular PET scans. And the dynamic sequence showing the radiotracer moving around the body in three dimensions over time was, frankly, mind-blowing. There is no other device that can obtain data like this in humans, so this is truly novel.”

Badawi and Cherry first conceptualized a total-body scanner 13 years ago. Their idea was kickstarted in 2011 with a $1.5 million grant from the National Cancer Institute, which allowed them to establish a wide-ranging consortium of researchers and other collaborators. And it got a giant boost in 2015 with a $15.5 million grant from the National Institutes of Health. The funding allowed them to team up with a commercial partner and get the first EXPLORER scanner built. Cherry said he expects EXPLORER will have a profound impact on clinical research and patient care because it produces high-quality diagnostic PET scans than have ever been possible. EXPLORER also scans up to 40 times faster than current PET scans and can produce a diagnostic scan of the whole body in as little as 20 to 30 seconds. Alternatively, EXPLORER can scan with a radiation dose up to 40 times less than a current PET scan, opening new avenues of research and making it feasible to conduct many repeated studies in an individual, or dramatically reduce the dose in pediatric studies, where controlling cumulative radiation dose is particularly important.

UC Davis
https://tinyurl.com/ybtmrcee

**Novel imaging technique brings diagnostic potential into operating room**

A team of University of Illinois at Urbana-Champaign researchers led by Bioengineering Professor Stephen Boppart has successfully visualized the tumour microenvironment of human breast tissue shortly after it was surgically removed from a patient in the operating room. The researchers achieved this using a new portable optical imaging system developed in Boppart’s lab.

This work marks a major step toward providing cancer researchers with a new tool for tracking tumour progression and physicians new technology for tissue pathology and diagnostics.

Typically, the process for diagnosing cancer takes several days. A surgeon first removes a tissue sample that is then processed with chemical dyes; later, the sample is sent to a pathologist for examination and subsequent diagnosis.

Label-free intraoperative nonlinear imaging of the tumour microenvironment provides real-time visualization of structural and molecular features, including extracellular...
vesicles that can be potential biomarkers of cancer aggressiveness.

“We believe that capturing the dynamic cellular and molecular features in freshly removed or biopsied tissue specimens contains valuable diagnostic and prognostic information that is currently lost when specimens are placed in a fixative and essentially killed quickly in order to preserve structure,” said Boppart, who is also a faculty member at the Beckman Institute for Advanced Science and Technology at Illinois and a professor of electrical & computer engineering (ECE) at the Carle Illinois College of Medicine. “Our imaging platform and methodology allow us to extract this new information in real-time, at the point-of-procedure.”

Boppart's portable optical imaging system uses precise light pulses to simultaneously image tissue in four modalities, enabling his team to study concurrent processes within cells and tissue that make up the tumour microenvironment. For example, collagen fibres appear in green; elastin fibres and flavin adenine dinucleotide-containing cell cytoplasm appear in yellow; cell membranes, lipid boundaries, and extracellular vesicles (EVs) appear in magenta; and nicotinamide adenine dinucleotide in the cells and lipids appears in cyan.

The team demonstrated the viability of their imaging system in the operating room at Carle Foundation Hospital during breast cancer surgeries. Within 30 minutes of the diseased tissue being extracted, the researchers were able to identify specific tissue features, including molecular signatures associated with metabolic activity inside individual cells that make up the tumour microenvironment. The researchers were also interested in measuring tumour-related extracellular vesicles (EVs), which are known to promote the spread of cancer.

“EVs do play an essential role in cancer progression,” said ECE graduate student Yi “Edwin” Sun, the lead author of the research paper. “Quantifying EV densities may be developed as a potential biomarker for future cancer diagnoses.”

As part of their studies, they also collected and imaged healthy breast tissue that surgeons had removed from cancer-free patients during breast reduction procedures.

In a comparison of the two types of tissue, they found a clear difference in EV density between the cancerous and healthy tissue. For example, the cancerous tissue exhibited increased EV densities and had shorter tumour-to-margin distance.

“What we observed about the extracellular vesicles is significant but it could only be accurately determined with our new system,” said Sun, noting how other portable optical imaging systems deployed in the operating room all alter the tissue samples either with fluorescent dyes or toxic ultraviolet light. “Our imaging technique works well with current cancer treatment routines and is free of any form of perturbation.”

According to Boppart, the team's future plans include using the imaging system on tissue specimens obtained from needle-biopsy procedures that are routinely performed in outpatient settings. They will also continue using the system on samples from the operating room.

University of Illinois College of Engineering
https://tinyurl.com/ybl75dj

**Novel technique may significantly reduce breast biopsies**

An innovative technique that uses mammography to determine the biological tissue composition of a tumour could help reduce unnecessary breast biopsies, according to a new study.

Mammography has been effective at reducing deaths from breast cancer by detecting cancers in their earliest, most treatable stages. However, many women are called back for additional diagnostic imaging and, in many cases, biopsies, for abnormal findings that are ultimately proven benign. Research estimates this recall rate to be more than 10 percent in the United States.

“The callback rate with mammography is much higher than ideal,” said the study’s first author, Karen Drukker, PhD, research associate professor from the Department of Radiology at the University of Chicago. “There are costs and anxiety associated with recalls, and our goal is to reduce these costs but not miss anything that should be biopsied.”

Dr. Drukker and colleagues recently studied a new technique called three-compartment breast (3CB) imaging. John Shepherd, PhD, currently at the University of Hawaii in Honolulu, and his team developed 3CB while he was at the University of California in San Francisco. By measuring the water, lipid and protein tissue composition throughout the breast, 3CB might provide a biological signature for a tumour. For instance, more water in the tumour tissue might indicate angiogenesis.

For the study, the researchers acquired dual-energy mammograms from 109 women with breast masses that were suspicious or highly suggestive of a malignancy immediately prior to biopsy. The ensuing biopsies showed 35 masses to be invasive cancers, while the remaining 74 were benign.

3CB images were derived from the dual-energy mammograms and analysed along with mammography radiomics developed by Maryellen L. Giger, PhD, and her team at the University of Chicago for use in computer-aided diagnosis on breast images. The combination of 3CB image analysis and radiomics improved the positive predictive value in breast masses deemed suspicious. The combined method improved positive predictive value from 32 percent for visual interpretation alone to almost 50 percent, with an almost 36 percent reduction in biopsies. The 3CB-radiomics method missed one of the 35 cancers, for a 97 percent sensitivity rate.

“These results are very promising,” Dr. Drukker said. “Combining 3CB image analysis with mammography radiomics, the reduction in recalls was substantial.”

Dr. Drukker said the combined 3CB-radiomics approach has the potential to play an increasingly prominent role in breast cancer diagnosis and perhaps also screening. She noted that 3CB can easily be added to mammography without requiring extensive modifications of existing equipment.

“The patient is already getting the mammography, plus we get all this extra information with only a 10 percent additional dose of radiation,” she said.

Radiological Society of North America
https://tinyurl.com/ychyg9wa

**Targeting MC1R in metastatic melanoma**

In 1960, scientists described the “Philadelphia chromosome” that causes chronic myeloid leukemia, and in 2001 the Food and Drug Administration approved the drug imatinib to disable the action of this cancer-causing genetic change. It was the dawn of genetically-targeted treatments against cancer and it seemed as if many cancers would fall to a similar strategy: Find a genetic difference between cancer cells and healthy cells, and then develop a drug to target this difference. Of course, rarely has it
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proved that easy. It’s difficult to find a genetic difference common to all cells within a single cancer, and many of these differences are impossible to target with existing drug strategies. Often this seemingly simple gene/drug pairing doesn’t work. Then again, sometimes it does.

A University of Colorado Cancer Center study describes a genetic change common to 80 percent of human melanomas, the most deadly form of skin cancer, and also describes a molecule that seeks out cells marked by this genetic change. The current study attaches a radioactive label to the targeting molecule and uses positron emission tomography (PET) imaging to show that the radiolabeled molecule does, in fact, seek out and bind to melanoma cells. Using a similar approach, it may be possible to not only image these cells, but to attach therapy to this targeting molecule to kill these melanoma cells.

The work starts with a protein called melanocortin-1 receptor (MC1R), which is involved in determining skin and hair colour, but which is also found at a higher level on the surface of more than 80 percent of human melanomas. The current study describes a “peptide” that specifically binds to MC1R. If MC1R is a lock, then the peptide 68Ga-DOTA-GGNle-CycMSHhex is the key that fits it. In this case, researchers attached an imaging radionuclide to the peptide, then the radiolabeled peptide finds MC1Rs on melanoma cells and lesions. Miao sees that the combination of these two approaches – one radiolabeled and one fluorescent – may potentially improve surgical outcomes for melanoma using imaging-guided surgery.

He also sees the potential to use a similar strategy as a personalized therapeutic approach for patients with melanoma metastases high in MC1Rs, especially for brain metastases.

University of Colorado Cancer Center
https://tinyurl.com/ycj552dv

Ultra ultrasound to revolutionize technology

A new and extremely sensitive method of measuring ultrasound could revolutionise everything from medical devices to unmanned vehicles.

Researchers at The University of Queensland have combined modern nanofabrication and nanophotonics techniques to build the ultraprecise ultrasound sensors on a silicon chip.

Professor Warwick Bowen, from UQ’s Precision Sensing Initiative and the Australian Centre for Engineered Quantum Systems, said the development could usher in a host of exciting new technologies.

“This is a major step forward, since accurate ultrasound measurement is critical for a range of applications,” he said. “Ultrasound is used for medical ultrasound, often to examine pregnant women, as well as for high resolution biomedical imaging to detect tumours and other anomalies. It’s also commonly used for spatial applications, like in the sonar imaging of underwater objects or in the navigation of unmanned aerial vehicles. Improving these applications requires smaller, higher precision sensors and, with this new technique, that’s exactly what we’ve been able to develop.”

“We’ve developed a near perfect ultrasound detector, hitting the limits of what the technology is capable of achieving,” Professor Bowen said. “We’re now able to measure ultrasound waves that apply tiny forces – comparable to the gravitational force on a virus – and we can do this with sensors smaller than a millimetre across.”

According to research leader Dr Sahar Basiri-Esfahani, now at Swansea University, the accuracy of the technology will soon give us the ability to listen to the sound emitted by living bacteria and cells.

“This could fundamentally improve our understanding of how these small biological systems function. A deeper understanding of these biological systems may lead to new treatments, so we’re looking forward to seeing what future applications emerge.”

University of Queensland
https://tinyurl.com/ycck2orgs

European Society of Radiology and Siemens Healthineers are inviting discussion on the digital future of radiology at ECR 2019

A joint discussion platform for all aspects relating to the digitalization of radiology will take place at the European Congress of Radiology in the Siemens Healthineers Digital Experience Hall, where experts from academia and industry will be available for open exchanges in a range of interactive discussion formats and will provide insights into their current research and development to make the influence of digitalization on the radiology of the future more tangible.

The discussion topics were selected in advance by the ECR participants as part of an online survey. The respondents chose artificial intelligence (AI), big data and augmented and virtual reality. Visitors to the Siemens Healthineers Digital Experience Hall will be able to, among other things, experience augmented reality solutions firsthand and create their own AI applications.

Digitalization has, for several years now, been a major topic at every radiology congress. Given the growing importance of big data applications and artificial intelligence – Siemens Healthineers has already launched 40 AI-based solutions and secured around 500 machine learning patents – a wide range of predictions are circulating regarding the significance of the potential changes for the occupational profile and range of tasks of radiologists. But what will the real consequences of increasing digitalization be for their daily work? This is what the ESR, together with the congress participants and Siemens Healthineers, wants to find out at ECR 2019. In the hall, the speakers will provide insights into their latest development work and present new innovative technologies, such as a digital twin of the heart. In addition to a wide range of discussion formats, numerous visionary application examples will be able to be both experienced and understood with all the senses.
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Artificial intelligence and clinical decision support - FDA lends a helping hand

In February last year, the US Food and Drug Administration (FDA) cleared the first medical device which uses artificial intelligence (AI) to provide clinical decision support for stroke. The Viz.AI Contact application uses an AI algorithm to identify a suspected stroke and notifies a specialist more quickly than was previously possible. Faster treatment, in turn, lessens the extent of a stroke or its progression. Subsequent FDA clearances and a recent decision to formalize regulations for such evaluations are likely to stimulate further innovation and acceptance of AI devices.

Saving time
Viz.AI Contact analyses CT images of the brain and sends a text notification by smartphone or tablet to a vascular neurologist or a neuro-interventional specialist, should a large vessel occlusion (LVO) be suspected. The algorithm automatically notifies the specialist at the same time that a review of the images is being conducted by a first-line provider. This is faster than the usual standard of care where patients wait for a radiologist to firstly review CT images and then notify a neurovascular specialist.

Retrospective study and real world data
Viz.AI, Inc., which developed the Contact application, submitted a retrospective study of 300 CT scans. This compared the performance of the image analysis algorithm and notification functionality against two trained neuro-radiologists. Real-world evidence from a clinical study demonstrated quicker notification of a neurovascular specialist, in cases where blockage of a large vessel in the brain was suspected. In more than 95 percent of cases, the automatic notification was faster, saving an average of 52 minutes (with a range of between 6 and 206 minutes).

De Novo premarket review
The Viz.AI application was reviewed by the FDA through its De Novo premarket review process, a regulatory pathway for new types of medical devices that carry low to moderate risk, but lack a legally marketed predicate device to base a determination of equivalence. The FDA action creates a new regulatory classification, allowing other devices with the same medical imaging intended to obtain marketing authorization by 510(k) notification. One of the first areas to benefit from Viz.AI will be AI or computer-aided triage devices, whose potential in fields such as emergency medicine is likely to be vast. Viz.AI, Inc., itself is developing Viz ICH, which uses AI to automatically detect intra-cerebral hemorrhages and triage the patient directly to the neurosurgeon on call.

Decision support for breast cancer screening
Nine months after FDA approval of Viz.AI, at the 2018 Radiological Society of North America (RSNA) annual meeting in November, Siemens Healthineers showcased the AI-based features of syngo.Breast Care, a mammography solution. syngo.Breast Care aims to provide interactive decision support for breast cancer screening. Transpира, Siemens’ mammography reading software, is based on deep learning techniques, with training provided via over 1 million images. As a result, syngo.Breast Care's AI-based algorithms evaluate and interpret individual lesions as well as 2-D mammograms and 3-D tomosynthesis. The system also sorts and scores cases on a 10-point scale, based on radiologist preferences of risk factors such as lesions, micro-calcifications and other abnormalities.

Siemens Healthineers aims to integrate interactive decision support into syngo. Breast Care, and reduce radiologists’ workload for the interpretation of mammograms. This has become especially challenging, given rapid growth in the use of techniques such as 3-D breast tomosynthesis.

Small firms also in play
Smaller firms have also targeted this area. ICAD’s ProFound AI, for example, also leverages AI to detect cancer in breast tomosynthesis. The software, which was FDA cleared less than a month after syngo.Breast Care was unveiled, examines every image in a tomosynthesis scan,
detects malignant soft tissue densities and calcifications. Profound AI estimates a ‘Certainty of Finding’ for each detection and, like the classification system in syngo.Breast Care, assigns Case Scores to each case to represent confidence that a detection or case is malignant. The scores are represented on a scale from 0 to 100 percent, with higher scores indicate high confidence levels in malignancy. This, in turn, is expected to improve detection, lead to fewer patient recalls and save mammographers time in reading images. This makes it geared toward screening, although it can evidently be used for diagnostic studies.

**AI at inflection point**

The above examples demonstrate that the use of AI is now close to an inflection point in terms of clinical decision support tools. These will provide physicians usable interactive and dynamic pathways which move beyond decision support to true evidence-based decision making, along with personalized care recommendations. To many experts, AI seems to have been the missing link for tools that assist radiologists in improving appropriateness of follow-up recommendations for incidental findings, and thereby to enhance adherence to guidelines available at point of care. One of the consequences of such AI-assisted tools will be to reduce the variability in follow-up recommendations, as well as unnecessary imaging studies.

**Diagnosis and decision support versus analysis and detection**

Maximum attention to AI in imaging is currently on diagnosis and decision support. AI in areas such as quantitative analysis and assisted detection can be considered a spin-off from automation, which has been around for a longer period of time, but reinforced more recently by machine learning. Automated quantification tools are now sufficiently mature and routinely accepted in the market. AI algorithms are used to make measurements from imaging exams and perform calculations which were previously manual and time-consuming. AI-driven quantitative analysis tools also are being used in data analytics for data mining electronic medical records, billing systems, patient scheduling and even in stand-alone scanners. Mined data range from radiation dose used by particular technologists for specific protocols to predictive analytics that pinpoint spikes in demand by day and time, and schedule back-up staff in the radiology department. By contrast, the application of AI (and even automation) in medical fields such as computer-aided diagnosis and clinical decision support is very recent, and is likely to be some time before they become commonplace. The principal focus on AI use for image diagnosis is where timing is crucial – such as a heart attack or stroke (e.g. Viz.AI Contact). Closely related areas include tools to reduce review time for complex exams, and help triage patients needing more immediate care or other kinds of back-up.

**Other new AI imaging applications**

One exciting new entrant into AI in imaging is IcoMetrix, from Belgium’s IcoBrain. This FDA-cleared algorithm analyses CT scans to characterize traumatic brain injury, using deep learning to quantify the severity of such typically qualitative indicators of brain injury as hyperdense volumes, compression of the basal cisterns and midline brain shift. Another FDA-cleared device is Cardio AIMR, which analyses MR images for cardiovascular blood flow. Its developer, Arterys, also has other AI tools to measure and track liver lesions and lung nodules, accelerate display of medical images, and interface with the common desktop Google Chrome browser to display mammograms.

**The challenge of integration**

Although the FDA is clearing the way for follow-on AI products, there are concerns that the process is constrained to highly specific medical imaging diagnostic reviews. Some radiologists are questioning the viability of new AI software systems, if they require scores of different contracts and integration into a hospital or enterprise imaging system – which would be a problem not only for hospital IT departments but also for legal review. One of the ways forward is by reconfiguring approaches to enterprise imaging by streamlining workflow. Some vendors are developing bridges between different AI applications. One of the immediate goals is to have AI imaging dovetail into picture archive and communication systems (PACS) as well as vendor neutral archives. For example, Viz.ai software is designed to receive DICOM images directly from any CT scanner to a local virtual machine (VM) behind a network’s firewall.

**Major firms nurture start-ups**

Leading healthcare technology vendors are also starting to actively partner with smaller companies to provide a combination of in-house and third-party apps via a web-based AI app store platform. One good example of this is Siemens’ Digital Ecosystem, which offers an online menu of apps from Siemens and its partner, including some offering AI-enabled technology. Similar AI app store initiatives are also being taken by other vendors. At RSNA 2018, where Siemens showcased syngo.Breast Care, IBM Watson said it would begin to partner with AI vendors to offer products on its new AI Marketplace, by offering standardized application programming interfaces (API) for building or integrating third party software and making it available through the IBM Cloud. Smaller vendors have seized such opportunities. French imaging agent vendor Guerbet, for instance, is working with IBM Watson Health to develop AI software to support liver cancer diagnosis and care. IBM had initially planned to develop and launch its own AI solutions across the healthcare spectrum. However, it had to cope not only with delays in commercializing its own AI products, but small and nimble start-ups, such as viz.AI getting ahead in obtaining FDA clearance. The biggest setback was MD Anderson ending its partnership on cancer imaging with IBM. Other major players are also treading similar paths. GE Healthcare’s Edison platform is designed to help accelerate the development and adoption of AI and other new technologies, with clinical partners using Edison to develop and test algorithms and mate them to Edison applications and smart devices. On its part, at RSNA 2018, Philips Healthcare also launched its IntelliSpace Discovery 3.0 visualization and analysis platform to prepare patient data to train and validate deep learning algorithms. The platform is designed specifically to support imaging research.

**FDA to formalize De Novo rules**

Developments in AI-enabled clinical decision support, like broader AI healthcare applications, are likely to pick up after the FDA decided to formally establish regulations for the De Novo classification process in December 2018. Although the De Novo process is part of the Food and Drug Administration Modernization Act, the FDA Safety Innovation Act and the 21st Century Cures Act, it is currently not covered by any specific regulations. If finalized, the proposed rules are intended to provide clarity and transparency on the De Novo classification process.
Heart failure telemedicine programs prove effective six months after discharge

Home telemedicine programs for heart failure are effective at preventing death for at least six months after hospitalization, but generally lose any benefit after one year, according to a meta-analysis of clinical trials published. These findings, published by a study team led by Feinstein Institute for Medical Research Professor Renee Pekmezaris, PhD, help educate healthcare professionals how to refine heart failure telemedicine programs and about who most benefits from these programs.

Heart failure occurs when the heart muscle does not pump blood as well as it should. An estimated six million Americans have heart failure, half of whom die within five years of diagnosis. One way to decrease heart failure mortality is to be cognizant and proactive about symptoms post hospitalization. It is challenging for patients to continuously monitor symptoms and notify professionals, but this is a critical step for the patient's health because medications and diet may need to be adjusted.

Home telemedicine programs offer a solution. They are comprised of healthcare professionals monitoring important vital signs and teleconferencing with patients on a regular basis to discuss their symptoms with the goal of identifying issues sooner and preventing re-hospitalization. Dr. Pekmezaris’ analysis of 26 telemedicine programs in randomized, controlled trials for heart failure found the programs are effective, but lose their effectiveness over time.

“We found that while home telemonitoring or telemedicine decreases mortality six months after a hospitalization for heart failure patients, this benefit does not continue a year after hospitalization,” said Dr. Pekmezaris. “There may be several reasons for this. Patients may become less adherent to monitoring their vital signs, like weight and blood pressure, over time. Whether they are too sick to adhere, or they just don’t make it as much of a priority as they did right after their hospitalization, we don’t know. But, these findings are important because, as scientists and providers, we need to understand when to rely on telemedicine, and how to create a program that most benefits patients.”

Another interesting finding from the analysis was that despite industry expectations, home telemonitoring doesn’t necessarily stop hospitalizations – in fact, it increases the odds of all-cause emergency room visits. This is actually a good thing because if the patient is determined to be experiencing a serious episode – the emergency room is the right place to be.

Northwell Health
https://tinyurl.com/y7k6cnbz

Machine learning can be used to predict which patients require emergency admission

Machine learning – a field of artificial intelligence that uses statistical techniques to enable computer systems to ‘learn’ from data – can be used to analyze electronic health records and predict the risk of emergency hospital admissions, a new study from The George Institute for Global Health at the University of Oxford has found.

The research suggests that using these techniques could help health practitioners accurately monitor the risks faced by patients and put in place measures to avoid unplanned admissions, which are a major source of healthcare spending.

‘There were over 5.9 million recorded emergency hospital admissions in the UK in 2017, and a large proportion of them were avoidable,’ said Fatemeh Rahimian, former data scientist at The George Institute UK, who led the research. ‘We wanted to provide a tool that would enable healthcare workers to accurately monitor the risks faced by patients, and as a result make better decisions around patient screening and proactive care that could help reduce the burden of emergency admissions.’

The study, of 4.6 million patients from 1985 to 2015, was conducted using linked electronic health records from the UK’s Clinical Practice Research Datalink. A wide range of factors was taken into account, including age, sex, ethnicity, socioeconomic status, family history, lifestyle factors, comorbidities, medication and marital status, as well as the time since first diagnosis, last use of the health system and latest laboratory tests.

Using more variables combined with information about their timing, machine learning models were found to provide a more robust prediction of the risk of emergency hospital admission than any models used previously.

‘Our findings show that with large datasets which contain rich information about individuals, machine learning models outperform one of the best conventional statistical models,’ Rahimian said. ‘We think this is because machine learning models automatically capture and ‘learn’ from interactions between the data that we were not previously aware of.’

Whether machine learning models can lead to similarly strong improvements in risk prediction in other areas of medicine requires further research.

University of Oxford
https://tinyurl.com/y9wlgsmy

Telemedicine may increase patients’ satisfaction with their medical care

Cardiovascular disease pervades Appalachia, yet many Appalachians live far from any heart and vascular specialist. Follow-up doctor’s visits in the weeks after cardiovascular surgery can involve hours-long drives down narrow, winding roads. A recent study led by Albeir Mousa, a professor in the West Virginia University School of Medicine, suggests telemedicine may improve these patients’ satisfaction with their postoperative care as well as their quality of life.

With telemedicine, a healthcare provider can use a computer, tablet or other electronic device to remotely evaluate their patients’ symptoms, diagnose illnesses or injuries, and prescribe treatments. They can also field their patients’ questions.

The 30 participants in Mousa’s study were recovering from vascular surgery. In each case, the surgeon made an incision in the patient’s groin to access the arteries that needed rebuilding or rerouting. Whether the incisions healed without complications was the study’s focus.

Sixteen patients received tablets with Enform—a telemedicine app developed by TeleMed 2020 Inc.—that facilitated communication with nurses managing their care. As part of an in-home monitoring kit, patients also received thermometers,
blood pressure cuffs, scales and devices to measure blood oxygen saturation levels. Each day, patients who had been discharged from the hospital weighed themselves, took their temperature, measured their pulse and blood pressure, and determined their blood oxygen levels using the Enform app. They completed a wellness and symptom tracking quiz that included questions like “How is your pain today?” Each week they answered satisfaction and emotional wellness questions as well. These data, along with photos of the surgical incision sites that patients captured with the app—were made available to the patients’ care team.

Care managers, in turn, logged into the telemedicine platform daily to review the information patients had submitted from their homes. Cares managers received notifications of abnormalities, such as blood pressure spikes and fevers. Based on the information they gathered, the care managers intervened, answered patients’ questions about symptoms or wound care, called in prescriptions, scheduled appointments with physicians, and modified care plans based on consultations with the medical director. Meanwhile, the other 14 participants had standard-of-care treatment. They received no monitoring equipment, tablet or telemedicine app.

After 30 days, the researchers made a number of comparisons between the two groups. For example, were wound infections more common in one group than the other? Did one group require more hospital readmissions? How did members of each group rate their own well-being? Were they happy with the postoperative care they received? Hospital-readmission and wound-infection rates did not differ significantly between groups. The researchers attribute this fact to the study’s small sample size. But patients in the telemedicine group scored better on measures of their physical function, mental health and role limitations due to physical health problems. In addition, the vast majority of patients who used the app found it intuitive to use. Using a five-point scale to measure ease of use, 91 percent of patients gave it a score of 4 or 5. A similar percentage of patients said the app enriched the quality of care they received.

Likewise, the telemedicine patients’ scores on quality-of-life assessments surged more dramatically between the study’s beginning and end.

Patients assigned to the telemedicine group lived an average of 60 miles from their vascular care center. Almost a third of them lived more than 77 miles away and had to drive for two to three hours to get there. “Telemedicine would save a lot of headache in Appalachia—in areas where people don’t even have the money to get in the car to get to the hospital,” said Mousa, who teaches surgery at the WVU Health Sciences Charleston Campus.

He envisions that, one day, patients will be able to download a cell phone app that provides these telemedicine services. That way, they won’t even need a tablet. “Each household has at least one cell phone, and most likely, it’s a smartphone.” “You’re getting the same service,” he said, “but with a very minor hassle for the patient and the physician.”

West Virginia University
https://tinyurl.com/ya3z8p6r

**Automated text messages improve outcomes after joint replacement surgery**

An automated text messaging system increases patient engagement with home-based exercise and promotes faster recovery after total knee or hip replacement surgery, reports a study.

Patients receiving timely texts showed improvement in several key outcomes, including fewer days on opioid pain medications, more time spent on home exercises, faster return of knee motion, and higher satisfaction scores, according to the research by Kevin J. Campbell, MD, of Rush University Medical Center, Chicago, and colleagues. “A chatbot that texts timely, informative and encouraging messages to patients can improve clinical outcomes and increase patient engagement in the early postoperative period after total joint replacement,” Dr. Campbell comments.

The randomized trial included 159 patients undergoing primary total knee or hip replacement. All received standard education, including instructions on home exercises after surgery. In addition, one group of patients received a series of automated, physician-specific text messages. The pre-programmed texts provided recovery instructions along with encouraging and empathetic messages, personalized video messages from the surgeon, and brief instructional therapy videos. The texts were sent via a service called STREAMD; Dr. Campbell is the CEO and Co-Founder of STREAMD.

“The content of the text and video messages reinforced the perioperative instructions and were delivered to patients at the appropriate time based on their recovery progress,” the researchers write. Over the six-week period after surgery, patients in the text-message group received about 90 texts. The system did not accept inbound text responses from patients, although patients could access further information on topics they selected.

Patients who received automated texts performed their home exercises an average of 46 minutes per day, compared to 38 minutes in the standard-care group, a significant difference of nine minutes per day. The texted group had greater knee motion at three weeks’ follow-up, suggesting faster short-term recovery, but by six weeks, knee motion was similar between groups.

Patients in the text-message group stopped using opioid pain medications about 10 days sooner than those in the control group (22 versus 32 days). They also had higher mood scores and were more likely to say that their postoperative instructions were clear. Patients assigned to automated texts also made fewer phone calls to the surgeon’s office. There was a trend toward fewer emergency department visits as well, although this difference was not statistically significant.

There is growing interest in using text messages to increase patient engagement in recovery after surgery. But previous digital patient engagement platforms have not been widely adopted by either patients or healthcare providers.

This study provides evidence of improved outcomes when an automated text-message system makes daily contact with patients and provides them with relevant information and encouragement. Advantages include more time doing recommended home exercises, faster recovery of knee motion, and improved patient satisfaction. The 10-day reduction in opioid use is a potentially important advantage, reducing the risk of persistent opioid use and other complications. “This finding could be related to improved patient education and to the encouraging and empathetic tone of the text and video messages,” Dr. Campbell comments. “It could also reflect improved mood scores and patients’ confidence in their ability to manage their recovery, which have been shown to be very effective pain relievers.”

The benefits of such an automated system could be especially important at a time when more patients are undergoing joint replacement surgery with less overall contact with the treatment team. “As we search for practical methods to engage
The marketing of direct-to-consumer “neurotechnologies” can be enticing: apps that diagnose a mental state, and brain devices that improve cognition or “read” one’s emotional state. However, many of these increasingly popular products aren’t fully supported by science and have little to no regulatory oversight, which poses potential health risks to the public. In a new piece published in the journal Science this week, two bioethicists from Penn Medicine and the University of British Columbia suggest the creation of a working group that would further study, monitor, and provide guidance for this growing industry – which is expected to top $3 billion (€2.63 billion) by 2020.

“There’s a real thirst for knowledge about the efficacy of these products from the public, which remains unclear because of this lack of oversight and gap in knowledge,” said lead author Anna Wexler, PhD, an instructor in the department of Medical Ethics and Health Policy at the Perelman School of Medicine at the University of Pennsylvania. “We believe a diverse, dedicated group would help back up or refute claims made by companies, determine what’s safe, better understand their use among consumers, and address possible ethical concerns.”

The group, made up of researchers, ethicists, funders, and industry experts, among others, the authors wrote, would serve as a clearinghouse for regulatory agencies, such as the U.S. Food and Drug Administration (FDA) and the Federal Trade Commission (FTC), third-party organizations that monitor advertising claims, industry, social and medical scientists, funding agencies, and the public at large.

While some of these techniques are used in clinical and research laboratory settings – for example, electroencephalography (EEG) devices are used to diagnose and treat epilepsy — many consumer-grade versions of neurotechnology devices are only loosely based in science. It is unclear whether the laboratory data collected to test them is applicable to consumer-grade products, leading many in the scientific world to question the efficacy, and advocate for increased regulation of these readily available techniques and products.

For example, some consumer neurostimulation devices may pose dangers, such as skin burns. There are also potential psychological harms from many consumer EEG devices that purport to “read” one’s emotional state.

“If a consumer EEG device erroneously shows that an individual is in a stressed state, this may cause him or her to become stressed or to enact this stressed state, resulting in unwarranted psychological harm,” the authors wrote. Also, a smartphone wellness app that diagnoses symptoms of depression does so without medical support structures, such as a psychologist or mental health counsellor.

Penn Medicine
https://tinyurl.com/ydk5fldg

Home-based hypertension program produces ‘striking’ results

Pilot study by Brigham investigators finds that an innovative care-delivery program helped 81 percent of participants achieve blood pressure control in seven weeks.

Hypertension, or high blood pressure, is a widespread clinical problem affecting nearly half of all adults. Despite the serious consequences that can result from hypertension, which puts patients at increased risk for heart attacks, strokes and other cardiovascular events, elevated blood pressures often remain untreated or undertreated for years, and the control rate for hypertension hovers at just 50 percent. Seeing opportunities for improvement, innovators and clinicians at Brigham and Women’s Hospital have developed a new home-based, care-delivery program designed to improve hypertension control rates quickly and at significantly lower cost than traditional, office-based blood pressure programs. The new approach, piloted among 130 participants, helped 81 percent of patients bring their blood pressures under control in, on average, just seven weeks.

“This is a striking result, especially given the very short time frame in which control was reached: an average of seven weeks,” said corresponding author Naomi Fisher, MD, director of the Hypertension Service and Hypertension Specialty Clinic at the Brigham. “There are a few notable healthcare systems that have matched or exceeded this control rate, but most clinical practices do not approach this rate of success.”

To overcome some of the challenges that clinical practices face, Fisher and colleagues combined several innovative strategies to create their program. Enrolled participants each received a Bluetooth-enabled blood pressure device that could automatically transmit the blood pressure measurements patients took at home into their electronic medical records. Patients had easy and frequent access to “patient navigators”—non-physicians who had been trained to use a clinical algorithm developed by hypertension specialists. The program enabled rapid assessment and medication dosage adjustments for the patients.

The pilot was conducted as a prospective cohort study. The team enrolled 130 patients whose blood pressure was uncontrolled (greater than 140/90 mmHg). Patients were recruited from two clinics to test efficacy in two settings: a Brigham primary care clinic (800 Huntington Ave.), and the Brigham’s Watkins Cardiovascular Clinic. All adults were eligible except pregnant women and those with advanced kidney disease.

Enrolled patients were given a Bluetooth-enabled blood pressure device and taught how to use it. Patients were instructed to measure their blood pressure at home twice daily in duplicate. Medication adjustments were made every two weeks until home blood pressure was controlled at <135/85 mmHg.

The team's next step will be to scale up the program to test its generalizability and sustainability. With this approach, the team anticipates significant cost effectiveness and cost savings, in addition to the prevention of cardiovascular events and death from treating hypertension more intensively in men and women.

“The time-honoured model of treating hypertension via traditional visits to the doctor is neither effective nor sustainable,” said Fisher. “Development of innovative solutions to manage hypertension effectively and efficiently, and thus reduce the cardiovascular risk burden in larger populations, is critical. Organizations can and should develop and adopt innovative technologies to create sustainable solutions for the control of hypertension.”

Brigham and Women’s Hospital
https://tinyurl.com/yatadjyf

Bioethicists call for oversight of direct-to-consumer “neurotechnologies”
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www.worldhospitalcongress.org
Emergency telemedicine

Over recent decades, the field of telemedicine has been witness to periods of great promise, relative stasis as well as overstretch and false starts.

However, there is one telemedicine application which has seen steady, consistent growth. This is emergency telemedicine, where application development, especially teleconsultation and teleradiology, has synchronized with increasing demand for A&E as well as the forward march of telecoms technology.

From the outset, the benefits of telemedicine were self-evident in emergency care in settings such as ski resorts, highway or rail accidents, and after natural disasters. Telemedicine enabled trauma specialists to interact with overtaxed field personnel on site, to gauge the severity of injuries and provide clinical assessments on treatment or evacuation. This aspect of telemedicine was spun out off one of its first movers, the military.

Telemedicine and travel

The roots of ‘serious’ telemedicine practice can be considered to date to the 1990s. Nevertheless, medical practitioners were aware of the enormous possibilities it afforded well before this.

In the 1930s, luxury liners used marine radio-telephones to communicate with physicians about urgent cases on board. Travelers were again the core target market for the first teleradiology consultations, conducted in the 1960s by Dr. Kenneth Bird, who used a two-way/interactive television system that connected Massachusetts General Hospital to Boston’s Logan Airport to provide emergency medical care.

1994: A&E referrals fall at Belfast hospital

Among the earliest case studies on modern emergency telemedicine is a 12-month review of a 1994 link between the Royal Victoria Hospital in Belfast and a minor treatment centre (MTC) in South Westminster, London. Over the study period, the telemedicine link was actively used in only about 0.5% of cases. However, the number of patients referred to a GP fell dramatically as did those referred to A&E. Another interesting observation was an increase in confidence of the nursing staff at the Westminster MTC.

Wembley study compares outcomes, radiologists vs. teleradiologists

At the beginning of 1996, Wembley Community Hospital in London established a minor accident treatment service (MATS), supported by an advanced teleradiology link to Central Middlesex Hospital. The system was run by emergency nurse practitioners based on a set of clinical protocols which consisted of prompts advising the use of teleradiology.

Two years later, a paper evaluated six months activity at the MATS, covering all patients seen – a total of 2,843, with 150 teleradiology consultations. After an interval of three months, 99 per cent of teleradiology and 95 percent of non-teleradiological cases were followed up. Interestingly, while no further problems had arisen with the teleradiology group, 26 of the non-teleradiology group had consulted their GP for the same problem. Another interesting finding was that A&E teleradiologists interpreting radiographs performed better than the consultant radiologist who subsequently interpreted the original films.

Head CT scans

Similar efforts were also made in the US and continental Europe. Other than minor injuries support, another application area with near-universal acceptance in A&E practice consisted of the transmission of head CT scans to a tertiary neurosurgical centre, in order to obtain an immediate expert opinion.

Economic impact of emergency telemedicine

By the late 1990s, rather than convenience alone, the first arguments about the economic impact of emergency telemedicine had begun to appear. A 1997 paper from Hong Kong found a significant reduction in unnecessary transfers, alongside a decrease in adverse events occurring during transfer. Another study from Austria during the same year concluded that though teleradiology for CT scans was more expensive than transferring the physical scans by taxi, it was considerably quicker, and much less expensive than transferring the patient.

Growing ER costs drive US interest in telemedicine

The acceleration of growth in mobile telecoms quality onwards from the late 2000s, along with sharp falls in cost, has intensified the case for emergency telemedicine. Alongside, increased demographic pressure
on emergency rooms due to an ageing population and ER staff shortfalls have strengthened this further.

ER figures have been used to make the case for emergency telemedicine in the US. 130 million people visit ERs each year, up 36 percent from 97 million in 1995. In spite of this, the number of ERs in the US dropped by 11 percent over the period.

One leading healthcare provider, Cardinal Health, estimates that the average costs of a telehealth visit at USD 40-50, compared to USD 922 for an emergency room visit and that telemedicine could eliminate nearly 1 in 5 ER visits, which corresponds in numbers to almost two-thirds of those discovered to be non-urgent. Cardinal Health also states that 20% of ER visits require follow-up care for similar conditions, while only 6% of telehealth visits do. This echoes the spirit of the findings of the Wembley Community Hospital MATS study in 1996, mentioned previously.

Waiting times and demographic pressures
The problems with emergency medical care are similar in Britain. A&E waiting times have increased substantially over recent years, with many National Health Service (NHS) units failing to meet a four-hour standard for admission and discharge at national level. The number of people going to A&E has also risen substantially. In 2016/17 there were 23.4 million attendances at A&E departments – the equivalent of 63,000 attendances each day on average, and since 2011/12, this has been growing by 1.7 per cent each year – or the equivalent of an extra 5,100 each day.

These pressures have been exacerbated by closures. One in six A&E departments are being closed or downgraded, which corresponds to 33 casualty departments in hospitals in 23 areas of the UK.

The scourge of unnecessary visits
Unnecessary visits to A&E account for 16% of the total in England, but go over 50% in areas such as Durham and Darlington. From time to time, the media has a field day, citing lists from health officials about people going to A&E with broken false nails, splinters in their fingers, emergency contraception, as well as shaving and paper cuts.

The situation is similar in the US, where over 30% of visitors discover their case is not urgent – after being attended to. Some studies have estimated that 14 to 27 percent of ER visits could be treated at facilities like retail clinics or urgent care centres, with potential savings of USD 4.4 billion.

Telehealth to ‘redesign’ emergency medicine?
A 2017 study from the University of Warwick calls for using telehealth to “redesign” emergency medical services. It chooses best of breed cases from different continents to make three cases:

- Specialists in underserved communities
- Pre-ambulance triage
- Ambulance-based triage

Providing patient access to remote specialists in underserved communities
In its early stages, emergency telemedicine applications were motivated by the need to provide more timely diagnosis and care to patients in underserved communities, in other words those lacking hospitals with full-time emergency medicine teams.

The Warwick study cites the Western Australia Emergency Telehealth Service (ETS), which comprises over 70 regional and remote hospital EDs as a “prominent example of this type of telehealth initiative.” The WA ETS makes specialist emergency medicine physicians available via videoconferencing to support regional hospital-based clinicians with the diagnosis and treatment of acute emergency patients. Another example in the Warwick study is the Cumbria and Lancashire Telestroke Network in Britain. This remote teleconsultation service connects 15 stroke consultants to provide ‘out-of-hours’ advice from their homes to hospital sites.

More recently, conclusive evidence about some of the above advantages has been obtained from another study at the University of Iowa’s Carver School of Medicine. The study found that telemedicine-equipped rural emergency departments provided patients with access to a clinician six minutes sooner than those in hospitals without the technology, regardless of whether or not telemedicine was used to intermediate the interactions. However, when telemedicine was used, as happened in 42% of the interactions, the door-to-provider time was shortened by nearly 15 minutes. This, according to lead author Nicholas Mohr, MD, an emergency physician and associate professor at the University, could change outcomes for patients with conditions like “severe trauma, stroke, myocardial infarction.”

Pre-ambulance triage, via teleconsultation with probable primary care patients
The second application highlighted by the Warwick researchers consists of pre-ambulance triage, via a system called ETHAN (Emergency Telehealth and Navigation). This was developed by the Houston (Texas) Fire Department in 2014, and combines teleconsultation, social services and alternative transportation. Its aim is to reduce the numbers of primary-care related patients being transported directly to the ED via fire-engine (although it could apply equally to ambulance). Apart from reducing ED patient loading, ETHAN makes substantial cost savings by eliminating unnecessary fire engine/ambulance journeys – estimated at USD 2500 per trip.

ETHAN equips EMS units with a Tablet to respond to patient initiated calls. Patients are connected via secure videoconferencing software to a hospital-based emergency physician who makes a diagnosis based on vital signs measured on scene by the field crew. After outlining treatment options, the physician then makes a final decision on whether the patient should be brought to the ED by fire engine/ambulance or via taxi, or taken by the latter to a primary care facility, or instructed on home care.

There is, however, little homogeneity in pre-ambulance triage, either in the US or elsewhere. In 2013, a systematic review of 120 publications by The Norwegian Knowledge Centre for the Health Services found that there was a “lack of scientific evidence about the effects of validated pre-hospital triage systems,” and called for further research.

Ambulance-based Triage
It has long been recognized that in-ambulance triage and care for an acute emergency patient during transportation to the ED, impact positively on patient outcomes, especially with time-critical conditions such as myocardial infarction and stroke. In several respects, Europe can be considered to be ahead of the US in this application. In Tucson (Arizona), a citywide ambulance telemedicine network, was shut down in 2011 due to budgetary problems and problems of reliability with the WiFi network.

On its part, the Warwick study reports on an ambulance-based telemedicine triage system with real-time bidirectional audio-video communication, carried out in Brussels. In 90 per cent of cases, preliminary pre-hospital diagnosis was formulated and was in agreement with in-hospital diagnoses. Failures, as had been the case in Arizona, resulted mainly from limited mobile connectivity.
Multicentre trial supports use of topical antibiotic to eliminate Staph colonization in NICU babies

A team of doctors led by Karen L. Kotloff, M.D., University of Maryland School of Medicine (UMSOM), Center for Vaccine Development and Global Health (CVD), has performed a clinical trial involving multiple hospitals that tested the effectiveness of applying a topical antibiotic known as mupirocin for prevention of Staphylococcus aureus (SA) infection in babies in the neonatal intensive care unit (NICU).

In this study, between 10 and 45 percent of infants became colonized with SA in the eight NICUs across the country that participated in this study. A 5-day course of mupirocin was applied to the skin and nasal passages of the infants in the NICU who tested positive for SA. The results indicate mupirocin is safe and highly effective in eliminating SA from the skin and nasal passages of these infants. More than 90 percent of the treated infants tested negative for SA after treatment, indicating effective “decolonization” in response to mupirocin. This is the first randomized multicentre clinical trial to demonstrate the effectiveness and safety of mupirocin in infants, including those born prematurely, and to show that this treatment reduced colonization by both SA that are susceptible to commonly used antibiotics (MSSA) and those that are not (MRSA).

SA are bacteria that are commonly present on the skin and mucous membranes without causing disease. When bacteria live in the body without causing disease, this is referred to as colonization. Infants who become colonized with SA while hospitalized are at increased risk of developing life-threatening infections. Therefore, this treatment is likely to reduce clinical infection in infants. The effect of a course of mupirocin lasted for at least two to three weeks.

“Staph aureus is a leading cause of sepsis in young children admitted to the NICU. Sepsis, which is systemic infection, can be fatal in infants. Thus, preventing these infections is very important in managing risk for babies in the NICU who are fragile and struggling with multiple medical problems,” said Dr. Kotloff. This is the first study to test the safety and efficacy of mupirocin use in the NICU using a randomized controlled trial.

Prevention and treatment of ICU acquired delirium requires personalized approach

A population health study from the Regenstrief Institute and Indiana University Center for Aging Research has determined that haloperidol, the drug most commonly used to treat delirium in hospital medical and surgical intensive care units (ICUs), did not benefit elective thoracic surgery ICU patients when given prophylactically, with the possible exception of those who had surgery to remove their esophagus. The study results indicate the need for a personalized approach to delirium in the ICU.

The work is the first to evaluate the use of the antipsychotic drug haloperidol to reduce post-operative delirium in elderly patients undergoing elective non-cardiac thoracic surgery. Researchers found no differences in delirium incidence or severity between haloperidol and placebo in patients who had undergone elective non-cardiac thoracic surgery except in the small number of study participants who were admitted to the ICU after removal of the esophagus, a procedure known as esophagectomy. Removal of this organ is a treatment for esophageal cancer.

“Our work suggests that just as you can’t lump all cancer patients together for treatment, you can’t put all delirium patients in the same bucket,” said Regenstrief Institute investigator Babar A. Khan, M.D., M.S., who led the new study. “We need a personalized approach to delirium, focusing on people at higher risk of developing this complication.”

He notes that while elective surgery patients typically are healthier than other ICU patients, they are very much at risk of delirium. He counsels those considering elective surgery to consult with their primary care clinicians and their surgeon to weigh the significant risks of delirium with the benefits of the proposed procedure.

“Because we now know that haloperidol, the most commonly used drug to treat ICU delirium doesn’t, with possibly few exceptions, work, we need to focus on non-pharmacological therapies and vigilantly curtail administration of drugs that are harmful to the brain, especially the aging brain,” said Dr. Khan.

Approximately five million Americans are admitted to a surgical or medical ICU annually. Delirium, a sudden and serious change in brain function causing confusion, occurs in as many as three quarters of those treated in the ICU. Causes include sepsis, metabolic problems such as liver and kidney disease as well as drugs that injure the brain. Individuals who experience delirium are more likely to have longer hospital stays and hospital-associated complications. They also have a greater likelihood of dying in the hospital for up to a year after their hospital stay than ICU patients who did not experience delirium. They are also more likely to lose physical functioning and experience cognitive impairment.

Regenstrief Institute
https://tinyurl.com/y9of7krr

Machine-learning system could aid critical decisions in sepsis care

Researchers from MIT and Massachusetts General Hospital (MGH) have developed a predictive model that could guide clinicians in deciding when to give potentially life-saving drugs to patients being treated for sepsis in the emergency room.

Sepsis is one of the most frequent causes of admission, and one of the most common causes of death, in the intensive care unit. But the vast majority of these patients first come in through the ER. Treatment usually begins with antibiotics and intravenous fluids, a couple litres at a time. If patients don’t respond well, they may go into septic shock, where their blood pressure drops dangerously low and organs fail. Then it’s often off to the ICU, where clinicians may reduce or stop the fluids and begin vasopressor medications such as norepinephrine and dopamine, to raise and maintain the patient’s blood pressure.

That’s where things can get tricky. Administering fluids for too long may not be useful and could even cause organ damage, so early vasopressor intervention may be beneficial. In fact, early vasopressor administration has been linked to improved mortality in septic shock. On the other hand, administering vasopressors too early, or when not needed, carries its own negative health consequences, such as heart arrhythmias and cell damage. But there’s no clear-cut answer on when to make this transition; clinicians typically must closely monitor the patient’s blood pressure and other symptoms, and then make a judgment call.

In a paper, researchers describe a model that “learns” from health data on emergency-care
sepsis patients and predicts whether a patient will need vasopressors within the next few hours. For the study, the researchers compiled the first-ever dataset of its kind for ER sepsis patients. In testing, the model could predict a need for a vasopressor more than 80 percent of the time.

Early prediction could, among other things, prevent an unnecessary ICU stay for a patient that doesn’t need vasopressors, or start early preparation for the ICU for a patient that does, the researchers say.

“It’s important to have good discriminating ability between who needs vasopressors and who doesn’t [in the ER],” says first author Varesh Prasad, a PhD student in the Harvard-MIT Program in Health Sciences and Technology. “We can predict within a couple of hours if a patient needs vasopressors. If, in that time, patients got three litres of IV fluid, that might be excessive. If we knew in advance those litres weren’t going to help anyway, they could have started on vasopressors earlier.”

In a clinical setting, the model could be implemented in a bedside monitor, for example, that tracks patients and sends alerts to clinicians in the often-hectic ER about when to start vasopressors and reduce fluids. “This model would be a vigilance or surveillance system working in the background,” says co-author Thomas Heldt, the W. M. Keck Career Development Professor in the MIT Institute of Medical Engineering and Science. “There are many cases of sepsis that [clinicians] clearly understand, or don’t need any support with. The patients might be so sick at initial presentation that the physicians know exactly what to do. But there’s also a ‘grey zone,’ where these kinds of tools become very important.”

MIT
https://tinyurl.com/y7rllbeu

AI doctor could boost chance of survival for sepsis patients

Scientists have created an artificial intelligence system that could help treat patients with sepsis. The technology, developed by researchers from Imperial College London, was found to predict the best treatment strategy for patients.

The system ‘learnt’ the best treatment strategy for a patient by analysing the records of about 100,000 hospital patients in intensive care units and every single doctor’s decisions affecting them.

The findings showed the AI system made more reliable treatment decisions than human doctors. The team behind the technology say the tool could be used alongside medical professionals, to help doctors decide the best treatment strategy for patients.

Sepsis, also known as blood poisoning, is a potentially fatal complication of an infection, and kills around 44,000 every year in the UK.

In the study, researchers looked back at US patient records from 130 intensive care units over a 15 year period to explore whether the AI system’s recommendations might have been able to improve patient outcomes, compared with standard care. The researchers now hope to trial the system, called AI Clinician, in intensive care units in the UK.

Dr Aldo Faisal, senior author from the Department of Bioengineering and the Department of Computing at Imperial, said: “Sepsis is one of the biggest killers in the UK - and claims six million lives worldwide - so we desperately need new tools at our disposal to help patients. At Imperial, we believe that AI for Healthcare is the solution. Our new AI system was able to analyse a patient’s data - such as blood pressure and heart rate - and decide the best treatment strategy. We found that when the doctor’s treatment decision matched what the AI system recommended, they had a better chance of survival.”

The team used the AI system to assess which particular treatment approach to sepsis was most successful.

Sepsis can cause a drastic drop in blood pressure which can leave organs deprived of blood flow and oxygen, and can ultimately lead to multiple organ failure and death.

To raise blood pressure and keep the heart pumping, doctors give extra fluids, usually in the form of a salt solution, as well as medication that tightens blood vessels and raises blood pressure, called vasopressors.

Professor Anthony Gordon, senior author from the Department of Surgery & Cancer at Imperial explained: “We know that most patients with sepsis need fluid drips and in more severe cases also need vasopressors to maintain blood pressure and blood flow. There is still much debate amongst clinicians about how much fluid to give and when to start vasopressors. There are clinical guidelines but they provide general advice. The AI Clinician is able to learn what is the best option for each individual patient at that moment in time.”

We’re already making steps to improve diagnosis with our new sepsis tool, but we must also embrace any new technology solutions that can improve patient care and save lives.”

To help doctors decide which approach would boost a patient’s chance of survival, the research team created an AI system that would assess a patient’s vital signs and recommend the best treatment approach.

The system analysed the medical records of 96,000 US patients with sepsis in intensive care units. Using a process called reinforcement learning - where robots learn how to make decisions and solve a problem - the AI Clinician went through each patient’s case and worked out the best strategy of keeping a patient alive. The system calculated 48 variables including age, vital signs and pre-existing conditions.

The system then predicted the best treatment strategy for each patient with sepsis. The results revealed that 98 per cent of the time, the AI system matched or was better than the human doctors’ decision.

The study also found that mortality was lowest in patients where the human doctor’s doses of fluids and vasopressor matched the AI system’s suggestion. However, when the doctor’s decision differed from the AI system, a patient had a reduced chance of survival.

The team say the findings show the AI Clinician could help doctors decide the best treatment strategy for patients.

Imperial College London
https://tinyurl.com/y7bubfbc

Over half of former intensive care patients in the UK report symptoms of psychological disorders

Patients in the UK who have survived critical illnesses requiring care in an intensive care unit (ICU) frequently report symptoms of anxiety, PTSD and/or depression, according to a study. Those reporting symptoms of depression after critical illness appear to be at a greater risk of death.

Researchers in the Nuffield Department of Clinical Neuroscience led by Peter Watkinson investigated psychological disorders in a cohort of 4,943 of former ICU patients. They found that 46% of patients reported symptoms of anxiety, 40% reported symptoms of depression and 22% reported symptoms of PTSD, while 18% of patients in the study reported symptoms of all three psychological conditions.

To investigate possible links between treatment in an ICU and symptoms of
psychological disorders, the authors asked a total of 4,943 patients who received treatment in one of 26 ICUs in the UK between 2006 and 2013, to complete a questionnaire on their symptoms of anxiety, depression and PTSD three months after discharge from ICU and again 12 months after discharge.

The authors found that patients who reported symptoms of depression were 47% more likely to die from any cause (all-cause mortality) during the first two years after discharge from the ICU than those who did not report these symptoms.

Dr Peter Watkinson said: 'Our findings suggest that depression following care of a critical illness in the ICU may be a marker of declining health and clinicians should consider this when following up with former ICU patients.'

The authors caution that the generalisability of the results outside of the UK may be limited as the data was only collected from UK-based patients. Furthermore, the observational nature of the study and its reliance on self-reported data mean that it does not allow for conclusions about cause and effect between ICU care and symptoms of psychological disorders.

The authors noted that having the skilled personnel needed to monitor and interpret cEEG data is a major issue. Hospitals have started recognizing the value of detecting and preventing seizures to improve patient outcomes, Keskinocak says. "The investment needed towards cEEG monitoring may be substantial. This study indicates that those expenditures may be warranted. We hope that it encourages researchers to pursue studies that could determine whether cEEG monitoring could improve health outcomes for the youngest ICU patients.”

NC State
https://tinyurl.com/y9iv2pcm

Study highlights potential benefits of continuous EEG monitoring for infant patients

A recent retrospective study evaluating continuous electroencephalography (cEEG) of children in intensive care units (ICUs) found a higher than anticipated number of seizures. The work also identified several conditions closely associated with the seizures, and suggests that cEEG monitoring may be a valuable tool for helping to identify and treat neurological problems in patients who are 14 months old or younger.

“The retrospective analysis was conducted by a team of engineers, who were able to make use of robust statistical methodologies to control for observational bias,” says Julie Swann, co-author of a paper on the work. “It was possible due to a long-standing partnership with institutions such as Children's Healthcare of Atlanta and Emory University, which had been collecting data on a large cohort of pediatric patients receiving continuous monitoring. Among other things, this allowed us to identify a risk threshold of 14 months. Patients younger than 14 months were at much higher risk of having seizures.” Swann is department head and A. Doug Allison Distinguished Professor of the Fitts Department of Industrial and Systems Engineering at North Carolina State University.

EEGs measure electrical activity in the brain, and are often used to detect potential neurological problems. Conventional EEGs usually last less than an hour, but cEEGs allow healthcare providers to monitor brain activity for hours or days. However, cEEGs are not in widespread use, due to the expense of related hardware and software and costs associated with having the skilled personnel needed to monitor and interpret cEEG data.

“One reason for the study is that there has been very little research to determine whether cEEG would be a worthwhile investment for monitoring young children,” says Pinay Keskinocak, Ph.D., who co-authored the paper. “Even harder is to determine whom to monitor, where our results suggest some of the risk factors to consider.

“Our main finding is the unexpectedly high prevalence of mostly non-symptomatic seizures in very young children,” says Keskinocak, the William W George Chair and Professor in Georgia Tech’s Stewart School of Industrial Engineering and the director of the Center for Health and Humanitarian Systems at Georgia Tech. “Non-symptomatic seizures are those that can be detected with an EEG, but that do not present any outward, physical symptoms. Children over the age of 14 months had an overall seizure rate of 18 percent. However, we found that children aged 14 months and younger had an overall seizure rate of 45 percent.”

“In addition, we found that – for these younger patients – seizures were often associated with one of the following conditions: hypoxic-ischemic encephalopathy, intracranial hemorrhage or central nervous system infection,” says Dr. Larry Olson of Children's Healthcare of Atlanta and Emory University.

“In fact, those conditions were associated with 61 percent of the seizure patients we identified who were under 14 months old,” says Dr. Atul Vats, also of Children's Healthcare of Atlanta and Emory University.

“All of this is important because it means that cEEG may have value in helping to diagnose neurological problems in young patients,” Swann says. “And early diagnosis could help ensure that patients get treatment in a timely way, which would – hopefully – improve outcomes. Only an interventional study could demonstrate that. Maybe these findings will pave the way for that work.”

The retrospective study analysed data on 517 children who were monitored by cEEG. All of the children were ICU patients. Because the children had been selected for cEEG monitoring, they likely presented a higher risk of neurological problems than the general population, which should be taken into account when evaluating the seizure prevalence data.

“Hospitals have started recognizing the value of detecting and preventing seizures to improve patient outcomes,” Keskinocak says. “The investment needed towards cEEG monitoring may be substantial. This study indicates that those expenditures may be warranted. We hope that it encourages researchers to pursue studies that could determine whether cEEG monitoring could improve health outcomes for the youngest ICU patients.”

NC State
https://tinyurl.com/y9iv2pcm
Outstanding Innovations in Healthcare Leadership and Management

The Implementation of Recovery-Oriented Practice at Ontario Shores Centre for Mental Health Sciences

Excellence Award for Quality & Safety and Patient-centered Care – Bronze

Simone Arbour
Research Scientist
Ontario Shores Centre for Mental Health Sciences
Whitby, Canada

Mark Rice,
Senior Administrative Director
Ontario Shores Centre for Mental Health Sciences
Whitby, Canada

In 2015, Ontario Shores Centre for Mental Health Sciences embarked on a strategic direction to embed recovery-oriented principles into its services to align with the global recovery movement. Specifically, the organization implemented Safewards, a Recovery College and the Recovery Assessment Scale to provide patients with more options, higher expectations and hope for improved mental health outcomes. In addition to enhancing recovery-related outcomes, interventions have effectively reduced stigma and improved patient safety and experience. Organizational commitment and national and international support from the mental health community has reaffirmed and evolved the commitment to further align with the recovery philosophy of care.

Bed Management System of Sant Joan de Déu (BEDMA-SJD), an innovative system for efficient management of healthcare processes

Excellence Award for Leadership and Management in Healthcare - Silver

Ricard Casadevall
Health Economist
Barcelona Children's Hospital
Sant Joan de Déu, Spain

Josep Lluís Vega
Medical Manager
Barcelona Children's Hospital
Sant Joan de Déu, Spain

Daniel Ormazabal
IT engineer
Barcelona Children's Hospital
Sant Joan de Déu, Spain

ABSTRACT

To reduce hospital overcrowding and its negative effects, we use a bed management model that takes into account the hospital as a whole, harmonizing patients scheduled for surgery and those from ED.

We use an algorithm that predicts daily beds available, 24 hours in advance, using real-time data from EHR combined with an estimate of inpatients discharges and admissions from the ED based on recent historical data. When the formula predicts a situation where no action is needed the probability that reality will behave as the prediction is well above 90%. However when a threshold is exceeded, the measures adopted avoid it in more than 60% of the days. We manage scheduled patients throughout the year modulating the overall activity and the proportion of outpatient surgeries.

Therefore, we can plan the use of beds for each group in an interconnected way so we greatly reduce days with overcrowding.
Introducing value-based healthcare in the oral health sector
A new approach to improve oral health outcomes
*Dr Kwang Tae Kim Grand Award – Gold*

Susan McKee
Executive Director
Dental Health Services Victoria
Carlton, Australia

**ABSTRACT:**
Dental Health Services Victoria (DHSV) is transitioning to a model of care that reflects the principles of value-based healthcare. By co-designing a new system in partnership with our consumers and staff, we are driving better health outcomes and experiences for clients. In February 2017, we started developing a model for value based oral healthcare and in October 2018, we commenced our proof of concept at The Royal Dental Hospital of Melbourne. Client and staff feedback has been overwhelming positive thus far indicating that we are on our way to creating an oral health system that improves the health outcomes that matter to clients.

**Dynamics of Peer Learning in Medical Department: Journal and Case Sharing Club**
*Poster Awards - Gold*

Lei Pak On
Ward Manager
Ruttonjee and Tang Shiu Kin Hospitals
Hong Kong

Wong Ting Fung
Advanced Practice Nurse Ruttonjee and Tang Shiu Kin Hospitals
Hong Kong

Sze-to Tak Leung
Advanced Practice Nurse Ruttonjee and Tang Shiu Kin Hospitals
Hong Kong

**ABSTRACT**
Shortage of experienced manpower is probably the most common challenge faced by healthcare organizations in recent healthcare trend. This problem affects not only services but also appropriate staff mixture to maintain care quality. Since 2016, 60% of the nurses in our department were having less than 3 years of experience. “Dynamic Case and Journal Sharing Club” was initially developed to assist novice nurses to bridge the gap between theoretical knowledge and real practice. Subsequently, this new learning strategy became a peer learning culture in the department and provided opportunities for staff to identify quality improvement focus through discussion. The most valuable contribution was allowed novice nurses to grow their experience through peer sharing and gradually build up their clinical insights.

**MoTHER digital solution: a smartphone App and web-based portal for enhanced service delivery and care of women with Gestational Diabetes Mellitus**
*Excellence Award for Quality & Safety and Patient-centered Care – Gold*

Rachel M. Stoney
Director Nutrition and Dietetics Department
Redland Hospital
Brisbane, Australia

Wendy Dutton
Director Obstetrics and Gynaecology Department
Redland Hospital
Brisbane, Australia

Marlien Varnfield
Senior Research Scientist
Australian e-Health Research Centre, CSIRO
Brisbane, Australia

**ABSTRACT**
Significantly increased numbers of women diagnosed with Gestational Diabetes Mellitus (GDM) requiring ante-natal care, pose a health service challenge. An innovative eHealth solution achieved through multi-disciplinary clinician engagement and strategic collaboration with CSIRO: Australian e-Health Research Centre, resulted in the development of a smartphone application (GDM MoTHER App) and web-based clinician portal. A pilot proof of concept study has demonstrated improved clinician care co-ordination and user satisfaction, facilitating enhanced health care for women with GDM through health care technology integration. This innovative service delivery model will be further evaluated in a multi-site implementation trial.
GIVE A LIFE: A Corporate Social Responsibility Program for Improving Cardiovascular Pediatric Health Care in Underserved Populations in Colombia

Excellence Award for Corporate Social Responsibility - Gold

Iberto E. García-Torres
Pediatric Cardiologist
Fundación Cardioinfantil
Bogotá-Colombia

Miguel Ronderos-Dumit
Pediatric Cardiologist
Fundación Cardioinfantil
Bogotá-Colombia

Rodolfo J Dennis
Head of Research Department
Fundación Cardioinfantil
Bogotá-Colombia

ABSTRACT:
Congenital Heart Defects (CHD) are among the most common type of congenital diseases globally, and in Latin America are the third cause of neonatal mortality. For more than 20 years, and in accordance with its mission of treating underserved children with CHD, Fundación Cardioinfantil-Instituto de Cardiología (FCI-IC) has developed a social responsibility program called “Regale Una Vida” (Give A Life, in English) for the postnatal detection and treatment of CHD. Nowadays, this Program conduct at least 12 non-profit medical brigades yearly, screening around 3,000 children per year. In this article, we describe the program achievements and challenges.

An Innovative Culture and Technology to Advance Excellence in Mental Health Care

Excellence Award for Leadership and Management in Healthcare - Bronze

Karim Mamdani
President and CEO
Ontario Shores
Whitby, Canada

John Chen
COO
Ontario Shores
Whitby, Canada

Ilan Fischler
Physician-in-Chief
Ontario Shores
Whitby, Canada

ABSTRACT
This article describes the implementation of an electronic health record (EHR) in a specialty mental health care facility. With support from the Board of Directors and Senior Management Team, this project achieved its goals of 1) advancing best practice, 2) enhancing safety and quality of care, 3) standardization of care; 4) enhancing patient experience; and 5) creating efficiencies. Modules were customized to the specific needs of the mental health population. Work continues to ensure sustainability, partner with organizations for a shared EHR, and create greater efficiencies through innovative projects using data analytics.

Metro South Health Service Queensland - Our Transformation to Australia’s First Digital Health Service

Dr Kwang Tae Kim Grand Award - Silver

Stephen Ayre
CEO
Metro South Hospital and Health Service
Woolloongabba, QLD, Australia

Cameron Ballantine
Acting CIO
Metro South Hospital and Health Service
Woolloongabba, QLD, Australia

ABSTRACT
Metro South's transformation into Australia’s first digital health service was a large scale and highly complex task, requiring massive clinical change while ensuring the highest levels of safety and quality for patients. The project exemplified the innovative use of ICT to achieve better connected, more efficient, integrated, and safer care. The integrated electronic medical record (ieMR) program of work commenced in 2015 at Brisbane’s Princess Alexandra Hospital (PAH) being the first tertiary public hospital in Australia to replace paper-based medical records. The record automates uploads of observations and vital signs from patient monitoring devices, allows efficient electronic ordering of radiology and pathology tests; and provides decision support for clinicians in prescribing, verifying and administering medicines to our patients.
ABSTRACT

The application of Artificial intelligence (AI) techniques to exploit healthcare data has led to the development of risk prediction models that have obtained variable outcomes. With the objective of applying Data Science solutions to make predictions related to our daily practice that can help to improve the quality of healthcare, optimize human and material resources and reduce costs, we present a project based on a new predictive model developed using complex artificial intelligence algorithms. Their prediction ability was properly evaluated with historical data. AI requires a systematic evaluation prior to be integrated in routine healthcare. Our pilot study points to a very high accuracy in the prediction of readmissions, and a good accuracy in prediction of hospital length of stay.
Fujifilm Medical Systems Europe will celebrate SYNAPSE’S 20-year anniversary and will present, REiLI the company’s global Medical Imaging and Informatics Artificial Intelligence (AI) technology initiative at the European Congress of Radiology (ECR) annual meeting to be held from February 27th to March 3rd, 2019 at the Austria Congress Center in Vienna, Austria.

Under the REiLI brand, Fujifilm is developing AI technologies that strongly support diagnostic imaging workflow, leveraging the combination of deep learning in its AI technology with the Company’s image processing heritage. Fujifilm’s artificial intelligence software is a work in progress and is not commercially available in Europe.

Applications currently in development include, but are not limited to: Region Recognition, an AI technology to accurately recognize and consistently extract organ regions, regardless of deviations in shape, presence or absence of disease, and imaging conditions; Computer Aided Detection, an AI technology to reduce the time of image interpretation and support radiologists’ clinical decision making; Workflow Support, using AI technology to realize optimal study prioritization, alert communications of AI findings, and report population automation. At Fujifilm’s in-booth AI Center, it will be possible to see live demonstrations of AI delivering enhanced workflows.

SYNAPSE 3D CONSOLE MODE is the powerful native Advanced Visualization workflow in Synapse PACS. Synapse 3D is designed to enhance visualization features in Synapse 5. It offers advanced 3D rendering in the Synapse PACS Viewer to perform fast and accurate extractions, stenosis measurements, brain perfusion CT, MRI, and more.

The Fujifilm Healthcare IT platform showcased at ECR includes also the comprehensive medical informatics and enterprise-imaging portfolio:

SYNAPSE 5 is our next generation PACS, Synapse is one of the fastest medical imaging solutions in the industry, offering sub second delivery of extremely large datasets. Its underlying architecture promotes significantly less bandwidth consumption and tighter security.

SYNAPSE VNA is the most secure, comprehensive application for ingesting, storing and providing access to the complete imaging record. It securely integrates more specialties, more devices, and more data than any other VNA.

SYNAPSE MOBILITY Enterprise Viewer uses the latest server-side rendering technology to stream imaging securely and quickly to any authorized user. It can be used within applications, directly from the EHR, or on our mobile device apps. Both within and outside of the Enterprise, giving access to imaging immediately and helping clinicians making the most informed and accurate decisions.

SYNAPSE 3D is an enterprise-wide solution for quickly accessing multiple Advanced Visualization processing tools (in excess of 50 modules). Designed for use across multiple specialties including radiology, cardiology, surgery and more. Full integration with Synapse PACS means one-click extremely fast image processing from any Synapse client.

SYNAPSE CWM, Clinical Workflow Manager, is the most advanced Radiology Information System on the market today. It continues to evolve to support the unique imaging and information needs in today’s radiology department. One platform can support acute care facilities, imaging centres, and radiology practices providing distributed diagnosis.

SYNCRO-DOSE is the Radiation Dose Index Monitoring system, compliant with the Directive 2013/59 / EURATOM of the European Union. Syncro-Dose is a comprehensive system for monitoring and managing patient radiation exposure at enterprise level across different imaging modalities and hospital facilities.

THE 20-YEAR ANNIVERSARY OF SYNAPSE: THE WORLD’S FIRST WEB- BASED PACS

In 1983, Fujifilm launched Fuji Computed Radiography (FCR), becoming the first company in the world to offer a digital X-ray diagnostic imaging system. Medical professionals quickly learned the merits of digital diagnostic images, including ease of storage and processing. They found that images from a variety of tests and procedures could be shared within and among facilities, and the images could
even be used for remote diagnosis and consultation. Recognizing this trend, Fujifilm saw the opportunity to leverage the technologies it had developed for FCR and contribute to the evolution of connectivity within and among medical facilities. What made Fujifilm's SYNAPSE concept different was that it used the emerging Internet and web technologies instead of private networks. It was, in essence, a Web-based PACS: the first in the world.

Offering outstanding medical connectivity based on the convenient and efficient sharing of information, SYNAPSE made possible initial diagnosis at a local clinic, followed by more complete testing and treatment at a larger medical facility, in turn followed by periodic monitoring at the original local clinic. SYNAPSE’s rapid rate of adoption was due in large part to its capability, to contribute significantly to the quality of medical care, including support for the important objective of informed consent. Nowadays 5000 Synapse PACS systems are installed in healthcare facilities around the world, earning the largest market share worldwide (estimation based on a set of data from multiple market research studies), and last September “SYNAPSE 3D” (also known as Synapse Vincent in some global markets) a 3D image analysis system, won the Red Dot Award: Communication Design 2018 - the prestigious international design award in recognition of superior design, outstanding performance, and excellent operability.

www.fujifilm.eu
www.fujifilmholdings.com

At ECR 2019, Fujifilm also shows advancements in its clinical imaging portfolio and IT solutions to maximize productivity and ensure better patient care.

FCT Speedia and FCT Speedia HD represent the finalization of Fujifilm's maturation process in the medical systems field: the wide market vision and the unceasing efforts to provide a comprehensive solution to customers have led to the implementation of CT technology alongside the well-known room and mobile digital solutions. A 64-slice system will be shown at the booth, together with an empowered CT console that embeds Synapse 3D reconstruction modules, flagship of Fujifilm's Medical Informatics portfolio. An advanced AI-based solution, FCT Pixel Shine, will be highlighted to appreciate the advantages of FCT images processing at extremely low dose.

Bellus II digital mammography workstation is the new, empowered tool for FFDM and DBT images management. It features advanced functions for images visualization and processing, together with an embedded reporting utility designed to support the mammography interpretation workflow. It will be possible to appreciate 2D and DBT images resulting from Fujifilm's new iterative reconstruction (ISR), S-View synthetized 2D samples and Energy Subtraction processing in CEDM examinations.

AMULET Innovality is Fujifilm's flagship in digital mammography solutions. Images resulting from its innovative approach to tomosynthesis clinical application – two different acquisition modes, to better fulfil breast screening and diagnostic mammography needs – with unsurpassed 50 micron pixel size, will be shown together at the booth.

FDR Smart X is the name of Fujifilm's new, flexible and scalable room solution for digital radiography. Available in ceiling-suspended or floor-mounted versions with automated and motorized stitching functionality, it has been designed to complement FDR D-Evo II and FDR-ES digital panels in all their clinical applications.

FDR D-Evo GL is the first digital panel designed for long view exposures, featuring an acquisition area that allows single-shot exposures of the whole spine and of the inferior limbs: image quality and dose reduction are guaranteed by proprietary ISS technology and Fujifilm's Virtual Grid software for scattering radiation detection and suppression.

FDRGO Plus is the mobile X-ray equipment that is generating so much positive feedback during the last years. Better manoeuvrability and ergonomics are provided thanks to a compact design; improved image quality comes from DVII and Virtual Grid advanced processing.

FDR Nano strikes again. On the Fujifilm booth it will be possible to test the lightweight and compact mobile X-ray that has already impressed with its manoeuvrability and easiness of use. Its revolutionary design and sensational image quality are the base of the success of this small and smart system, capable of combining efficiency and performance to a previously unattained level.

Experts and product specialists are available at Fujifilm booth for product demonstration and to create tailor-made solutions for any healthcare provider.

ECR, Expo X5, Stand 503
Innovative gantry on interventional platform

Philips’ new FlexArm gantry on its Azurion platform opens up imaging and patient positioning opportunities for image-guided procedures. During increasingly complex interventions, clinicians need to quickly and easily visualize critical anatomy and identify changes to the patient during the procedure. Azurion with FlexArm includes a set of innovations that makes it easier for the clinician to perform imaging across the whole patient in both 2D and 3D. As the clinician moves the system, the image beam automatically maintains alignment with the patient, allowing more consistent visualization and enabling them to keep their focus on the treatment. The system is ideally suited for Hybrid ORs that cater to multiple specialties in one room, such as a combination of surgical and endovascular procedures.

PHILIPS
ECR, Expo X4, Stand 402, 416
i www.interhospi.com & search 47415

Patient information mobile device

Honeywell’s Systevo Mobile device offers a scalable platform designed to give caregivers critical patient information, such as approved medicines or planned care tasks, through advanced mobile technology. The system can efficiently collect vital sign data, helps to prioritize patient calls on the go, and can escalate issues to other staff members through an efficient alert notification system leveraging data, telephony, SMS or e-mail transmission. Created for demanding hospital environments, the Honeywell Systevo Mobile device features a large display for easy usability, a high-performance barcode scanner, extended battery life for longer shift operation, and is highly resistant to clinical disinfection agents.

HONEYWELL
i www.interhospi.com & search 47411

High-end ventilator for critical care

The HAMILTON-C6 represents the latest generation of high-end ventilators, which combines modularity, mobility and ease of use with a range of advanced features. This combination allows clinicians to provide individualized, lung protective ventilation therapy for all patient populations. Just like its predecessors, the newest device from Hamilton Medical comes fully equipped with a range of Intelligent Ventilation technologies. In addition to the advanced ventilation modes ASV and INTELLI-VENT-ASV, the HAMILTON-C6 offers tools for lung assessment and recruitment manoeuvres, continuous cuff pressure management, transpulmonary pressure measurement, state-of-the-art ventilation monitoring and an integrated humidifier control. With this new ventilator, Hamilton Medical also introduces the brand-new technology IntelliSync+, which was...

F R O N T C O V E R P R O D U C T

Intelligent software assistant for chest CT

AI-Rad Companion Chest CT is a software assistant that brings artificial intelligence (AI) to computed tomography (CT). Using CT images of the thorax (chest), the software can differentiate between the various structures of the chest, highlight them individually, and mark and measure potential abnormalities. This applies equally to organs such as the heart and lungs, the aorta and the vertebral bodies. The software automatically turns the findings into a quantitative report. AI-Rad Companion Chest CT is the first application based on the new AI-Rad Companion platform. It is designed to help radiologists interpret images faster and more accurately, and to reduce the time involved in documenting results. CT examinations of the thorax are common procedures in daily clinical practice. For radiologists, this means more examinations in a limited amount of time and usually for low reimbursement rates. In radiology, examinations of the chest, a region containing multiple organs, are also challenging because the images display a wide variety of information. Radiologists mainly assess images regarding the primary indication – in other words, the possible disease – which was the reason for performing the CT scan. By contrast, the algorithms in AI-Rad Companion Chest CT pay equal attention to all areas of the chest and can mark abnormalities in places that the radiologist might not consider so closely. The software assistant generates standardized, reproducible, and quantitative reports based on the AI-supported analysis. AI-Rad Companion Chest CT currently supports a variety of tasks, such as identifying lung lesions and calculating cardiovascular risk based on an analysis of coronary artery calcification on non-ECG-triggered CT images. A study in collaboration with the Medical University of South Carolina (MUSC) has also shown that AI-Rad Companion Chest CT can segment and measure the diameter of the aorta, an important parameter for potential aneurysms. AI-Rad Companion Chest CT also examines the spine in the patient’s chest region. It detects and segments the individual vertebrae, labels and analyses them for bone density and possible fractures. This can be helpful for detecting osteoporotic changes at an early stage. AI-Rad Companion Chest CT is a cloud-based solution and uses certified, secure teamplay infrastructure that complies with the Health Information Portability and Accountability Act (HIPAA) in the U.S., and with the General Data Protection Regulation (GDPR) in the EU. The software integrates seamlessly into existing clinical workflows and conforms to Digital Imaging and Communications in Medicine (DICOM) standards. The images and all supporting information can be made automatically available in the picture archiving and communication system (PACS) in line with the radiologist’s individual requirements. The solution is particularly helpful for time-consuming, basic, and repetitive tasks. AI-Rad Companion Chest CT is vendor-neutral and can analyse image data from all CT manufacturers.

SIEMENS HEALTHINEERS
ECR, Expo X1, X5, Stand 135, 511; Mobile unit 547
i www.interhospi.com & search 47417
developed to avoid patient-ventilator asynchronies and their negative effects on patients. By continuously analysing wave-form shapes hundreds times per second, IntelliSync+ detects patient efforts and cycling immediately, and initiates inspiration and expiration in real-time. The technology can be used regardless of the ventilation mode and with no additional hardware required. The HAMILTON-C6 features a high-performance turbine, which provides a class-leading peak flow of 260 ml per minute and carries a lifetime warranty. Together with a slender and easy manoeuvrable trolley and a 3-hour battery life, the HAMILTON-C6 thus can effortlessly accompany patients on transports within the hospital. The shelf-mount version with various mounting options for the detachable monitor allows for smooth integration into various settings and environments.

HAMILTON MEDICAL
i www.interhospi.com & search 47412

4K surgical display
The MDSC-8427 4K surgical display provides a double user interface for smooth control of screen and layout configurations. The touch screen at the front offers four dedicated shortcut buttons, which can be programmed to meet the personal preferences of surgical staff. Tactile navigation keys at the back ensure perfect usability and user friendliness. Designed with the needs of biomedical staff in mind, they give access to more technical display configuration functions. Thanks to smart image processing technology, specially designed for medical video, surgical images will be razor-sharp. The wide colour gamut and advanced colour calibration provides the most accurate colours on-screen, from any angle in the operating room. The 27” size offers a lightweight and attractive alternative to current 24” or 26” Full HD displays. It can also replace the Full HD screen on the surgical cart or dual displays on the monitor arm of a surgical boom. Thanks to the broad future-proof connectivity options (DP, HDMI, 12G-SDI, Quad-SDI, IP), surgeons can easily visualize a wide range of digital video sources, including endoscopic video, room and boom camera video, patient and surgery information, and more. For a comprehensive view of all information in the OR, multiple sources can be displayed simultaneously on the screen.

BARCO
ECR, Expo X3, Stand 302
i www.interhospi.com & search 47413

International Symposium on Intensive Care and Emergency Medicine

39th ISICEM

SQUARE - BRUSSELS MEETING CENTER - MARCH 19-22, 2019

CME ACCREDITED
Chairperson: JL Vincent - jlvincenc@intensive.org
Manager: V De Vlaeminck - veronique.de.vlaeminck@intensive.org
www.intensive.org

Breast biopsy system with real-time imaging
The Brevera breast biopsy system with CorLumina imaging technology combines tissue acquisition, real-time imaging, verification and advanced tissue handling for an optimal patient and physician experience. Before this innovation, radiologists performing stereotactic breast biopsy procedures to diagnose breast cancer were often required to leave the patient under compression while they moved to another room to image and verify tissue samples. This leads to lengthy procedure times and anxious, uncomfortable patients, and can interrupt facility screening schedules. With the Brevera system, radiologists are able to obtain and image tissue samples in the procedure room in just a few seconds, potentially saving up to 10 minutes per patient and cutting the procedure time by up to 25 percent according to the 2015 Kadence International survey of 200 healthcare professionals. In addition to saving facility resources and clinician time during a breast biopsy procedure, the Brevera system’s proprietary CorLumina imaging technology helps enhance workflow across multiple departments within a health system. The technology automates the tissue sample collection and separation process, which allows patient tissue to be sent to pathology with little or no manual handling, and also protects the integrity of samples. The system also features PACS integration for advanced image sharing and transfer of patient records.

HOLOGIC
ECR, Expo X2, Stand 211
i www.interhospi.com & search 47418
Vital signs devices help early detection and response to patient deterioration in general care

Research suggests that the signs and symptoms of clinical deterioration can be detected as early as six to eight hours before an event or arrest. However, physiological signs and symptoms of clinical deterioration can be difficult to detect in early stages. The use of early warning scores—especially automated scores, as opposed to manual calculations—has been shown to improve effectiveness. Welch Allyn Connex vital signs devices can help hospitals combine vital signs measurement with the collection of additional patient observational information—all in a single workflow. Vital signs and additional collected information are automatically calculated to generate an overall patient score—directly on the device at the bedside. Clinicians are prompted with messages providing specific response actions based on the patient score and the facility’s protocols. Complete information can then be sent directly to the patient’s record in the EMR. The use of automated early warning scores, such as those featured in Welch Allyn Connex vital signs devices, can help provide the timely decision support clinicians need to respond to patient changes right at the bedside.

WELCH ALYN
i www.interhospi.com & search 47414

Certified app for detecting atrial fibrillation and other arrhythmias

FibriCheck is a medically certified app (CE-class IIa and FDA-cleared) capable of detecting atrial fibrillation and other heart rhythm disorders, thereby preventing strokes. FibriCheck is leveraging mobile technologies for a better health. FibriCheck uses the built-in photoplethysmographic (PPG) sensors commonly found in smartphones and smartwatches to measure the rhythm of the user’s heartbeat. Employing medically-certified algorithms together with an artificial intelligent deep neural network, FibriCheck detects the presence of atrial fibrillation and other potentially fatal cardiac arrhythmias. It is as good as a 1-lead ECG and 96.5% accurate compared with a 12-lead ECG. By decentralizing the diagnostic process, FibriCheck is paving the way for broader access to effective care for individuals while reducing the total cost of healthcare for governments and insurers, thus helping to make Health 2.0 a reality for communities around the globe. FibriCheck is commercially available since May 2017, prescribed by over 1,200 doctors, used by over 110,000 people and reimbursed by selected healthcare funds.

QOMPIUM
i www.interhospi.com & search 47410

MRI scanner uses innovative coil

GE’s new SIGNA Premier MRI scanner has been developed to offer better images of the brain, however it also provides sharper images from other parts of the body too, including knees, vital organs and elbows. For scanning the elbow, for instance, instead of having the patient lying still for a 25-minute scan with an arm wrapped in a bulky plastic tube to be kept bent above the head, SIGNA Premier uses a more comfortable alternative: a coil, shaped like a mat, that is laid over the patient’s body like a blanket. Called AIR Technology it is lightweight and also offers a more conclusive body scan thanks to its extra channels.

SIGNA Premier’s head coil has 48 channels for probing anomalies, and patients wear it like a helmet. And while older MRI scanners have a knee coil with eight channels, SIGNA Premier’s has 18, allowing a clearer definition of the muscles and cartilage surrounding the knee joint, for instance. Sharper images can also have a direct impact on diagnosing and treating patients who are suspected of having cancer, enabling for example the visualization of smaller imperfections in the prostate, thereby helping to reduce the number of painful biopsies on prostate patients.

SIGNA Premier’s wider bore — an opening of 70 centimeters in diameter versus the typical 60 — also helps make a scan easier for that 5 percent of patients who suffer from claustrophobia.

GE HEALTHCARE
i www.interhospi.com & search 47409

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For more events see www.interhospi.com/events/
conhIT turns DMEA

9–11 April 2019
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www.dmea.eu
Shaping the future of radiology with advanced imaging technologies.

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FUJIFILM MEDICAL SYSTEMS EUROPE | BOOTH #503, EXPO X5 (GROUND LEVEL)

Digital Radiography | Women’s Health | Healthcare IT | Artificial Intelligence | Ultrasound