INNOVATIVE SOLUTIONS
To boost efficiency in health care
Best Case 1

How does it work

Companion diagnostic is a medical test used as a companion to a therapeutic drug to determine its applicability to a specific person.

It helps predict likely response and consists on a variety of tests: diagnostic tests of proteins, metabolites, essential elements, tracers, and other categories of invitro diagnostics.

Benefit for the patients

- Identify patients likely to be at increased risk for serious side effects as a result of treatment with a particular therapeutic product.
- Monitor response to treatment with a particular therapeutic product for the purpose of adjusting treatment to achieve improved safety or effectiveness.
- Ultimately, empower patients by improving health literacy and by fostering patient involvement in decision-making processes.

Benefit for the system

Companion diagnostics can limit ineffective medication use, preventing unnecessary ambulatory consultations and hospitalization.

It can also make personalised healthcare more affordable across the EU. With knowledge of a patient’s genetic structure, tailored treatment cut down on the unnecessary use of resources. By promptly determining how the person’s body will react to that drug or treatment, the hospital loses less money and fewer resources to the trial and error involved in this process.

Example of application

Oncology is the most common disease areas for companion diagnostics, covering 95% of the market.

In the United States, lung and blood cancers are the most important application areas, whereas in Europe, breast cancer dominates the market.

The overexpression of the so-called HER2 protein (a member of the human epidermal growth factor receptor) has been strongly associated with breast cancer. HER2 is used as a biomarker or an indicator of breast cancer. Companion diagnostic leverages this relationship to design therapies for patients and delivered personalized care.

Challenges

Challenges for equal access to companion diagnostics in Europe relate to:

- The variation of approaches for assessment and reimbursement across and within Member States.
- The general lack of link between assessments and decision making.
- The lack of established clear processes for reimbursement, funding and uptake of diagnostic innovation.
How does it work

Robot-Assisted Surgery was developed to foster minimally-invasive surgical procedures and to enhance the capabilities of surgeons performing open surgery. Instead of directly moving the instruments, the surgeon uses a direct tele manipulator or computer control.

With the support of AI, surgeons can determine what is happening during a complex surgery by providing real-time data about the movements the surgeon makes during the procedure.

**ARTIFICIAL INTELLIGENCE IN ROBOTIC SURGERY**

**Best Case 2**

**How does it work**

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**Benefit for the patients**

- AI brings accuracy, better planning and better assessment of the risks.
- AI robotics outcomes include shorter hospitalization.
- 21% reduction in length of stay.
- Reduced pain and discomfort.

**Benefit for the system**

This technology can reduce avoidable discomfort and costs. AI applications, by gaining experience in the field, will continually lead to improvements in precision, efficiency and outcomes. The benefits are considerable also for healthcare professionals and their workflow. AI can help surgeons in their decision-making process while assessing about potential risks, and likelihood of major morbidity and mortality in addition, AI technology brings in more patient business for elective procedures and makes the hospital more competitive when compared to other facilities.

**Example of application**

AI-assisted surgery robot to suture small blood vessels, some no larger than 0.03 millimeters.

Assisting neurosurgeons treating epilepsy: Robots place electrodes into the brain and need 2-3 mm holes in the cranium, reducing the regular operative time by half.

Augmented reality systems will be used to overlay important information required during surgery that is typically displayed on multiple monitors stacked around the surgeon.

Improve the venipuncture procedure with robot-assisted and predictive models. A system based on a high-resolution motion rapidly detects the vein entry by detecting blood.

**Challenges**

- Considerable initial investment in training, devices and infrastructures.
How does it work

Home tele-dialysis is used to purify the blood of a person whose kidneys are not working normally, in their own home. There are two main home dialysis procedures:
Peritoneal dialysis: A catheter is implanted into the abdomen, into which a dialysis solution is infused and drained out for as long as is necessary to remove waste and excess fluid.
Haemodialysis: Using a dialyzer the blood travels through a plastic tube where it is cleaned and then returned to the body. Only a small amount of blood is out of the body at any one time.

Best Case 3

HOME TELE-DIALYSIS

Benefit for the patients

- More free time and greater flexibility with treatment schedules.
- Saves time and money in hospital travels.
- Access to the treatment is increased in rural areas.
- Deeper understanding of health conditions and control over treatments.
- More autonomy and greater independence.
- More stable blood chemistry and body hydration.

Benefit for the system

The reduction of the expenses on hospital dialysis equipment and human resources in charge of monitor the treatment, as well as, avoid long-term hospitalization, have better collection and display of data and visibility to any missed treatments for healthcare team. And ultimately, improve the quality of life for patients who will be able to contribute to the economy.

Example of application

A Tele-dialysis systems can be upgraded throughout virtual monitoring apps and tools, to make patients feel connected to healthcare professionals remotely while on dialysis at home. Ultimately, tele-dialysis can improve compliance with the dialysis regime. Various mechanisms have been designed and implemented in this sense, including digital logbooks feedback tools and virtual dialysis assistance to enable cost-efficient remote dialysis care. Moreover, new apps have been developed to improve health behaviour via digital platforms. These apps can provide virtual coaching, messaging nurses during dialysis, camera surveillance and reminders for medications among others.

Challenges

- Dialysis patients lack knowledge about treatment options,
- Patients who are familiar with home dialysis may not have accurate information.
- Many dialysis facilities are not certified to offer home dialysis.
How does it work

The continuous glucose monitoring system (CGMS) measures the content of sugar in blood. By using a sensor under the tissue, the glucose level data is transmitted to medication administration devices and/or mobile apps. In addition, people can see their glucose level anytime along some special features:

- An alarm can sound when the glucose level inappropriate.
- Data can be downloaded to a smart device to see the glucose trends.
- Information can be sent automatically to a second person’s smartphone.

Benefit for the patients

- Reduce incidence of problems in which a person’s blood sugar either becomes extremely high or low.
- Increase the quality of life.
- Cut down emergency visits to the doctor.
- Help to make more informed decisions throughout the day.
- Psychological relief due to the predictability of glucose levels.

Benefit for the system

CGMS ultimately results in a lower hospitalization rate per patient. Over time, good management of glucose greatly helps people with diabetes stay healthy and outside hospitals, which results in cutting healthcare settings’ costs.

Example of application

A CGM can be one part of the “artificial pancreas” systems, now beginning to reach people with diabetes. An artificial pancreas replaces manual blood glucose testing and the use of insulin shots. A single system monitors blood glucose levels around the clock and provides insulin or both insulin and a second hormone, glucagon, automatically.

The system can also be monitored remotely, for example by parents or medical staff and it tests the glucose level every 5 minutes (day and night) through a CGM, and automatically gives the right amount of basal insulin, a long-acting insulin, through a separate insulin pump.

Challenges

- The high ongoing cost of continuous glucose monitoring devices is seen as the greatest barrier to their widespread use.
- The overwhelming amount of data patients receive.
How does it work

When admitting patients, the back-office workflow often has to go from desk to desk, which means longer wait times and more hassles for patients. It is possible to achieve substantial improvements in hospital admission workflow by using secure messaging.

Secure texting can be used to monitor bed availability and accelerate lab turnaround. The most recent secure messaging apps allow forwarding a consult with several doctors in case one particular doctor is not available.

AUTOMATING THE ADMISSION PROCESS IN HOSPITALS

Benefit for the patients

- Time saving.
- Improve patient's experience.
- Enhance effective operational procedures.
- More effective patient care.
- Reduce the need for manual searching for data.
- More effective diagnosis and treatment
- Improved patient outcomes.

Benefit for the system

Secure messaging for the admission process will ultimately reduce the delays and manual searches, save money and provide a higher return on the investment.

Example of application

The secure group messaging feature can be used to place orders and send automated notifications to section managers and nurses who oversee the patient's medical care.

Section managers, administrators and nurses can get clarification of orders through secure messaging if necessary and obtain quick responses from doctors or their deputies if they're not available.

Doctors can also obtain laboratory results and radiology photos as soon as they are inputted in the EMR to speed up diagnoses.

Challenges

- Many hospital information systems do not support the implementation of automated workflow.

Best Case 5

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