

NHG Clinical Needs

Clinical Needs: A novel solution to prevent blood clot & infection in IV Cannula

Description

Intravenous (IV) therapy is common in surgery and acute care settings, with approximately 60-70% of patients receiving some form of IV therapy as part of their treatment. Skin irritation and infections are some complications leading to mortality and morbidity.

Pain Point

If the cannula is not sited correctly, or if the vein is particularly fragile, blood may extravasate into the surrounding tissues. Repeated attempts at cannulation result in the narrowing of veins making future access more difficult. The cannula has to be changed every few days to reduce the risk of infection.

What is needed

A cannula that can be left in place for days or weeks with minimal risk of leak or infection.

Preferred Business Model

- R&D Collaboration

Clinical Needs: A novel way to assist clinicians to insert a needle through the intervertebral space into the subdural space

Description

Intrathecal chemotherapy is a treatment in which anti-cancer drugs are injected into the fluid-filled space between the thin layers of tissue that cover the brain and spinal cord.

Pain Point

The clinicians find it difficult to insert the needle through the intervertebral space if patients are obese or have curved spines. As the intervertebral space narrows, the path that the needles have to negotiate becomes more complex. Clinicians will need to carry out X-ray guided insertions for patients who have failed multiple unguided procedures.

What is needed

A better method to guide the needle into the subdural space.

Preferred Business Model

- R&D Collaboration

Clinical Needs: A novel way to create affordable and comfortable orthopaedic cast

Description

An orthopaedic cast or plaster cast is used to stabilize and support fractured limbs and aid healing. Plaster-of-Paris is essentially calcium sulfate hemihydrate, a white powder that forms a paste when it is mixed with water. The paste is moulded on the patient's limb and hardens into a solid cast.

Pain Point

Plaster cast is uncomfortable and causes skin complications. The skin under the plaster may become dry and itchy because users are unable to wash the affected area. The weight of the plaster cast restricts movement. The material is brittle and the cast can break if it strikes something hard.

What is needed

A method of supporting and protecting fractured limbs with fewer of the disadvantages of Plaster-of-Paris.

Preferred Business Model

- R&D Collaboration

Clinical Needs: A better way to study skin lesions

Description

Dermoscopy (or dermatoscopy) is an essential tool used by dermatologists, plastic surgeons, general practitioners and other health professionals for early diagnosis of melanoma. The instrument is more accurate in distinguishing benign and malignant (cancerous) skin lesions (such as melanoma). Dermoscopy is also increasingly useful in the diagnosis of non-pigmented skin lesions and inflammatory dermatoses.

Pain Point

Commercially available dermascope requires users to place their eye (monocular) to the eye piece. This is inconvenient especially if the mole or lesion is located at parts of the body that are difficult to reach. To capture a 2D image, user needs to have an external adaptor and attach a camera to the dermascope.

What is needed

A dermoscope that is easier and more convenient to use, preferably hand-held and free of wires.

Preferred Business Model

- R&D Collaboration

Clinical Needs: A novel way to minimize the pain of frequent injections

Description

Patients suffering from chronic disease such as diabetes need to self-administer injections at least once a day. Other patients sometimes also injections at different parts of their body, including sensitive areas like the face. Numbing gel is a way to prevent pain, but it requires some time for the effect to take place and the effect is not of satisfactory

Pain Point

There is no consistently effective and convenient way to inject painlessly.

What is needed

A painless method to deliver a sufficiently large dose of liquid medication into the superficial layer of the skin.

Preferred Business Model

- R&D Collaboration

Clinical Needs: An efficient and fail-proof way to identify patients with no co-operation from them

Description

Patients with mental health problems (e.g., psychosis) or who are confused or drowsy are unable to respond appropriately to questions about their identity. These patients may also remove their wristbands or switch wristbands with other patients. Caregivers do use photographs as a secondary means of identifying patients.

Pain Point

The photography of patients is not carried out routinely. Manual facial recognition is prone to error.

What is needed

A method to positively and accurately identify patients without their co-operation and is safe from tampering.

Preferred Business Model

- R&D Collaboration

Clinical Needs: A better way to reduce the incidence of pressure ulcers in bedridden patients

Description

Pressure ulcers are very common in bedridden patients with coma, dementia, fractures, and strokes. Once formed, the ulcers require more nursing and medical care, they last for months or years and they cause pain and death.

Pain Point

Standard methods to prevent ulcers require intensive nursing effort: regular patient rotation and the use of pressure relief mattresses. They are not commonly successful. Methods used to prevent pressure ulcers in a hospital institution are not available or readily accessible in the community.

What is needed

A radical method to minimise or prevent the development of pressure ulcers in bedridden patients.

Preferred Business Model

- R&D Collaboration

Clinical Needs: An efficient way to cannulate peripheral veins of patients

Description

In the hospital, cannulation of veins is very frequently used to administer fluids and drugs. Direct visual cannulation is difficult in obese and elderly patients. Difficulty in placing a tube into a subcutaneous vein results in multiple failed attempts, discomfort to patients, delay in patient management or occurrence of adverse events.

Pain Point

Placing a cannula into the vein is still a manual process requiring much operator skill. There are ultrasound and other “vein-finding” devices but it is unclear if they are useful.

What is needed

A better method to locate and insert a cannula into patient’s vein that requires minimal human intervention.

Preferred Business Model

- R&D Collaboration

Clinical Needs: A way to contain patients waiting for beds at the Emergency Department

Description

Many ill patients do not have space to rest or pass time while waiting for hospital beds. This wait may last hours or even days.

Pain Point

Setting up beds for these patients is not an efficient use of space as the demand for such assets fluctuate. There should be an automated method for cleaning these beds between patient usage.

What is needed

A patient-friendly method to hold patients awaiting hospital beds. The solution must be deployable at short notice and stored in a space-saving manner when not used. It must be easily or automatically cleaned between uses.

Preferred Business Model

- R&D Collaboration

Clinical Needs: A way to minimise manual effort for changing of bed sheets

Description

Changing each bed sheet takes 2 nurses about 2-3 mins. TTSH has ~1600 beds. The time taken to change the bed sheets for bedbound patients is much longer – the nurses have to clean the patient and change the bed sheets. Before changing, the nurses have to check that the bed sheets look presentable.

Pain Point

This procedure consumes nursing manpower and is purely non-clinical. Moving patients for linen changing can be uncomfortable for them.

What is needed

A better and faster way of changing bed sheets, or replacing the need for bed sheets.

Preferred Business Model

- R&D Collaboration

Clinical Needs: A way to dispense medication and food correctly without nursing intervention

Description

Nurses serve medications to patients in the wards four times day, not counting the urgent orders. The serving of medication is routine yet requires great care because the frequency and types of medications are different for each patient. Meal orders are also customised to the needs of individual patients and nurses have to ensure food is served correctly.

Pain Point

Because serving medication and food who takes up several hours a day, nurses do not spend quality clinical time with patients who require more attention.

What is needed

A better and safer way to ensure that the correct medications and diet are delivered to the right patient without repeated human checking.

Preferred Business Model

- R&D Collaboration

Clinical Needs: A novel way to remove plaques from narrowed blood vessels

Description

Plaques are the major cause of arterial narrowing and lead to strokes and heart attacks. Current treatment are open-heart surgery to bypass the affected blood vessels, balloon angioplasty and stent placement and rotational atherectomy to remove the plaques along the inner lining.

Pain Point

Open-heart surgery remains a major operation with high risks. Patients can have recurrent vascular narrowing after stent implantation and may require repeat stent placement. Rotational atherectomy may hurt the vessel lining, contribute to increased risk of peri-procedural myocardial infarction.

What is needed

A better and safer way to remove plaques in the arteries while minimising the risk of recurrent disease.

Preferred Business Model

- R&D Collaboration

Clinical Needs: A more efficient way to transfer patients

Description

It is likely that in the future, more patients will be living alone and using walking aids to maintain mobility. Walking frames provide extra stability compared with sticks. In the course of daily life, patients need to be able to transfer themselves independently from bed to commode and back again. Patients using conventional walkers normally need a caretaker to assist them during transfers; otherwise, the risk of falling is very high.

Pain Point

Most falls occur during unassisted transfers.

What is needed

A more reliable way of transferring patients utilizing walking frames that can be deployed at home with minimal human supervision.

Preferred Business Model

- R&D Collaboration

Clinical Needs: A safer way to dose insulin in the treatment of hyperkalemia

Description

Hyperkalemia, an elevated concentration of the electrolyte potassium in the blood, can be dangerous. In urgent situations, intravenous dextrose 50% plus insulin is used to rapidly reduce the potassium concentration. Insulin should be measured with a U-100 insulin syringe and dextrose with a 20-cc syringe. Each unit of marking is 0.01 ml in the U-100 syringe but 1 ml in the 20 cc syringe.

Pain Point

Healthcare providers may inadvertently use the 20-cc syringe for both insulin and dextrose 50%. This leads to a massive overdose of insulin that can cause harm because of the hypoglycaemic shock.

What is needed

A method that ensures only the correct U-100 syringe is used to withdraw insulin from the vial.

Preferred Business Model

- R&D Collaboration

Clinical Needs: A way to ensure medication compliance

Description

Hospitals issue medications in blister packs, sachets and pill bottles while GPs do so in blister packs and zip-lock bags. Patients find it hard to reconcile medications, others have difficulty opening pill-boxes or blister packs while others are confused by the dosages or the timing. It is difficult to measure and ensure medication compliance especially among the geriatric patients.

Pain Point

Automated pill-dispensing solutions exist in the US on a subscription basis, but not available locally. Nevertheless, they cannot ensure compliance – patients have the choice whether to consume the medication or not.

What is needed

A system to dispense medications at the right doses and frequency, plus a method to verify that the patient has taken the drugs.

Preferred Business Model

- R&D Collaboration

Clinical Needs: A more effective way for stroke patients and family to manage their illness

Description

Each year, approximately 795,000 people suffer a stroke. About 600,000 of these are first attacks, and 185,000 are recurrent attacks.

Pain Point

Often, stroke patients cannot manage their anger and emotions. They tend to develop behavioural issues during the 6 months of physical rehabilitation and immediate post-discharge period.

What is needed

Tools to help patients and family members handle this stressful period of the recovery.

Preferred Business Model

- R&D Collaboration

Clinical Needs: A better way to evaluate swallowing in dysphagic patients

Description

Patients who lose the ability to coordinate the muscles involved in swallowing (also known as dysphagia) are at risk of having food material enter the lungs, with serious consequences. Cervical auscultation (CA) is a method used to evaluate the pharyngeal phase of swallowing. The health care provider places a stethoscope on the lateral border of the trachea above the cricoid cartilage to listen to the sounds of swallowing and breathing. Sounds indicating normal or impaired swallowing can be analyzed and interpreted by the listener.

Pain Point

This evaluation method is subject to clinician's experience. Extensive time required for training to distinguish the various sounds of the cervical region. Though widely accepted, this method has not been well proven.

What is needed

A simple and reproducible way to evaluate swallowing at the bedside, requiring minimal cooperation from the patient.

Preferred Business Model

- R&D Collaboration

Clinical Needs: A way to prevent back and waist strain of physiotherapist

Description

Physically dependent patients requires maximum or more-than-maximum assistance form the therapist. Physiotherapist often strain their backs and arms in the course of their job.

Pain Point

Repeated movements such as bending trunk and transfer of patients increase the strain on the physiotherapists' back. Work-related injuries lead to absenteeism and a high proportion of occupational disability costs.

What is needed

A method to augment the physiotherapist's ability to lift and support patients in a responsive manner without risk of injury to the health care provider.

Preferred Business Model

- R&D Collaboration

Clinical Needs: A way to reduce inefficiency of looking for hospital equipment

Description

Exercise equipment are shared resources used by various physiotherapists.

Pain Point

The equipment are used in various parts of the ward, so they cannot be easily located when needed. Some equipment are not returned to the proper storage area, or even taken home by patients. Repeatedly replacing these equipment is a financial burden.

What is needed

A method to enable real-time and continuous tracking of all equipment belonging to a given unit.

Preferred Business Model

- R&D Collaboration

Clinical Needs: A way to increase patients' exercises and mobility frequency

Description

Usually, in the hospital, the physiotherapist sees a given patient once a day for exercise and rehabilitation. For the rest of the time, patient is meant to do the exercises they learnt from the therapists on their own.

Pain Point

Most patients are not compliant to those exercises and spend most of their time resting in bed. This will eventually lead to de-conditioning or a suboptimal rate of recovery, possibly delaying discharge.

What is needed

A better way improve patient compliance with the exercises during hospital stay when the therapist is not present.

Preferred Business Model

- R&D Collaboration

Clinical Needs: A method to prevent patients falling

Description

Short of a massive increase in nursing manpower, it is not possible for the staff to observe every patient around the clock. Physically, it is not possible for nurses at their station to have visual contact with every patient.

Pain Point

Though there are scores that help identify patients at risk of falling, these are often too 'sensitive' and many end up being classified as high-risk without them actually falling. This reduces the staffs' level of alertness. Cameras are intrusive and require constant but fatiguing attention by nurses.

What is needed

A non-intrusive but always-on system to monitor patients, with fall-predictive algorithms and staff-warning capabilities.

Preferred Business Model

- R&D Collaboration

Clinical Needs: A smart and efficient way to monitor patients' vital signs so as to allow timely intervention

Description

The patient's vital signs (pulse rate, respiration rate, blood pressure, temperature, pain and oxygen saturation) are measured many times throughout the day. They are usually interpreted in isolation, or used retrospectively to provide a record of the patient's status.

Pain Point

While vital signs are increasingly measured automatically, there is no method to integrate and use all the data in a predictive manner, issuing warnings to the staff if there are indications of deterioration.

What is needed

A method to automate, interpret continuous clinical data that enables early prediction of deterioration.

Preferred Business Model

- R&D Collaboration

Clinical Needs: A smart and efficient way to administer insulin

Description

Some diabetics require up to three or four insulin injections per day. It is tedious and painful to monitor capillary blood sugar level. Patients sometimes have to follow complex and dynamic insulin regimes as prescribed by doctors.

Pain Point

There are pain and distress on patients with the frequent finger pricking and abdominal subcutaneous injection. There is no way to monitor blood sugar levels and do accurate interventions automatically.

What is needed

A painless way to monitor blood sugar and deliver automated insulin dosing in accordance to glucose level.

Preferred Business Model

- R&D Collaboration

Clinical Needs: A more efficient way to verify position of nasal gastric tube at bedside

Description

About 10-20% of hospital patients require artificial tube feeding because they are unable to swallow safely. As each patient needs 6 feedings/day, many nursing man-hours are used. The nurse has to carry out POCT (aspirate Gastric content), to ensure tube placement prior feeding. Thereafter the nurse stands at the patients' bedside, holding on the tube and syringe at eye level – slowly pouring in the milk through the nasogastric tube. The whole process takes up minimally 15 min of nursing hours per feeding. Aim to eliminate manual process of gastric aspirate test to determine tube placement and a gravity flow

device to allow milk feeds to flow into the stomach without nurses holding on to the syringe and standing at the bedside to carry out this feeding process.

Pain Point

Method not reliable and gold standard is to confirm tube position using x-ray.

Certain medication changes PH level of aspirate hence making tests not reliable.

What is needed

A better way to perform colonoscopy that is faster, more comfortable and requires less intensive trained manpower is needed.

Preferred Business Model

- R&D Collaboration

Clinical Needs: Predicting treatment outcomes in the mentally ill patient

Description

Mental illness is a long-term disease that takes a toll on patients and their family or care-givers. The outcomes are varied: some patients may go into remission, others require medications for disease control while others suffer uncontrolled diseases.

Pain Point

Currently there is no model to predict the patient's outcome at disease outset. Also, in patient with well-controlled diseases, there is no way to predict relapses.

What is needed

A method to model disease trajectory so that it is useful for prognosis and early detection of relapses.

Preferred Business Model

- R&D Collaboration

Clinical Needs: A better way to perform colonoscopy

Description

Colonoscopy, the use of a flexible scope through the large intestines, is an important test to detect colorectal cancer or polyps. Regular testing is recommended for people aged ≥ 50 years.

Pain Point

Colonoscopy is carried out manually by trained doctors and takes approximately 45 minutes for each patient. It is difficult to complete in certain patients, especially those with tortuous intestines.

What is needed

A better way to perform colonoscopy that is faster, more comfortable and requires less intensive trained manpower is needed.

Preferred Business Model

- R&D Collaboration

Clinical Needs: A way to prevent keloid recurrence

Description

Keloids are scars that are raised and conspicuous. They can occur on any part of the body, but commonly affect the ear, arms and chest. Some people are prone to keloids and may develop them after body piercings, trauma or surgery.

Pain Point

Keloids are treated with intralesional injections, lasers and surgery. The management of keloids is cumbersome and recurrence rate is high. This may affect patients' lifestyle and general appearance.

What is needed

A reliable method to treat keloids effectively that minimises the risk of recurrence.

Preferred Business Model

- R&D Collaboration

Clinical Needs: An effective way to reduce post-inflammatory hyperpigmentation

Description

Superficial skin lesions, for example viral warts, seborrheic keratosis and skin tags, are abnormal growths. Though the majority of them are benign, they cause a problem with cosmesis so some patients chose to remove them. They may be removed by shaving or saucerization, with the resultant bleeding controlled by electrocauterization.

Pain Point

Electrocauterization is often used in many types of surgery to seal blood vessels, so as to reduce or stop bleeding. However, this can lead to formation of crusts and possibly increased risk of post-inflammatory hyperpigmentation.

What is needed

A method to reduce hyperpigmentation after electrocauterization or other forms of trauma.

Preferred Business Model

- R&D Collaboration

Clinical Needs: A comprehensive personalized cognitive rehabilitation program

Description

Training to perform physical and functional tasks for the patients or their caregiver is emphasized so that patients can be discharged home promptly. Cognitive training or rehabilitation is often overlooked. There is no formal cognitive rehabilitation program to help patients with cognitive impairment, such as those afflicted by stroke, traumatic brain injury, or dementia.

Pain Point

Only few medications can improve cognition but their effects are inconsistent. Software such as “Lumosity”, “Neuroathome” and “Lively Silver” may help but they are not comprehensive and do not cater to all disease groups.

What is needed

A comprehensive and personalized cognitive rehabilitation program that is cost-effective and engaging for patients, that can be carried out as patients are prepared for discharge.

Preferred Business Model

- R&D Collaboration

Clinical Needs: A better method of urinary catheterization

Description

Many patients are catheterized (a flexible tube placed in the bladder to drain urine) during their acute illnesses for different reasons.

Pain Point

Due to poor technique of catheterization, some patients develop traumatic hematuria (blood in urine), urinary tract infection and even injury to their urinary tract, causing a false passage. Some patients require intermittent catheterisation several times a day.

What is needed

A solution to place the urinary catheter safely and efficiently, that can be repeated many times throughout the day, preferably usable in the patient's home.

Preferred Business Model

- R&D Collaboration

Clinical Needs: A more efficient way to interpret and diagnose chest x ray

Description

Chest x rays are the most commonly performed imaging test for screening of lung disease. It has limited specificity but due to its widespread availability and low cost CXRs are well accepted in medical practice. With the explosion in demand for imaging as a diagnostic tool, there is an increasing need for more manpower to analyze all forms of imaging including radiographs, ultrasound, CT, MRI, etc. Greater time and expertise is required in cross sectional imaging modalities.

Pain Point

In Singapore, and more so in the rest of the South East Asian region, there is a shortage of well-trained radiologists who can adequately interpret imaging studies adequately. Furthermore radiologists should concentrate their efforts on higher value add modalities like CT and MRI. In a screening cohort, more than 70% of cases will be normal. Annually, there are more than 100,000 screening CXR performed. Hence there is a large market need for automated evaluation of CXR, to pick out the normal ones, so that the abnormal ones can be analysed by the radiologists.

What is needed

To develop a machine learning algorithm that will be able to diagnose normal CXR to reduce radiologist workload and increase their value add.

Preferred Business Model

- R&D Collaboration