

Horizon Scanning

TechScan

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ACCUKNEE

KEYWORDS: Accuknee, Arthrometer, Anterior cruciate ligament

SUMMARY OF TECHNOLOGY

Accuknee is an arthrometer innovation intended to measure the anterior cruciate ligament (ACL) laxity of the knee. It is created with the combination of several appliances such as aluminium alloy frame with curved patella and tibia end, adjustable stylus, tibia strap, patella strap, plastic knob and digital depth gauge for digital measurement. It is created based on standard Asian leg size with a measurement of 31 cm length, 8.5 cm width and 0.4 kg weigh.

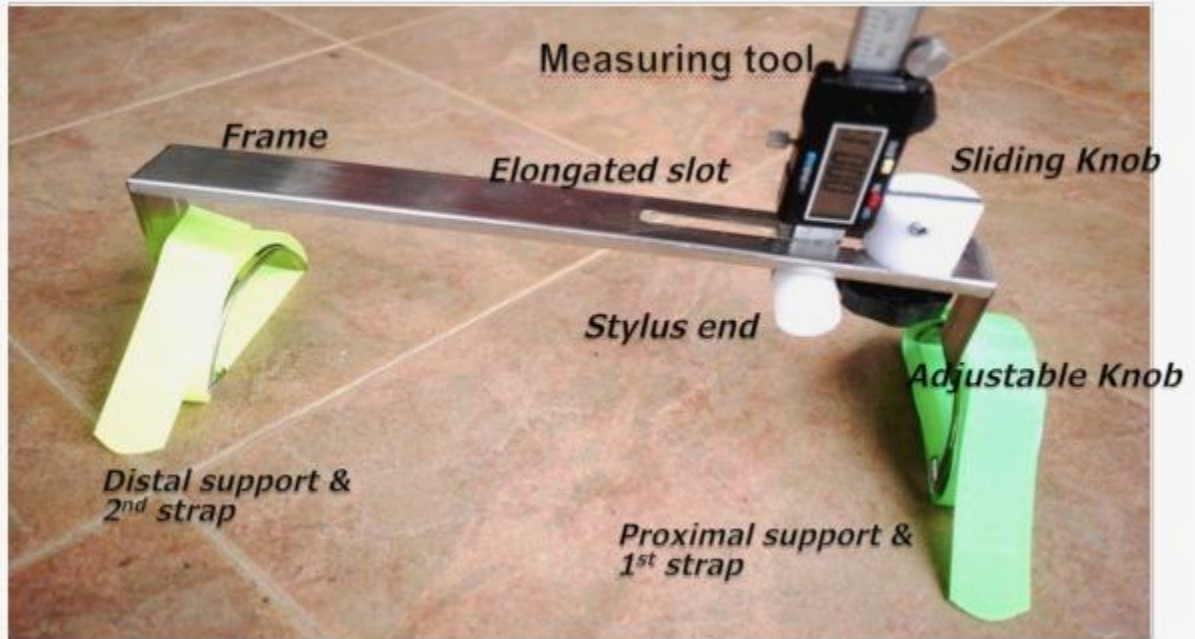


Figure 1 : Accuknee

When a patient comes with signs and symptoms of ACL, laxity will be measured with Accuknee. When running the test, the patient is placed in the supine position on an examination table with the affected knee flexed at 30°. A leg rest is placed underneath the foot to fix the position of the lower limb. Accuknee will be placed on the leg with the patella support on mid patella position and secured with the strap. Hamstring muscle will be put in relaxed position and digital measurement is reset to zero. The leg is pulled forward and reading on the measuring tool will be recorded. An average of three readings

will be taken to minimise the error. The knee laxity reading is categorized into three grade which are Grade 1 (<5 mm), Grade 2 (5-10 mm) and Grade 3 (>10 mm).

Kaizen (continuous improvement) method was used to modify and improve Accuknee. First prototype was improved due to unsuitable arrangement of plastic knob on the aluminium frame while on the second prototype, velcro stickers were added on both patella and tibia curve to stabilize Accuknee and made it stronger.

Accuknee has been patented by the Intellectual Property Corporation of Malaysia (MyIPO) on 26 April 2019 with file reference PI 2019002372. Currently, the Technology Readiness Level (TRL) of Accuknee is at level 9 i.e ready to be commercialised under Ministry of Health (MOH) of Malaysia.

Accuknee have participated and won several awards as first prize winner in:

1. *Pertandingan Kumpulan Inovatif & Kreatif (KIK), Pertandingan Kualiti Peringkat Hospital Sultanah Bahiyah* on 2018 2.
2. *Kategori KIK Penciptaan sempena Konvensyen Kualiti, Jabatan Kesihatan Negeri Kedah* on 2019
3. *Konvensyen Kumpulan Inovatif & Kreatif (KIK) Kementerian Kesihatan Malaysia (Peringkat Kebangsaan)* on 2019
4. *Konvensyen Team Excellence (RTEEx) Wilayah Utara* on 2019
5. *Annual Productivity & Innovation Conference and Exposition (APIC)* on 2019

INNOVATIVENESS

Novel, completely new	
Incremental improvement of the existing technology	/
New indication of an existing technology	

DISEASE BURDEN

The ACL is known to occur in people participating in athletic activity. As sports become an increasingly important part of daily life, ACL injury has become more common and affects active population⁶. Early diagnosis and prompt multidisciplinary treatment can provide good clinical outcomes in patients with limited range of motion (ROM) after ACL reconstruction.

CURRENT OPTIONS FOR PATIENTS

Laxity of ACL can be measured by clinical examination (drawer test) or Arthrometer KT-1000.

The current gold standard clinical tool for the diagnosis of ACL is magnetic resonance imaging (MRI).

POTENTIAL IMPACT OF TECHNOLOGY

a. Clinical Impact

Accurate assessment of knee laxity is critical in the management of ACL injury. Arthrometers are devices designed to apply a reproducible force across the knee and mechanically measure the resulting displacement. Their advantages include a relatively simple and quick technique, non-invasive, objective measurement compared with clinical examination and requires no radiation exposure. Many factors influence the test reliability, including examiners experience, device overtightening, improper positioning, inconsistent force application, leg external/internal rotation, examiners hand dominance and presence of knee effusions⁴. The diagnosis of ACL injury is confirmed by either MRI or arthroscopy.

Accuknee is an option for measurement of knee laxity. It is simple to use and able to give accurate reading until 0.00 mm with basic training to the clinicians. This may help them to decide on which patients should be given priority to confirm the diagnosis by MRI or arthroscopy. Definitive treatment can then be offered early to avoid complications of ACL injury. However, evidence is required to show its advantages compared with arthrometer KT-1000.

b. Cost

According to the developer, total cost of Accuknee is RM126.00 which is much cheaper than Arthrometer KT-1000 worth of RM 9182.01.

c. Organisational

Measurement of knee laxity with Accuknee requires only one staff to perform and takes just 10 minutes.

d. Societal/ethical

Accuknee have been patented by the Intellectual Property Corporation of Malaysia (MyIPO) on 26 April 2019 with file reference PI 2019002372.

e. Safety

Accuknee does not involve any radiation and invasive procedure. It is made of light metal with smooth patella and tibia end curve.

EVIDENCE

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