Establishing a cutoff value for Lumbar skeletal muscle index (SMI) in the assessment of Sarcopenia that will predict adverse outcomes in emergency laparotomy in a local Asian Population

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Introduction
Sarcopenia – the loss of muscle mass is increasingly recognized as an important factor in post-operative recovery. A quick measurement of lumbar skeletal muscle index (SMI) at the L3 level on computed tomography (CT), which is routinely performed for emergency patients, can be used to indicate sarcopenia. Low SMI is associated with poorer clinical outcomes and is useful in counselling and post-operative management. However, the SMI cut-off differs in different populations. In our study, we aim to derive a cut off value for our local population and correlate with post-operative outcomes.

Methods
Patients were selected from Khoo Teck Puat Hospital’s emergency laparotomy database from 2016 – 2019. A retrospective analysis was done for all patients aged >65-year-old during this period. Patient demographics, comorbidities and operative factors were analysed and tabulated as per table 1. SMI was calculated for each patient based on admission CT images done prior to surgical intervention. Outcome data collated included length of stay, complications and mortality. The cut off for SMI was calculated based on population studies and based on analysis of the 25th percentile SMI in the study sample. In our study, the cut off for SMI in males was based on the 25th percentile value. In females, the SMI was used based on a previous local study of sarcopenia as this yielded a lower SMI value. The cut-off values were determined to be <22.9 cm²/m for females and <37.4 cm²/m²

Results
• Total of 289 cases from 2015-2019, aged >65 year old, undergoing emergency laparotomy
• SMI was determined based on 25th percentile values and correlation with previous population studies. SMI cut off for sarcopenia was calculated to be:
  - < 22.9 cm²/m² for females
  - < 37.4 cm²/m² for males
• 17% of patients were sarcopenic
• Overall, in the sarcopenic group
  1. Longer length of acute hospital stay (20.8 days vs 16.2 p value 0.041)
  2. Higher rate of Clavien – Dino IV complications (18.4% vs 7.5% p value 0.035)
  3. Higher 1-year mortality (28.6% vs 14.6%, p value 0.03).
  4. 2x higher chance of mortality within 1 year

Discussion and Conclusion
CT scan assessment for sarcopenia using L3 Skeletal muscle Index is a quick and easily reproducible tool. Based on our local data, we identified SMI cut-off values for males and females which is predictive for 1-year mortality, inpatient mortality, Clavien 4 complications and longer overall length of stay. There is huge potential in using SMI as a surrogate marker in perioperative care in our local Singaporean population, to both counsel as well as to prognosticate outcomes, due to the widespread availability of CT scans and ease of calculation. SMI has the potential to be used as a quantifiable variable in risk prognostication models and is likely to further add value on top of existing prediction models (e.g P-Possum scoring, NELA mortality scoring). This will impact patient care and has the potential to affect allocation of hospital resources in the setting of an aging population globally.