Title: The effectiveness of nurse-led pre-operative assessment clinics for patients receiving elective orthopaedic surgery : a systematic review

Presentation of SR result

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Background

- Traditionally, patient will be admitted to the ward on the day before surgery .
- The day of admission will be planned quite in advance.
- The medical or physiological or sociological condition may be changed.
- A range of research findings found that such practice results in high rates of cancellation of the operative procedure or the surgery will have to be postponed.
- Cancellation of surgery contributed a negative impact on patient's anxiety as well as the waste of hospital resources and preparation.

(Knox et al, 2009; Cantlay et al, 2006; Rai & Pandit, 2003; Craig, 2005; van Klei et al, 2002; Pollard et al, 1996; Ferschl et al, 2005; Reed et al, 1997).

Background of POAC

- Pre-operative assessment clinic (POAC) has been advocated as one of the effective health care agency to conduct the pre-opertive assessment in order to prepare the patient for surgery to reduce cancellation of surgery.

- The clinic was designed to optimize the medical condition of the patient before surgery and assessment of patient's pre-anesthetic status before surgery.

- A range of research articles also supported that after the implementation of the nurse-led POAC, the rate of cancellation of surgery reduced (Barnes et al, 2000; Knox et al, 2009; Cantlay et al, 2006; Rai and Pandit, 2003; Dussa et al, 2007; Reed et al, 1997).

- National Health Service Modernization Agency (2003) stated 30% of operations that were cancelled on the day of surgery could have been avoided if effective pre-operative assessment had been carried out.

Background of nurse-led POAC

- Traditionally, pre-operative assessment is within the remit of the medical professional mainly conducted by the doctors or the anesthetist. Kinley et al, (2002); Rushforth et al, (2000) and Rushforth et al, (2006)

- Nowadays, some of the POAC clinics are operated and coordinated by the nurse practitioner (Dussa et al, 2007; Judd, 2009; Walsgrove, 2004; Wadsworth et al, 2002).

- Nurse-led pre-operative assessment clinics (POAC) have been widely implemented in the health agency of different countries recently (Cantlay et al, 2006; Fischer, 1996; Flynn, 2005; Hepner et al, 2004; Walsgrove, 2004; Knox et al, 2009; Flowers and Wright, 2003).

- Many hospitals across United Kingdom, the routine preoperative assessment of elective case is performed by nurse practitioners. They are specially qualified and trained to perform the comprehensive pre-operative assessment. Dussa et al (2007)

Background – ortho surgery

- It is also noteworthy that the number of orthopedic surgery is in an increasing trend.

- According to the Centers for Disease Control and Prevention National Center for Health Statistics reports (2008)
- 46 million surgery in 2006.
- Reduction of fracture is 672,000
- Total knee replacement is 542,000
- Total hip replacement is 231,000

- **The surgery of knee replacements**
  - aged 65 years and over
    - increased from 60.1 per 10000 population in 2000 to 88.0 per 10000 population in 2006.
  - aged 45-64 years old
    - the rate doubled from 13.1 per 10000 population in 2000 to 27.3 per 10000 population in 2006.
- **The surgery arthroscopy of knee**
  - Increase (153%)
  - The US's seventh most frequent operation in 1994. (Rutkow, 1993)

Definition of pre-operative assessment

- According to the NHS Modernization Agency (2003) of the National good practice guidance on pre-operative assessment for inpatient surgery, the definition of pre-operative assessment is

  "Pre-operative assessment establishes that the patient is fully informed and wishes to undergo the procedure. It ensures that the patient is as fit as possible for the surgery and anesthetic. It minimizes the risk of late cancellations by ensuring that all essential resources and discharge requirements are identified and coordinated."

Review objectives

- To examine the effectiveness of nurse-led pre-operative assessment clinic on **orthopaedic patient outcomes** such as levels of satisfaction with the process of pre-operative assessment, incidence of post-operative complications, post-operative recovery, as well as levels of fear and anxiety before surgery.

- To synthesize the evidence on the impact of nurse-led pre-operative assessment clinic for elective orthopaedic patients on **health service outcomes,** including cancellation or delay of surgery, length of hospital stay and waiting time for pre-operative assessment and surgery.

Inclusion criteria

- **Types of participants:**

- This review will consider all studies that included adult patients who were 18 years old or above, required elective orthopaedic surgeries e.g. total knee replacement, total hip replacement, reduction of fracture or procedure of arthroscopy etc in hospitals or day surgery centers, and had attended a nurse-led POAC.

- Adult elective orthopaedic surgical patients within the American Society of Anesthesiologist (ASA) Physical Status Classification of 1 or 2 will be eligible for inclusion in the review. ASA classification 1 patients are considered to be healthy and normal, and ASA classification 2 patients are patients with mild systemic disease such as mild asthma, well-controlled hypertension, or well-controlled diabetes.[37]

- Studies will be excluded:
- if the participants had received emergency orthropaedic surgery.
- if they were primitively related to preoperative teaching or education.

Types of interventions:

- The review will consider studies that evaluate the effectiveness of attending a nurse-led POAC for elective orthopaedic surgery.

- A POAC is defined as a clinic that provides a general medical and anaesthetic pre-operative assessment includes history taking, health assessment and physical examination. Routine investigations such as laboratory and blood tests may be carried out. Referral to specialists before surgery work-up and health education will also be provided.

- Patients would attend a POAC 2 to 4 weeks prior to the scheduled elective orthopaedic surgery. The nurse-led POAC could be solely run by nurses, or nurses worked collaboratively with physicians.

Types of outcomes:

- The review will consider the following primary and secondary outcomes:
- Primary outcome measures are related to patients' health and well-being. This includes:
  - self-reported measures of pre-operative anxiety e.g. State-Trait Anxiety Inventory (STAI).
  - self-reported measures of patient satisfaction and experience with the process of pre-operative assessment e.g. patient's satisfaction questionnaire.
  - the incidence of patients' post-operative complications e.g. the perioperative blood transfusion, the post-operative wound infection and thrombo-embolic morbidity.
  - post-operative recovery
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- Secondary outcomes measures includes:
  - the rate of surgery cancellation or delay
  - patient waiting time for pre-operative assessment and surgery
  - the length of hospital stay

Types of studies:

- The review will include :
- randomized control trials (RCT),
- pseudo-randomized controlled trial,
- quasi-experimental studies,
- cohort studies
- case-control studies

The databases to be searched include:

- Academic Search Premise (1975 to 2011)
- British Nursing Index and achieve (1985 to 2011)
- Campbell Collaboration Library
- CINAHL Plus (1985 to 2011)
- Clinical Evidence
- Clinical Trials
- DARE (Database of Abstracts of Reviews of Effectiveness)
- EBM Reviews : Cochrane Database of systematic reviews
- EMBASE (1980 to 2011)
- MEDLINE (1966 to 2011)
- PsychINFO (1985 to 2011)
- ProQuest 5000 (1985 to 2011)

Electronic databases to be searched for primary publications written in Chinese include:

- Wan Fang Data, China Journal Net,
- Chinese Biomedical Literature Database,
- Chinese Medical Current Contents,
- Hong Kong Index to Chinese Periodical Literature,
- Chinese Electronic Periodical Services,
- Chinese Electronic Theses & Dissertations Service,
- Taiwan Electronic Periodical Services.
- The Chinese search terms will be based on the terminology used in Taiwan and China.

The search for unpublished studies will include:

- Agency for Healthcare Research and Quality,
- Current Controlled Trials,
- Clinical Study Results,
- Digital Dissertation Consortium,
- OpenSIGLE,
- MEDNAR,
- National Institute of Clinical Studies (NHMRC),
- New York Academy of Medicine Library Grey Literature Report,
- Science.gov,
- ProQuest Dissertation and Thesis,
- The Networked Digital Library of Theses and Dissertations.

Initial keywords to be used will include:

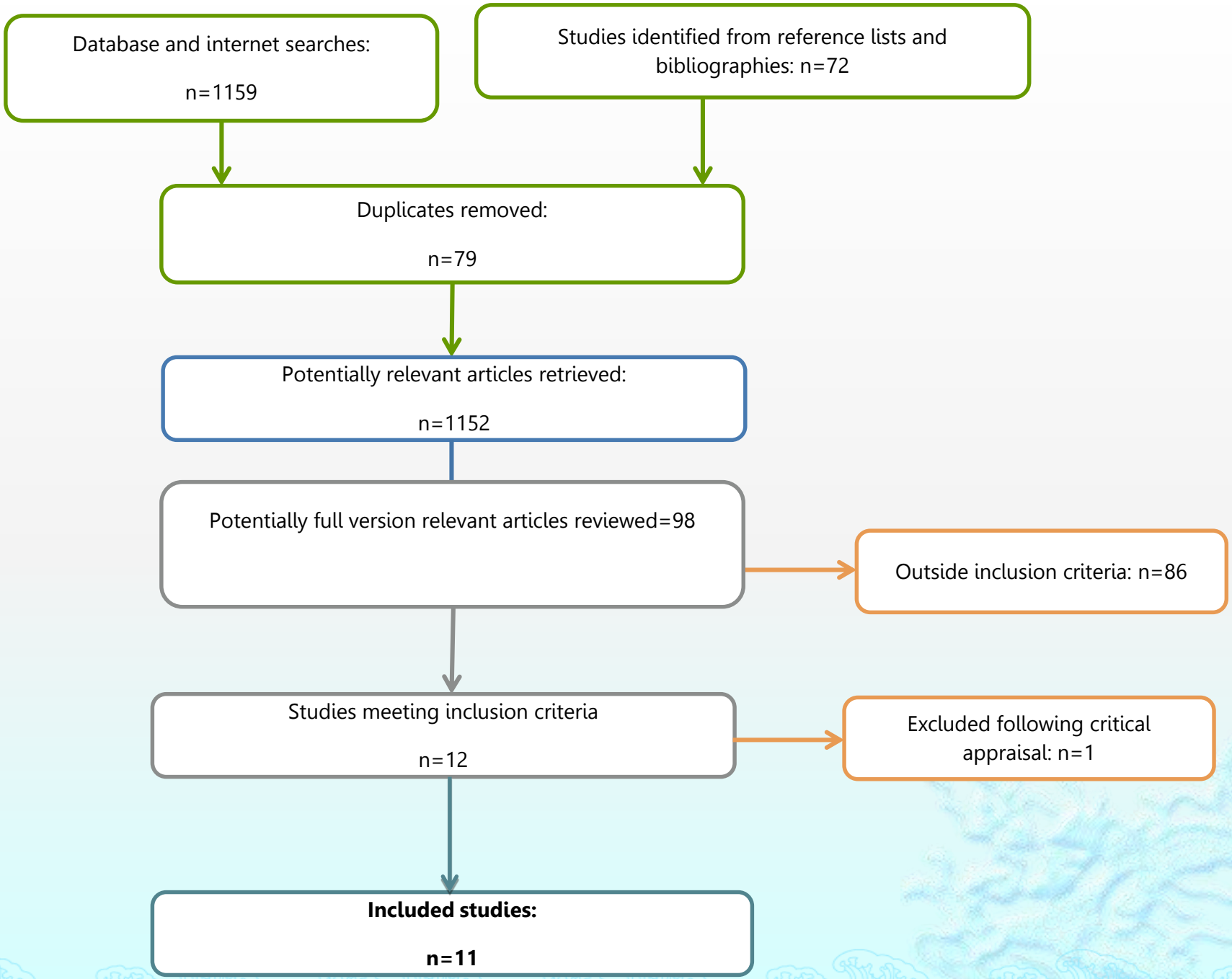
- admission process, ambulatory setting*, advance practice nurse*, cancellation, costs of peri-operative care, changing roles, elective surgery, elective surgical patient, efficacy and financial benefit, inpatient surgery, length of stay, nursing effectiveness, nursing outcomes, nursing efficacy, nurse practitioner*, nurse specialist*, nurse consultant*, nurse-led clinic*, nurse-led model*, nurse managed clinic*, nurse managed health cent*, nurse-led pre-operative assessment clinic, orthop#edic nurse practitioner, outpatient preoperative evaluation, operating room cancellation* and delay*, patient education, patient perceptions / perspective, patient satisfaction, pre-anesthesia evaluation, pre-admission clinic, pre-admission assessment clinic, pre-admission service, pre-operative clinic visit, pre-operative evaluation clinic, pre-operative assessment and management, postoperative outcomes, change management, waiting time.

- Whereas the initial Chinese searching terms will be '術前評估', '麻醉前評估', '入院前診所', '護士為主導的診所', '護士管理的診所', '擇期手術', '門診手術', '骨科手術', '專科護士', '護士顧問', '高級實踐護士', '取消手術', '住院', '外科病人', '醫院成本', '護理成效','病人的滿意度', '術後結果', '等候時間'.

Systematic Review Results :

Discussion on the included studies

Implication for clinical practice


Database and internet searches:
n=1159
Studies identified from reference lists and bibliographies: n=72
Duplicates removed:
n=79
Potentially relevant articles retrieved:
n=1152
Potentially full version relevant articles reviewed=98
Outside inclusion criteria: n=86
Studies meeting inclusion criteria
n=12
Excluded following critical appraisal: n=1
Included studies:
n=11

Review results : patient and hospital outcomes

- Primary outcome measures are related to patients' health and well-being. This includes:
  - Patient satisfaction with POAC
  - Peri-operative blood transfusion
  - Post operative recovery

- Secondary outcomes measures are related to hospital outcomes include:
  - The length of hospital stay
  - The rate of surgery cancellation

SR Results

- Eleven studies
- level of satisfaction (Heaney & Hahessy, 2011; Newton, 1996; Truscott et al.,2007).
- post-operative complication of blood transfusion (Grant-Casey and Madgwick , 2010)
- post-operative recovery and mortality (Kamal et al., 2011)
- length of hospital stay (Lewis, 1997)
- rate of cancellation of surgery (3.96 % to 7.94%) (Asimakopoulos et al., 1998; Barnes et al., 2000, Dussa et al., 2007; Ryan, 2000; Sutcliffe & Potter, 2002).

Discussion : Patient satisfaction with POAC

- The questionnaire used in the study of Heaney & Hahessy (2011) is a modified version of the Leeds Satisfaction Questionnaire. A convenience sample of 91 patients were invited. The response rate is 88%.
- The findings on general satisfaction scores for provision of information, empathy with the patient, attitude towards the patient, quality and competence for nurses were highly rated.

- Newton (1996): A six month review of a newly established nurse-led orthopedic pre-admission clinic. Patients who are undergoing elective orthopedic surgery are appointed by a junior sister.
- A total of 120 questionnaires were sent out with a response rate of 62%. Overall, patients were highly satisfied with the waiting time for laboratory tests like ECG, X-ray and blood tests. 92 % of the respondents commented that they had benefited from the visit and 99% understood the purpose of the clinic.

- A patient satisfaction survey form was provided to each patient with the nurse-led model in the elective orthopedic admissions process. But only 44 (17.5%) out of 252 were completed.
- Clients are satisfied with the competence performance of the nurses. (Truscott, Townsend & Arnold, 2007).

Discussion : Peri-operative blood transfusion

- Morbidity and mortality after surgery is significantly associated with the presence of pre-operative anemia which include fatigue, tachycardia, hypotension, dyspnea, lengthen the duration of hospitalization, rates of post-operative infection(Keating and Meding 2002).

- Education on improving diet, prescribing medication is paramount important before surgery (Keating and Meding 2002).

- Grant-Casey and Madgwick (2010) summarized a national comparative audit that 795 out of 5237 patient (15%) going for elective orthopedic surgery had anemia with a haemoglobin lower than 12g/dl.

- The author suggested that there is role for nurses who mange per-operative assessment clinics to ensure patients with anemia are managed effectively before surgery and decrease peri-operative blood transfusion unnecessarily.

Discussion : Post operative recovery

- Kamal et al (2011) audit the effect after the commencement of a specialized pre-operative anesthetic assessment clinic for patients after hip and knee arthroplasty and revision arthroplasty.
- Assessed preoperatively by multidisciplinary anesthetic lead team (anesthetist, orthopadic senior house officer, nurse practitioner).

- April 2005-March 2006
- N=298 (Prior)

- May 2006-Aoril 2009
- N=1147 (After)

- The overall reduction after surgery go to ICU, HDU, PACU
  - Admission to PACU (unplanned) 22% to 10%
  - Mortality in HDU, ICU and PACU 6.1% to 1.2%
  - HDU length of stay 2.1 days to 1.6 days
  - ICU unplanned admissions 1.3% to 0.4%
  - ICU length of stay 2.3 to 1.9 days

Discussion : length of hospital stay

- Lewis (1997) : The clinic is coordinated by the orthopedic clinical nurse consultant and a multidisciplinary health care team for elective orthopedic patients at an orthopedic preadmission clinic.

- The comparison is
- Prior
- Jan to July 1995 41 patients
- After
- July to Oct 1995 47 patients

- Prior to clinic LOS is 15.7 days for TKR
- After clinic LOS is 11.9 days for TKR
- This study identified length of hospital stay reduced 3.8 days for TKR patients

- Prior to clinic LOS is 13 days for THR
- After clinic LOS is 11.9 days for THR
- This study identified length of hospital stay reduced 1.1 days for THR patients

Discussion : Reasons for cancellation of surgery

Abnormal pre-operative investigations

Patient deemed medically unfit for surgery

- BMI > 30 obesity, smoker
- On steroids, cough,
- Shortness of breath, COAD,
- Pulmonary embolus
- Poor nutrition
- Rheumatoid arthritis, on steroids
- Hypertension
- Diabetes
- Deep vein thrombosis on warfarin, on anticoagulants
- History of asthma, swollen ankles
- History of kidney disease
- Dehydrated, difficulty in passing urine
- Abnormal ECG, chest pain, MI, stable angina
- Abnormal urine culture
- Anemia
- Liver disorder, biliary cirrhosis
- Skin infection
- Febrile
- Confusion
- Inappropriate medications (warfarin, aspirin, oral contraceptive pill)
- Patient cancelled – no reason, did not attend, change mind, change surgery place, no social support of family members, surgery no longer needed,
- Others: operating theatre or surgeon not available

Cancellation of surgery

Study	Cancellation rate
Asimakopoulos et al (1998)	5.60%
Barnes et al (2000)	4.80%
Dussa et al (2007)	3.96%
Rayan (2000)	6.00%
Sutcliffe & Potter (2002)	7.94%

Key points from Professional Institution

- Older people represent the fastest growing sector of society and a growing proportion of those undergoing elective surgery. Older people are at the highest risk of increased length of stay and post-operative complications(Ellis et al, 2012)
- POAC is particularly important for patients selected for day surgery because stringent physical, psychological and social criteria must be met (NHS Modernisation Agency, 2002)
- Produced guidelines on the use of routine pre-operative tests for elective surgical patients (The National Institute for Clinical Excellence NICE, 2003)
- POAC improves the hospital experience for the surgical patient, reduces the risk of late or same day cancellations and increase utilization and capacity in day surgery units (NHS Modernisation Agency ibid, Healthcare Commission 2005)
- POAC run by professional nurse may benefit which include the reduction in junior doctor hours (Department of Health 2009)
- POAC provided and increased the professional pathway of advanced nurse practitioner(Royal college of Nursing 2008)
- Adopt the use of patient pathway and competency frame work (Department of Health 2006)

Implication for clinical practice

- The implementation of a nurse-coordinated pre-admission clinic to identify, assess and evaluate patient who are medically and socially unsuitable for surgery was highlighted.
- PAOC results in better patient care, more efficient use of scarce hospital resources and consequently a reduction in waiting lists for surgery.
- The development of clinical guidelines, pathway and protocol are important as preoperative assessment by nurse-led clinics are being increasingly implemented worldwide.
- Adherence to these protocols promotes efficiency by streamlining in clinical decision making and minimizing unnecessary consults and costly diagnostic testing.
- The collaboration of multi-disciplinary teams consisting of orthopedic surgeons, anesthetist, nurse practitioner and paramedical should be involved in developing the local guidelines.

Casey and Ormrod (2003); Malkin (2000); Beck (2007) Wadwworth et al (2002) Ryan (2000); Truscott et al (2007); Fellows et al (1999); Lucas (2002); Lucas (2009).

Implication for clinical practice

- More research study to examine the efficiency of nurse-led clinic and audit the effectiveness of patient and hospital outcomes. More rigorous studies are required for all the examined outcomes.
- POAC can be act as an educational institution for health care professional and apply to all other specialties of surgery. Pre admission screening could be extended to all elderly patients undergoing surgery.
- Strategically, POAC may inform service improvement and policy development. The scheduling of theatre list could be improved and thus enable better utilization of theatre and ward facilities.
- The POAC service not yet fully implemented in every hospitals. Application to other hospitals where similar contextual factors can be considered.

Casey and Ormrod (2003); Malkin (2000); Beck (2007) Wadwworth et al (2002)
Ryan (2000); Truscott et al (2007); Fellows et al (1999); Lucas (2002); Lucas (2009

Summary

- Traditionally patient will be admitted to the ward the day before surgery and this practice results in lots of cancellation of surgery and in turn will waste hospital resources and preparation.

- Cancellations of surgery could be avoided by meticulous preoperative preparation and optimization of the patient's condition before intended surgery. The introduction of comprehensive pre-operative assessment for all patients could result in a substantial reduction in cancellation of surgery.

- Historically, pre-operative assessment is within the remit of the medical professional mainly conducted by the doctors or the anesthetist. Nowadays, some of the POAC clinics are operated and coordinated by the nurse practitioner.

- ***The result of this systematic review has drawn on the effectiveness of nurse-led pre-operative assessment clinic to summarize and identify the best available research evidence in order to better inform of the current clinical practice, promote better care and guide health decision making.***

- ***A further step ahead will conduct a pilot study to investigate on the effectiveness of a POAC in local context.***

End of presentation.

Thanks for your questions ?