The crate weight project

By Bobby Guy

ABSTRACT
The process used to determine an appropriate maximum surgical crate weight of 7 kg to minimise the risk of manual handling injuries for New Zealand staff is explored. This will also establish a standard for regulatory control across surgical settings.
Keywords: crate weight; surgical pack; manual handling injuries; Perioperative Nurses' College of the New Zealand Nurses Organisation.

Introduction

THE Perioperative Nurses College of the New Zealand Nurses Organisation (PNC NZNO) Annual General Meeting held in Auckland in September 2013 unanimously passed the following remit from National Committee: *"That PNC endorses a 7kg maximum surgical instrument crate weight across New Zealand."*

How was this change decided and what does it mean for you and the workplace?

Firstly, what does seven kilograms feel like?

Anyone using New Zealand domestic airlines is familiar with the current seven kilogram weight restriction for cabin baggage (Cabin Baggage, 2013). It is useful to remember how your bag felt and envision a journey where you handled it consistently. Now imagine if it was heavier – even twice the limit. In surgical settings around New Zealand, Perioperative Nurses and associated staff repeatedly lift and handle excessively heavy surgical instrument crates, often with no indication of their weight, on a daily basis.

The unidentified heavy crate or "elephant in the room" is the problem a seven kilogram maximum limit aims to eliminate. The term crate, tray or set are fairly interchangeable in our specialty and in the following report.

Background

At a regional meeting in 2011, a member of the Canterbury-West Coast Region of PNCNZNO whether the Perioperative Nurses College of NZNO had a safe maximum surgical instrument crate weight for workplaces to adhere to?.

Concern was expressed at the increasingly heavy surgical crates lifted by members. Others joined the discussion, identifying the surgical specialities of orthopaedics and neurology as problem areas. The nurses were particularly worried about the increasing risk of manual handling injuries. After further debate a motion was passed to refer the member's question to the PNCNZNO National Committee for comment.

At the next meeting of the National Committee of PNCNZNO, the topic was discussed, and the National Committee referred the issue back to Canterbury-West Coast Region to review and advise the College accordingly.

The first Canterbury-West Coast Region meeting to review the issue included volunteers from the four main hospitals in Christchurch - two private and two public. The turnout was inspiring considering staff attended in their own time. It included six nurse leaders, several theatre nurses, sterile service technicians and non-nursing staff with special responsibility for instrument sets. The high number of nurse managers and senior nurses at the first meeting served to further validate the seriousness of the issue. There was also email support from Greymouth and Timaru theatre staff unable to attend.

At the start of the meeting, to ensure that all interested parties knew what various weights felt like to lift, a simple blind lifting exercise was organised. Attendees had to guess the weight of a range of unlabelled surgical sets, weighing from 4-15kg. This exercise shocked many in the group. It was quickly evident that those in non-clinical roles were unprepared for how heavy some of the crates were. After this, the group was even more united in their intention to review and possibly find a solution

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to this issue.

At the second meeting, healthy discussion from the floor indicated a heightened awareness of the problem following the blind lifting trial at the previous meeting. As a result a very motivated group decided to utilize a triangular research methodology – combining a literature review, benchmarking, and collating local objective and subjective data on the extent of the problem across the four local hospitals.

Literature Review

Volunteers reviewed the topic using "surgical instrument tray / crate / set weights" as key words. They reported back to the group when they found information detailing the issue.

The American AORN (Association of periOperative Registered Nurses) describe a weight limit of 25lb or 11.3kg in relation to surgical "instrument containment devices" (2010, p.802). Interestingly their 2011 guidance statement on patient lifting and exertion notes a huge variation in weights of instrument trays in American theatres, with some reported as heavy as 40lbs (18.1kg). This same paper includes US nurse musculoskeletal injury statistics and ergonomic tools to identify occupational risks. Some of these were: forceful tasks, repetitive motion, awkward postures, static posture, - moving or lifting patients and equipment. "Equipment" included heavy instruments and other devices. The AORN paper found injuries of the shoulder and neck were more likely to prevent nurses working than back injuries. They also reported injured staff were prone to further injury, were less productive and may even need to leave the speciality or nursing altogether.

De Kastle (2010) comprehensively lists the individual, lifting frequency, environment and weight of the load as jointly determining the manual handling risk for any particular task. The group decided if you analyse each of these factors, there is no easy way of standardising any of them save the latter... the weight of the load. This determined the next focus, namely standardising that weight.

Benchmarking

Surprisingly, of the literature reviewed, there was little worldwide consensus on a recommended weight. The Canterbury group felt this reflected the complexity of the subject in relation to each country's resources and varying emphasis on workplace health and safety. However,the Australian College of Operating Room Nurses (ACORN) has had a surgical crate weight for loan instrument trays of 5-7kg maximum (S23. 2008) for several years. Interestingly, the Victorian Work Safe 2005 guide on the design and handling of orthopaedic surgical instrument has an ideal 5kg weight limit. However, a recent preview sent to the group of an uncompleted 2013 Strategic Health Resources update on surgical loan sets still recommends a 7kg limit.

As noted earlier, AORN (2010) recommends 25 lbs (11.3kg) as the maximum weight in guidelines on surgical sets. It appears this weight limit has also been adopted by the US based International Association of Healthcare Central Service Materil Management (IAHCSMM). They provide accreditation and advice for about 9000 sterile service member organisations worldwide. This includes a template for managing loan surgical instruments.

However early lifting trials from the Canterbury group dismissed the American weight limit as an option, due to the repetitive lifting and twisting seen in daily clinical practice. For instance, the group found a total knee replacement operation could involve more than 30 lifts of individual crates by the scrub nurse. If an experienced surgeon performs three joint replacements in the average four to five hour orthopaedic surgical list, that is a lot of lifting. Furthermore, the present New Zealand Accident Compensation Corporation (ACC) 45 Injury Claim Form has a work category which describes "often lifting of 5kg plus" as medium work, and "often lifting of 9kg plus" as heavy work. The ACC webpage information for completing this form states that this data helps ACC link injuries to occupations. From these definitions the group decided it could categorise much of perioperative lifting in today's environment as heavy work.

Differing optimum weights were considered by the Canterbury group but there was concern that whatever was selected would be rounded up in the clinical setting (e.g. 8-9kg pushed to 10kg) and there would be no benefit for our members. Also, as the Australian surgical industry market is similar to New Zealand's, it made sense to benchmark with Australia and trial the 7kg weight as a baseline for any further work on the subject. As one of the group joked, "do you think New Zealand has inherited all Australia's heavy crates since they have a weight limit?".

Findings from the Group Project Work

Loan Sets

In order to determine the source of the problem, the review group recorded the weight of all loan surgical instrument trays across the four Canterbury hospitals. Over this period, 240 loan surgical instrument sets came in, and of this number 82 or 34.17 per cent were found to be over 7kg. Some of these weighed as much as 14kg. The 240 sets were checked back out again over this period, which reflects the repetitive nature of manual handling in the perioperative specialty.

A breakdown of the set types in this review confirmed the working group's initial suspicions that the key offenders for heavy surgical sets were from the orthopaedic specialty, in particular joint arthroplasty sets, as well as spinal sets for use in neurosurgery and orthopaedics.

Canterbury hospitals' sets were also weighed. More than a third weighed more than 7kg, with many between 9-14kg.

Exposing the Crate's Journey

In order to expose the reality of the workplace, a study of the journey of a loan instrument tray including dispatch, use and return to the company was undertaken (Alexander, 2011). Seventeen steps were identified, involving nurses and sterile service staff in many repetitive lifts, not slides or transfers. Due to the specific work required at each step, there were only two points where the crate could be slid, otherwise the majority of the time lifting and twisting was required. This review included the unloading and loading of the travel bins that companies use to move instruments around New Zealand. These travel bins are another major injury risk, and some Australian states have made significant recommendations around them (Work Cover NSW, 2010). However, this is a related, but separate, issue.

Is There a Best Crate?

The Canterbury group found the two common types of surgical instrument trays most widely used in the industry present differing carrying and transporting problems (AORN, 2011).

1. Wrapped instrument sets have no handles and are bulky and awkward to lift off the shelf. Of major concern is their continual cost as they require a variety of different wrapping products which incur disposal/ laundering costs.
2. Rigid crate container systems are initially more expensive but they have outer handles for ease of moving. They also have the on-going cost of single-use filters for sterilising.

The group reported that to maximise storage, crates are stored and stacked by the scrub nurse with their shortest side presenting to the lifter. For the lifter this means a lift or slide forward, and then a twist or turn in order to grasp safely. Furthermore, to minimise cross-contamination AORN (2010) recommends crates are carried out from the body, with arms extended, causing extra musculoskeletal strain.

The Canterbury-West Coast group also found that the weight of the actual container without instruments is significant as frequently both styles of crates have a moulded inner tray to hold instruments for ease of checking and use. The group found these crate inserts, without any instruments or outer crate and lid, commonly weigh from 2-3.4 kg. The group also observed across the four hospitals, and despite NZSSA recommendations to the contrary (AS/NZS 4187:2003), sterile crates are often stacked, which creates a problem for staff requiring the bottom item.

Blind Lifting Trials and Measuring Exertion

The specially designed "Borg" scale devised by Wilson, Corlett & Taylor (1998) to rate perceived physical exertion was used to gauge the perceptions of staff after lifting three visually similar, but unidentifiable instrument trays. The heaviest was 11.3kg which relates to the maximum weight recommended in AORN guidelines, the others were five and seven kilograms, relating to the Australian standards. The Borg scale has 15 numerical options from six to 20 with descriptive terms relating to the perceived effort the worker selects. Six indicates no energy at all, and 20 indicates maximal exertion.

Sixteen staff took part in this exercise – three student nurses, five sterile service staff, and eight theatre nurses, one of whom was male. They ranged in ages from 22 to 65 years, with eight over 50 years. Using the Borg scale, seven of the participants described lifting a 7kg crate in the "light-very light range". Conversely the other nine lifters described the exertion required to lift the same 7kg as "somewhat hard". Both these categories are in the middle region of the Borg scale. However their discomfort at lifting the 11.3kg wrapped crate was also reflected in their attitude, and noted by the Canterbury review group. The younger nurses appeared more critical of the problem and several described it as unacceptable to lift repeatedly. In contrast the older nurses seemed resigned to the current situation; saying "that's how it's always been."

These results were replicated at the September 2012 Perioperative Nurses Conference in Wellington. There a similar blind lifting exercise using the BORG scale was conducted at the registration desk. There were similar results from 83 theatre nurse attendees who completed the exercise. They clearly favoured 7kg as more appropriate to lift regularly and repetitively. They recorded a strong aversion to the 11.3kg (AORN) wrapped crate, even describing it as off the BORG scale for exertion.

Conversations from Lifting Trials

"After working as a surgical instrument coordinator (with responsibility for checking sets in and out between hospitals) for over three years, I believe an acceptable weight for any tray is between 7-8kg."

"All heavy crates should be labelled - the HEAVY stickers come off them too easily and stick to the shelves and other crates etc."

"The shape of the crate and its position on a shelf affects a lift."

"The blue plastic shelf sliders for pulling crates forward wedge under the big orthopaedic crates and then you jam your fingers on the shelf freeing them!"

"I'm a sterile services technician… it's great to have someone do something about this at last."

"Lack of identifiable weight a problem… needs to be seen from end of shelf. End of crate labelling VIP."

"When I lift a crate I never know what it weighs - only that it is OK or OOPS - too heavy. It would be nice to not have this happen."

"I always try to remember to protect my back when lifting crates as they are an unknown weight until actually lifted."

"Our hospital has a "no lift" policy around patient care. If the ward nurse is caring for an obese patient they have the visual impact of the patient's build to continually remind them to use hoists, aids etc. We don't have anything - those crates can weigh a ton!"

End labelling is an essential health and safety technique to avoid unnecessary lifting.

NZSSA Supports Crate Weights

The Canterbury-West Coast group was invited to report its work at the November 2012 New Zealand Sterile Services Association (NZSSA) Conference in Dunedin. The presentation timetable left time for discussion from the floor; Australian attendees spoke positively of the Australian weight limit and its use as a baseline in the workplace. Many of the New Zealand NZSSA members listening were enthusiastic in their support for a maximum weight in the standards, so the blind lifting exercise using the BORG exertion scales was repeated among

attendees. Similar results were seen from this group, and their strong aversion to the 11.3kg (AORN, 2010) wrapped crate was clear. As NZSSA Guidelines on Loan Instrumentation (2007) clearly describe the health and safety risks from the weight of trays and volume of instruments being handled by members, it came as no surprise to receive a letter from their organisation officially endorsing a maximum 7kg weight.

Other issues influencing adoption of Crate Weight limit

In September 2012, the Canterbury-West Coast group was invited to submit a summary of its work for inclusion in a nursing submission (Head, 2012) on the consultation document "Safer Workplaces" from the Independent Taskforce on Workplace Health and Safety.

Each workforce across New Zealand was invited to detail key issues around occupational health and safety. The paper claims that even a one per cent reduction in workplace incidents would mean about $10 million in reduced costs per year. So constant lifting of heavy surgical instrument crates, along with diathermy plume and hearing loss, have been tabled as occupational health risks in the perioperative workplace. As a result, PNC[NZNO] has been asked to advise members to report any strain from heavy lifting in order to collect more accurate injury data.

In June 2013, [NZNO] (Head, 2013) expressed concern on behalf of Perioperative Nurses about the lack of safe and consistent handling requirements for heavy surgical trays and equipment in a further submission to Pharmac on Medical Devices Activity. The intention is that when surgical companies are submitting devices or implants for consideration by Pharmac, compliance with the 7kg maximum surgical crate weight standard will be required.

Crate Weight Trials

Crate weight trials are underway in Canterbury. The group has been moving slowly with the support of the surgical companies concerned. The key objective is to subject consigned and loan surgical sets to scrutiny regarding their weight, and devise smarter, safer, ergonomic ways of handling each system. For example, by reconfiguring an orthopaedic implant set of eight crates to a Left or Right specific option, 20kg was removed across the eight trays, and one less tray was required per case.

Discussion

At the same time the Crate Weight group was reviewing the issue, Jamieson (2012) was completing a descriptive exploratory study of New Zealand Generation Y Registered Nurses. This 2012 review of an on-line questionnaire conducted by 358 Generation Y (Gen Y) nurses found that the gloss is fading fast. At a presentation of her work to the Canterbury-West Coast Region, Jamieson, a theatre nurse, advised heeding Gen Ys' requests for a less tiring and stressful workplace. She discussed the looming worldwide nursing shortage and recommended employers ensure a better work-life balance to both entice and keep young nurses in the profession.

The Health Workforce Projections document (2010) reports that operating theatres have struggled to attract and retain staff. This same paper foresees a time within the next 16 years when the aging public's demand for surgery will exceed the supply of Perioperative Nurses. Furthermore, it predicts the closer the Perioperative Nurse is to retirement, the less likely they are to change specialties.

The latest statistics presented at the 2013 PNC Conference (Reed, 2013) describes the typical Perioperative Nurse profile as female, with around 48 per cent of us over 50 years. By implication, this profile is likely to be around for quite a while longer. The long term retention of young (Gen Y) Perioperative Nurses was also flagged as being of critical importance to protect the role of the nurse in the speciality. Optimistically, De Kastle (2010) suggests that by providing a safer workplace for the older skilled nurse, you create a more attractive option for the new nurse as well.

The Canterbury-West Coast project group was informed by our ergonomics advisor (Alexander, 2011) that the cost of a back injury was around $40,000. In further discussion, Alexander cautioned that after continual years of repetitive lifting and twisting, the aging Perioperative Nurse is at high risk of other musculoskeletal injuries. Of particular concern to the review group were "the gradual onset injuries", which are notoriously difficult to prove and are therefore not covered by ACC. Furthermore, ACC (2013) no longer has a vocational obligation when rehabilitating injured workers. This means an experienced theatre nurse sustaining a significant work place injury may be lost to the speciality forever.

The work of the Canterbury-West Coast group has served to expose the extent of the problem. Anecdotes from the 2012 NZSSA conference indicate some organisations are already weighing and splitting heavy surgical sets to ensure safer handling for their staff. However, it will be harder for others, as change requires time and resources. It is clear making one set into two has implications for sterilizing and autoclave capacity as well as packaging-wrapping and storage resources.

It is reassuring the NZSSA wholeheartedly endorses a baseline in the standard as they have an in-depth understanding of the implications arising from this change. Our Australian colleagues assure us that once a system is created to deal with each overweight set, there should be no need to revisit the issue. Interestingly though, the latest Queensland Health Department 2013 guideline on loan crate management acknowledges the input of the Australian Medical Industry in developing the document. It includes issues for companies to consider when developing service agreements. This includes *ensuring* compliance with the 5-7kg Australian standard. However, a critical review of the statement reveals a concerning assurance that if the crate weighs more than the 7kg maximum, it should be well labelled to warn staff. This implies it can still be sent out to surgical units over weight. This still leaves the true management of the problem with the end-user, the hospital and nurses instead of the source of the problem.

To date, individuals from the New Zealand surgical companies in the Canterbury region have been supportive of the change. The surgeons have as well, though, like others not directly affected, they were unaware of the workplace reality. One senior company representative noted that the surgeons "work in a compliance-driven industry and the change is overdue." He also noted that if a surgeon complained to the company about the weight of an instrument crate, it would be "remedied promptly.

Clearly there will need to be discussions at higher levels with medical industry representatives and the PNC National Committee on meeting compliance around loan and surgical consigned sets. After reviewing the weights of company instrument trays prior to instruments being added, it is clear that design and development of lighter surgical instrument crates is well overdue.

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What now? The real work starts now

"Think big-work small" (Higgins,2013.)

Since the passing of the remit in September

2013, PNC National Committee has prepared a letter of notification, endorsed by NZSSA, for circulation to all the key stakeholders. This includes all New Zealand hospitals, sterile service units, Pharmac, medical product suppliers, workplace occupational health leaders and the personnel who lift surgical crates.

We would like to see a gradual move, set by set, month by month, to phase in a 7kg crate weight limit across New Zealand surgical settings. A completion date for this has been floated as the end of 2016. This will be confirmed after further consultation.

There is also a plan to establish a "Crate Weight Project" link on the PNC website for members to access. This would include a register of "problem" surgical sets with their weights, plus a slowly increasing number of examples of how to effectively change these to work lighter and smarter. There could also be opportunity for members' feedback on the subject. This pooling of information and solutions encourages a standardisation of high risk sets across the country.

Summary

The work from the Canterbury-West Coast PNC Region's Crate Weight Group found that there are very heavy surgical instrument sets currently lifted by staff working in settings. Information collated suggests that more than a third are heavier than the current Australian 7kg maximum. Observational data collated confirmed that moving surgical crates in a perioperative setting involves multiple twisting lifts. This has health and safety implications for nursing and allied staff around energy and injury risks. When PNC and NZSSA members trialed lifting several unidentified items, the vast majority picked 7kg as a comfortable maximum crate weight. The key objective to approve such a weight was to determine a figure, which would minimise the risk of manual handling injuries for staff and set a standard for bringing about regulatory control across New Zealand surgical settings.

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