



SCHOLARSHIP REPORT

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SECTION 1 | PERSONAL AND AWARD DETAILS

Title	MS	PID	50626
Surname	MONAGHAN	Forename(s)	EIMEAR
Scholarship/award awarded	TRAVELLING FELLOWSHIP	Amount awarded	£1155

SECTION 2 | PROJECT/VISIT DETAILS

Name/Title	DR LEIF ISRAELSSON
Location	Lansklinik Kirurgi-Urologi-OronNasaHals, Sundsvall, SWEDEN (The County Clinic, Surgery-Urology- ENT)
Aims and objectives	Observe and learn the technique of small bites laparotomy closure. Discuss the implementation of the technique and analysis of outcomes.

<p>Summary</p> <p><i>Include methodology, results and conclusions if applicable</i></p>	<p>I landed in Stockholm on 5 November, just as Sweden experienced an early snowfall which was a delightful omen for the rest of the trip. I travelled by train north to Sundsvall, where I spent a week in the general surgery department learning the technique of small bites laparotomy closure.</p> <p>From my arrival in Sundsvall, where I was introduced to the general surgical department by Dr Israelsson, I was fully involved in the routine of the department, welcomed by trainees and senior surgeons, who made it their business to ensure I was never lost but could take full advantage to coordinate observation of closures performed by 3 different specialties (general surgery, urology and gynaecology).</p> <p>Dr Israelsson is a busy Head of Department with responsibility for multispecialty surgical services on 3 distant hospital sites, so he had arranged for me to be specifically looked after by senior colorectal specialists, Dr Maria Wallden and Dr Gustav Hagglund for the latter part of my weeklong visit. It's a small world – when she heard I was working in Inverness, Dr Wallden asked whether I knew a Ken Walker, and it turns out this is the same Professor Walker who is my current AES and had worked in a mission hospital with her in Nepal!</p> <p>While observing laparotomy closures, Dr Israelsson's senior colleagues in urology and gynaecology reminisced about how he had gathered data for the whole department, then once the risk of incisional hernia was quantified, challenged them to justify the extra risk of morbidity to their patient by persisting with the 1cm mass closure method. In the course of 20 years, it has become the accepted closure method in their unit to the extent that current colorectal specialists practicing for more than 10 years have not used any other method. It is disseminated at a Swedish national teaching course for all surgical trainees, and the wound dehiscence rate in Sundsvall is such that trainees may not see one in their 5 years in the unit (0.2% with 12 in 5000 laparotomies over 21 years). Incisional hernia rate is 6%.</p> <p>Dr Israelsson and Dr Cengiz, Senior Lecturer at Umea University and Sundsvall Hospital, have overseen the development of the small bites method, undertaking meticulous examination of all aspects from the theoretical and practical to the economic. The effect of bite size and of stitch interval (calculated by precise evaluation of the number of bites taken in closing the wound – even when closing full-length emergency laparotomy wounds in the wee small hours) are supported by peer-reviewed publications (Millbourn et al, Hernia 2011, 15:261–266), (Israelsson et al, BJS 1994, 81:1606-1608).</p> <p>Suture length to wound length ratio (SL:WL) has emerged as the robust measure of application of the methodology, as reported in a single centre RCT (Millbourn et al, Arch Surg 2009, 14:11, 1056-1059) and subsequently in a multicentre RCT by a separate group (Deerenberg et al, Lancet 2015, 386:10000, 1254-1260). Routine recording of SL:WL ratio as an outcome measure is ubiquitous in Sundsvall, accepted as the means to confirm application of small bites closure and thus permit analysis of outcome. The ratio is calculated by the scrub nurse using the lengths of suture unused, and the agreed protocol among all staff in theatres is that if the ratio is less than 4, the only instrument the scrub nurse can hand the surgeon is a pair of scissors to cut the stitch and redo the fascial closure. The SL:WL ratio is recorded in 2 places for each case: on the scrub nurse's documentation, and as an expected part of the operation note by the operating surgeon.</p> <p>Most trainees I spoke with mentioned their 'case of shame' and senior surgeons felt that it usually only happens once as trainees are then extremely meticulous. However, the ratio is measured no matter who the surgeon is, and Dr Israelsson reminded the scrub nurse, during one of the cases I watched, of the last time she had 'handed him the scissors' – at 0400 after a long emergency case, with a ratio of 3.9!</p> <p>Dr Israelsson was very generous in giving me resources to help with implementation of the small bites closure in my own practice, recognising the difference between</p>
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	<p>implementation in his centre as an organic process contemporaneously with the development of the method, and transplantation to a separate centre, with displacement of the previously accepted method of laparotomy closure. These are specified in the Learning Outcomes and Evaluation sections.</p> <p>There was much more to my visit to Sundsvall than achieving the objectives described above. One of the first things I noticed was a greater degree of informality in the Swedish medical profession. I was encouraged to use first names for everyone. This followed a decision in wider Swedish society that this was how adults would address each other. Although the respect for senior colleagues is clearly evident, it does alter how interactions proceed, and has interesting corollaries in interactions between medical professionals in the UK, both in terms of invitation to use first names by senior colleagues, and the difficulty junior trainees sometimes find in actually doing this.</p> <p>I discussed the training process with both trainees and senior surgeons in Sweden and found similarities and differences, although these are my personal observations only. A basic training period very like the UK Foundation Year program is followed by application to a specialty program, which for surgeons takes 5 years. Successful completion results in a general surgical accreditation but further study of approximately 5 years is required before recognition as a sub-specialist. There is not a formal subspecialty accreditation endpoint equivalent to UK CCT.</p> <p>Trainees take complete responsibility for patients with simple cases like inguinal hernia once they are judged competent, with gradual increase in complexity of cases, allowing trainees to develop the experience of responsibility. Rules on parental leave and the tendency to train within one program/at one institution can make it easier to plan family life, although research tends to take place alongside clinical work rather than in a dedicated time period, which can be difficult given the already busy schedule. I visited the Accident and Emergency unit under the auspices of Dr Hagglund who leads the Trauma service, which is modelled on the Johannesburg system of Prof K Boffard. The triage area allows for sheltered urgent assessment of patients as they exit the ambulance, essential in the winter weather, and the CT scanner is located in the next room to the Trauma Resuscitation bays.</p> <p>In the short time I visited Sundsvall, I enjoyed some typically Swedish experiences, courtesy of my hosts including succulent reindeer steak, and the beautiful view from the Sodra Berget resort over Sundsvall. The morning hike to the hospital through snowy forest was a delightful contrast to most of my commutes. I tasted elk casserole when Dr Wallden welcomed me to her home, along with glog (like mulled wine) and pepparkokken, which promote kindness when eaten at Christmas time!</p>
<p>Learning outcomes</p> <p><i>Detail here how the aims and objectives were met</i></p>	<p>I attended 7 midline closures during my week at Sundsvall Hospital, where the staff in general surgery, urology and gynaecology were very welcoming and entirely tolerant of my non-existent Swedish. Luckily their English was fluent although especially first thing in the morning it was noted that operating and explaining, and doing it in English, was a little taxing! I was able to perform 2 closures under supervision, and was very relieved to hear my SL:WL ratio was within the acceptable parameters (7-10). The procedures where I observed/performed the closures are detailed in the accompanying table.</p> <p>In comparison with the mass closure technique, which I have used as standard, the differences in the small bites method are listed below.</p> <p>Suture type: The suture used is USP 2-0 PDS Plus II (Ethicon, Somerville, NJ, USA) with a 31 mm needle and is significantly narrower than the USP 1 double loop PDS Plus II (Ethicon) with a 48 mm needle I have been used to. The weight of evidence in support of the small bites closure goes some way to balance the initial unease of relying on this suture, which is shared among surgeon colleagues I have discussed it with.</p>

Self-locking knots: To reproduce the results previously shown by exponents of the small bites method, the method should be adopted in its entirety. Learning new knots for such a fundamental purpose is another potential source of unease, particularly when knot-tying is a skill which is almost taken for granted. I had individual tuition with Dr Wallden and practice time on the self-locking knots used at the beginning and end of the closure. Dr Israelsson has been generous in offering the teaching DVD which clearly demonstrates how to do this and it is a skill which surgeons can practice in their own time. The finishing knot (Aberdeen knot) is well known in the UK. The starting knot is also one I know from tying in for rock-climbing, albeit with thick rope, and a colleague has recognised it as one she uses for tying on flies for fishing. These knots are used because they are stronger and have no slippage (Israelsson et al, Eur J Surgery 1994, 160:6-7, 323-7).

Bite size: The 31mm needle is smaller and limits the opportunity to take large bites. This is one aspect of the technique which reduces the amount of ischaemic tissue in the closure. Ideally bites are 5-8mm from the fascial edge and maximum 5mm apart.

Fascia only: Precise suture technique to include only the fascia (more correctly the aponeurosis) reduces the amount of compressible tissue in the bite. Compressed tissue becomes ischaemic, is more prone to infection and allows slackening and separation of aponeurotic edges during healing. Simple wiping of the wound edge makes the pale aponeurotic layer identifiable even when there is a thick adipose layer.

Tension: This is the third aspect of stitch technique that reduces ischaemic tissue in the wound. It is advised that the suture is visible on the surface of the tissue as a pragmatic guide to optimal tension, apposing but not compressing the edges together.

Time: The mean time to close the laparotomy wound with this technique is only 4 mins greater than the mean time for mass closure in the published literature (14 v18 mins, Millbourn et al, JACS 2013, 217:3, 556-559). In implementing the technique, this may well be a little longer at first but hopefully would reduce to a certain extent as the technique becomes more familiar. A separate issue, and one reason why the anaesthetist is an important stakeholder in implementing this technique, is the need to resuture if the SL:WL ratio is under the optimal level of 4. This is subject to clinical need of course, so that a decision weighing current physiology against longterm comorbidity can be taken jointly by surgeon and anaesthetist. The system in Sweden is very similar to the US, and anaesthetic nurses manage most cases without direct supervision from a medically qualified practitioner, although one is always assigned as the supervising doctor; this increased time requirement did not appear to cause a problem for the staff I spoke with.

Final assessment - SL:WL ratio: In Sundsvall, the generally agreed protocol is that calculation of the SL:WL ratio is performed by the scrub nurse, not by the operating surgeon. This introduces an element of impartiality, but requires that the scrub team are happy to take it on. The scrub nurses I spoke with had become accustomed to doing it, so that it was second nature and did not interrupt the flow of their activity, or that of the operating surgeon. Each laparotomy tray includes a ruler, and the wound length is measured either as the length of the relaxed skin incision, or by placing one finger on the knot at either end of the wound and measuring between the midpoint of each finger. I have noticed that there is a tendency in the UK to extend the fascial incision beyond the skin incision to make full use of it, which may be better avoided when using this technique. Van Ramshorst et al have summarised a useful blueprint to address the involvement of interested parties in setting up this closure method (van Ramshorst et al, Surg Tech International 2013, 25:34-37).

Having observed and performed some closures I discussed the method at length with Dr Israelsson and other surgeons in the unit, particularly relating to its modification in difficult cases and scenarios. The small bites closure method is used in all cases in Sundsvall, and as the accompanying table makes clear, for smokers, diabetics, and obese

	<p>patients. It is also used for closure of emergency cases, although there were no emergency laparotomies during my attendance. The optimal SL:WL ratio is 7-10, 4 is the minimum accepted. In the case of reoperation in the first postop week, for instance in the case of anastomotic leak in a colorectal resection where the fascial edges will be more fragile, Dr Israelsson would consider using 1.0 PDS (not loop), with 1cm bites and aiming for a ratio of 12. Resuture of dehiscence is so rare that many trainees and senior surgeons had not seen one and referred me to Dr Israelsson again, who described closing with 1.0 PDS, 1cm bites and aiming for SL:WL ratio of 15. Of note, the first case I observed was a RIF appendicectomy incisional hernia repair with mesh. Only the anterior rectus sheath was opened, and it was closed with the standard small bites technique I became accustomed to in my week at Sundsvall.</p> <p>In recognition that many of the trainees in the unit have trained in an environment where the small bites closure is ubiquitous, Dr Israelsson gave two presentations: on the development of the method, and a second reviewing closure of other types of abdominal wound. He has kindly copied these for me and authorised dissemination as required. Data is needed on the efficacy of any closure method in non-midline laparotomy wounds, and small bites closure may also be a useful technique in these scenarios.</p>
<p>Evaluation</p> <p><i>How has this scholarship/award impacted on your clinical/NHS practice or equivalent?</i></p>	<p>I had introduced the STITCH paper and preliminary results on the Raigmore colorectal unit incisional hernia rate through presentations at our monthly departmental audit meetings. I also used this forum to canvas ideas from colleagues on the information that would be useful to them in deciding to implement the closure in their practice, which informed some of my discussions with surgeons in Sundsvall.</p> <p>On my return I presented the experience as a poster at the NHS Highland Research Development and Innovation Day on 16th December 2016. I also gave a brief account of my experience at the December audit meeting and showed the laparotomy closure on DVD.</p> <p>Both of these were well-received and in the first instance, we plan to use the small bites closure in the colorectal department. The 'closing tray' is part of an ongoing program to reduce surgical site infection (SSI): a separate instrument tray used for abdominal wall closure after bowel anastomosis, peritoneal cavity washout and change of gown and gloves. Small changes (adding a measuring tape, and a 2.0 PDS suture into the closing tray) will allow us to measure the suture and wound lengths as an extension to the current quality improvement program. In terms of the practical aspects of the technique, an opportunity to review and practice the self-locking knots during our audit meeting may be useful.</p> <p>As a trainee, I will shortly be leaving Raigmore Hospital and moving to Aberdeen Royal Infirmary. I will discuss this research with my trainers there, and hope they may be open to implementing it as well. Involvement of the multidisciplinary team is also key and although I have discussed my visit with colleagues on the scrub and anaesthetic teams, a formal presentation of the project is planned at both anaesthetic and theatre departmental audit days.</p> <p>I certainly intend to use it in my own independent practice as a consultant. In preparation for this, I have collated resources including Dr Israelsson's presentations and relevant publications for my own study. Dr Israelsson has given free rein to copy the presentations and DVD and disseminate them as is useful in implementing the small bites closure. If they were found to be helpful in implementing the method in Raigmore, it may be possible to host them online as a collated resource for use by any interested surgeon in other units in Scotland. The training DVD is available online at http://www.remittent.se/sv/Videoarkiv/Oppen-kirurgi/Bukvaggskirurgi/Closure-of-midline-incision/</p>

I have measured the SL:WL ratio in my own laparotomy closures using the mass closure method since my return from Sweden, and will follow these patients up as I am able through the Scottish Clinical Information Store online system. It is instructive to observe the actual SL:WL ratio achieved.

SECTION 3 | IMAGES

Attached to email, with captions 1: View Sundsvall, 2: Snowy forest – commutal, 3: Sundsvall Hospital, snowstore (used for refrigeration during summer) 4: Trauma triage area, 5: Trauma resus bay, 6: Dinner with Dr Wallden and her husband. Still photos from Dr Israelsson's presentation – 7: Aponeurosis suture placement 8: Self locking knots 9: SL:WL ratio

SECTION 4 | EXPENDITURE

Breakdown of expenditures	Flight: Inverness - London - Stockholm return £481.03
<i>Please demonstrate how the scholarship/award funding was used to support your project/visit</i>	Airport bus Stockholm: £18.45
	Hotel: Stockholm, 1 night, B+B £80.23
	Train: Stockholm - Sundsvall return £158.50
	Hotel: Sundsvall, 6 nights, B+B £393.00
	Hotel: Heathrow, 1 night, B+B £46.55
	Subsistence: £45.94
	Total: £1223.70

SECTION 5 | PUBLICATION

Scholarship/award reports may be published in College News. Please tick here if you agree to your report being published.

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