

# Barriers and enablers for clinical management of surgical wound complications: results of an international survey prior and during the COVID-19 pandemic

## Authors

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Clinical management of surgical wound complications pose considerable challenges globally. Variations in the use of care bundles for prevention is still widespread in clinical practice. As part of the not-for-profit International Surgical Wound Complications Advisory Panel (ISWCAP) advocacy and research, two international surveys of clinicians were conducted during 2019 and 2021. The survey highlighted the perceived barriers and enablers for clinicians across multiple health care settings and surgical disciplines. Opportunities for improvement in early detection and treatment include improved systems for classifying surgical wound complications, implementation of evidence-based guidelines, and adoption of post-discharge surveillance programmes in the clinical and home setting.

**T**he global volume of surgery is considerable with over 234.2 million surgical procedures performed per year (Weiser et al, 2016).

Surgical wound complications (SWCs) such as surgical site infection (SSI) and surgical wound dehiscence (SWD), despite advances in surgical technique, intraoperative practice and the ever-expanding advanced wound dressing market, continue to pose considerable challenges for the patient and healthcare provider globally. Evidence suggests SWCs are the most managed wound type in some clinical settings, more so than pressure ulcers/injuries or other wound types (Mclsaac, 2007; Mulligan and Scott, 2011; Sandy-Hodgetts et al, 2016; World Union of Wound Healing Societies, 2018).

## Survey rationale: Identifying barriers and enablers for surgical wound management

Healthcare professionals' understanding and engagement in identifying patients at risk of SWCs, coupled with the use of mitigating strategies, is central to minimising post-surgical complications. Furthermore, the awareness and use of evidence-based clinical guidelines enables practice that should guide measurable outcomes (e.g. Sandy-Hodgetts, 2020). However, several authors have identified a gap between the evidence-base and what is conducted in practice (Guest et al, 2018; Ding et al, 2017; Lin et al, 2019;

Gillespie et al, 2020). An international survey was conducted as a scoping exercise to better understand the clinical challenges of identifying and managing SWCs. The survey builds upon work conducted by the International Surgical Wound Complications Advisory Panel (ISWCAP) and Sandy-Hodgetts et al (2016; 2017; 2020). The aim of the two surveys was to determine barriers and enablers for surgical wound management in contemporary clinical settings. This includes those who care for surgical patients in the acute, primary and community care setting. The authors would like to acknowledge those survey respondents for sharing their knowledge and opinions regarding contemporary surgical wound management practice.

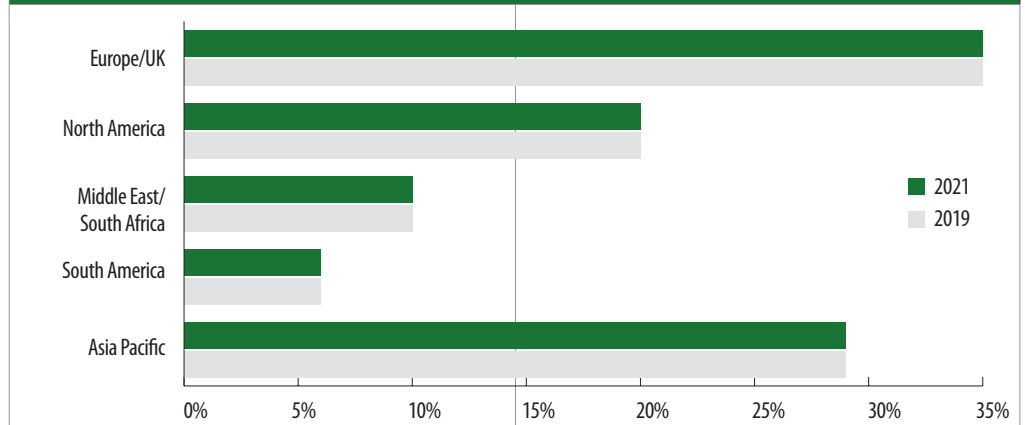
## Materials and methods

The survey questions were designed by the ISWCAP panel members and were generated using an online platform (SurveyMonkey; [www.surveymonkey.com](http://www.surveymonkey.com)). Emails to raise awareness of the survey and inviting participation were sent to all subscribers of Wounds International, Wounds UK and ISWCAP, by OmniaMed Communications Ltd (London, UK). The 12-question survey was sent to 21,000 OmniaMed subscribers and went live on 4th October 2019 and data were collected up to an including 11th October 2019. During the COVID-19 pandemic, the same survey with additional questions regarding COVID-19 was conducted to

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**Figure 1. Geographic location of survey respondents – 2019 and 2021**



determine the impact of the COVID-19 response to clinical management of surgical wounds. This second survey was sent to 21,000 Wounds UK and Wounds International subscribers in July 2021 and data were collected until August 2021. Survey respondents were requested to provide their profession, speciality, geographic location and practice environment. They were also asked to provide answers for questions in relation to their current clinical practice specific to surgical wound management and the identification and clinical diagnosis of wound infection. Questions were related to specific topics regarding operational tasks in the perioperative and operative environment, perceived challenges in the clinical environment for surgical wound management, the use of care bundles and post operative surveillance programmes. Responses were summarised across each question and graphically represented with descriptive statistics.

## Results

### Descriptive summary

All information from respondents was included regardless of how many questions they did or did not answer. Data were collected from a maximum of 534 respondents (response rate 2.6%) in 2019 and 207 respondents in the 2021 survey (response rate 0.98%). For both surveys, most of the respondents were from Europe and the UK, followed by Asia Pacific, North America, Middle East and South Africa and South America (Figure 1).

Respondents were asked to identify their primary discipline and type of healthcare profession they currently practice (Table 1). Survey respondents were asked a series of questions related to diagnosis, classification, management, surveillance and reporting of SSI and SWD. Respondents were from a broad range of clinical health care providers as well as scientists and researchers.

**Table 1. Professions and specialties of survey respondents**

Profession	2019 N=534	2021 N=5207
Specialist nurse (e.g CWOON, TVN)	191 (35%)	185 (89%)
Nurse Practitioner/General Nurse	175 (32%)	169 (81%)
Physician	73 (13.7%)	72 (34%)
Academic (e.g. Lecturer or Researcher)	14 (2.6%)	154 (74%)
Podiatrist	13 (2.4%)	0 (0%)
Director of Nursing or similar	7 (1.3%)	1 (0.4%)
Physical Therapist	6 (1.1%)	51 (22%)
Other	54 (10.13%)	51 (22%)
Speciality		
Cardiothoracic	11 (2.06%)	3 (1.4%)
Colorectal	14 (2.63%)	3 (1.4%)
Community/district	42 (7.8%)	13 (6.2%)
General Medicine	10 (1.6%)	5 (2.4%)
Burns	9 (1.6%)	3 (1.4%)
Emergency Medicine	3 (0.5%)	2 (0.9%)
General Practice	26 (4.8%)	14 (6.7%)
General Surgery	44 (8.2%)	21 (10%)
Obstetrics & Gynaecology	2 (0.3%)	4 (1.9%)
Orthopaedics	15 (2.8%)	8 (3.8%)
Plastics	15 (2.8%)	6 (2.8%)
Paediatrics	8 (1.5%)	0 (0%)
Public Health	5 (0.9%)	1 (0.4%)
Mental Health	2 (0.3%)	0 (0%)
Wound Care	242 (45.4%)	97 (46.8%)
Other	85 (15.9%)	19 (9.1%)

### Diagnosing SSI – who diagnoses?

Respondents in 2019 were asked who is primarily responsible for the diagnosis of SSI in their clinical practice. Of the 534 total respondents, 477

answered the question. Fifty eight percent of respondents in the 2019 sample indicated that the attending physician is primarily responsible for diagnosis of SSI (Table 2). In the 2021 survey, 53% of respondents reported the attending physician made the primary diagnosis, which is similar to 2019 results.

### Major challenges in the clinical management of SWCs

Respondents were asked to reflect on the current challenges they face in relation to clinical management of SWCs from a list potential challenges. Of the 2019 and 2021 respondents, the highest reported challenges according to the survey respondents were managing dehiscence and identifying infection. Interestingly, this finding was also consistent with the 2021 survey respondents (Figure 2).

### Barriers to clinical management of SWCs

Respondents were asked to select from a range of choices what they perceived as primary barriers

**Table 2. Healthcare provider responsible for primary diagnosis of SSI 2019 and 2021**

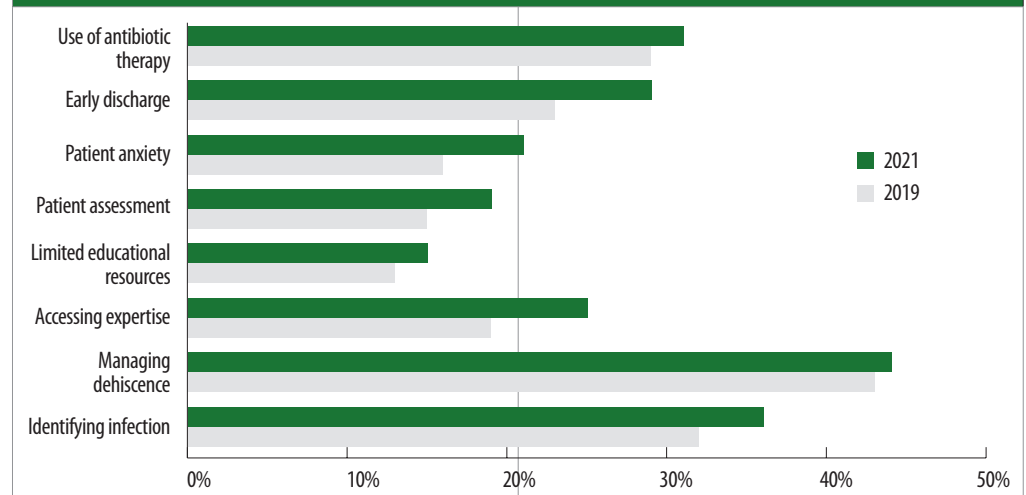
Person responsible for diagnosis	2019	2021
Doctor (attending physician)	277 (58%)	99 (53%)
Nurse	112 (23%)	53 (28%)
Infection control specialist	29 (6%)	7 (3%)
Other (please specify)	59 (12%)	25 (13%)
<b>Total</b>	<b>477</b>	<b>184</b>

regarding the clinical management of SWCs. The highest reported perceived barriers between both surveys were an undefined pathway for multidisciplinary access and poor access to advanced dressings (Figure 3). This result was consistent between the 2019 and 2021 survey results.

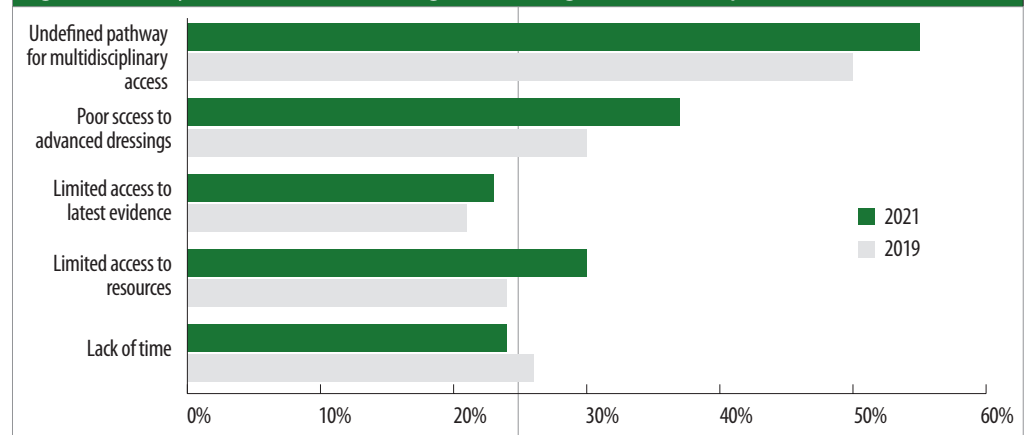
### Care bundles in clinical practice

Respondents were asked whether they use care bundles for the prevention of SSI in clinical

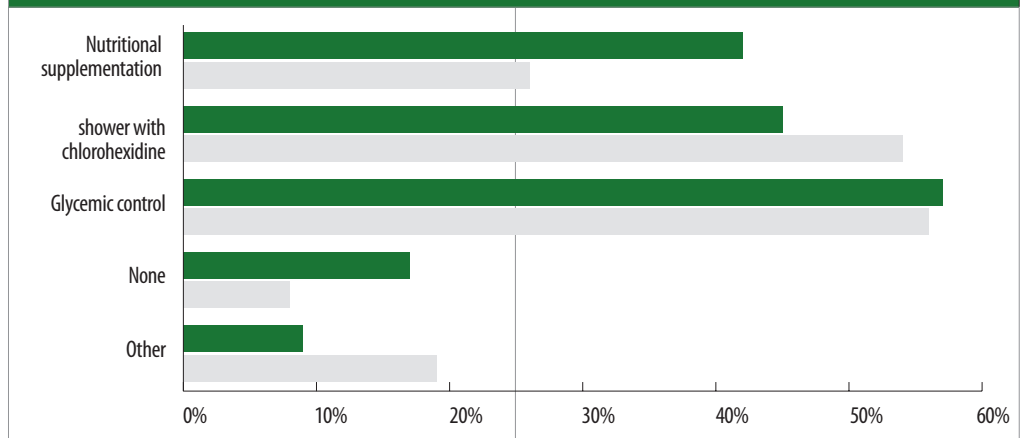
**Figure 2. Challenges faced by clinicians in the management of surgical wound complications during 2019 and 2020.**



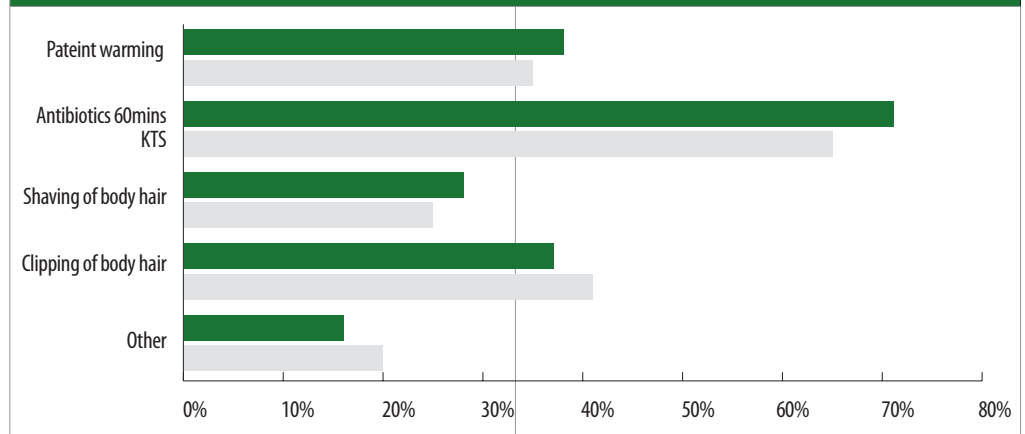
**Figure 3. Primary barriers to clinical management of surgical wound complications 2019 and 2021.**



**Figure 4. Adoption of patient interventions for the prevention of SSI as recommended by WHO Guidelines 2017.**



**Figure 5. Adoption of intraoperative interventions for prevention of SSI as recommended by WHO Guidelines 2017.**



practice. Care bundle types were not specified, and their use can range from intra-operative to post-operative care. Fifty seven percent of the 2019 survey respondents reported they did not use care bundles for SSI prevention. Similarly, these findings are reflected in the 2021 survey results, which report 57% of respondents did not use care bundles for the prevention of SSI in clinical practice.

### Surveillance programmes for SSI in the clinical setting

Most SSI surveillance is conducted in the acute care setting and hospital infection programmes do not always include a standardised methodology for the monitoring of surgical wounds following discharge (Rochon et al 2022). Post-discharge surveillance programme tends to vary between and within countries, with most using surveillance for reporting outcomes rather than a proactive approach for surgical wound management. Respondents were asked whether post-discharge SSI surveillance was regularly conducted in their clinical setting. A total of 57%

of the 2019 sample reported no post-discharge SSI surveillance programme. For the 2021 sample, the same question was asked of respondents with 64% reporting the use of a surveillance programme, whereas the remainder of the sample reported not conducting surveillance in the post discharge period.

### Operative interventions to minimise SWCs

Survey respondents were asked which therapeutic interventions they used in clinical practice as part of their pre-operative routine. In construction of these questions, a number of clinical operational tasks, identified as per the World Health Organization (WHO; 2018) *Global Guidelines for the Prevention of Surgical Site Infection*, were listed as part of the survey answer choices. Seventy six percent of the 2019 survey participants responded, and 71% of the 2021 participants responded. In the 2019 sample, the two most common interventions were for the patient to shower with chlorohexidine (54%) and to manage the patient's glycaemic control (56%), (Figure 4). Similarly, the two most common

interventions used prior to surgery for the 2021 sample, were patient glycaemic control (57%) and preoperative showering using chlorhexidine (45%). Of interest is the increased adoption of nutritional supplementation of the patient prior to surgery with a considerable difference between the 2019 and 2021 sample (28% versus 42% respectively).

Survey respondents were asked what interventions they used in clinical practice as part of their peri- and intra-operative routine. The most common intervention was to administer prophylactic antibiotics 60 minutes knife to skin (KTS) to the patient and this was similar across the 2019 and 2021 samples (Figure 5).

#### The use of evidence-based clinical practice guidelines, best practice statements, position and consensus documents

Respondents were requested to provide information on the national or international clinical practice guidelines and/or local or hospital policy that are currently used in their clinical practice to minimise SWCs. Answers were given as free text, and the results were grouped according to the frequency of reported guideline used by the respondent. Responders could provide specific answers and list policies/guidelines used, or alternatively if none were used (none), or if they did not know (unknown). Interestingly, several 2019 respondents (5%), reported using a combination of specific

guidelines, most commonly WHO, CDC and NICE guidelines (Table 3).

#### Wound care professionals' wellbeing during the pandemic and the impact on surgical wound management.

A total of 209 respondents answered a range of questions in relation to surgical wound management during the COVID-19 pandemic in 2021. Respondents were asked in their experience, what impact has the COVID-19 pandemic had on the clinical prevention and management of SWC? The responses were in free text format and a common thread of most of the responses included lack of time; patients not returning to the hospital for fear of contracting COVID-19; staff compassion fatigue; experienced staff leaving the profession; reduced access to infection control specialists and multidisciplinary teams; reduced tissue viability nurse access; reduced district nursing visits; and reduced elective procedures. Others observed an increased focus on detection of COVID-19 and an increase of infection control procedures such as frequent handwashing and constant monitoring of staff and patients for signs and symptoms of COVID-19.

#### Discussion

These two surveys evaluated the opinions and practice of clinical and non-clinical professionals working in the field of surgical wounds. For

**Table 3. Survey responses to use of clinical guidelines for surgical wound management**

Guidelines/policy used for SSI/SWD prevention in clinical practice	2019	2021
None	45 (20%)	12 (5%)
Unknown	23 (10.6%)	8 (3%)
Local policy/hospital guideline	28 (12.9%)	16 (7%)
International Surgical Wound Complications Advisory Panel Best Practice Statement	1 (0.4%)	1 (0.2%)
NICE Guideline	31 (14.3%)	14 (6%)
Australian National Quality Standards	2 (0.92%)	0
Wounds Canada Best Practice Guidelines	4 (1.8%)	1 (0.2%)
Canadian Patient Safety Institute	1 (0.4%)	0
WHO Guidelines for prevention of surgical site infection	35 (16.2%)	4 (1.9%)
World Union of Wound Healing Societies Consensus Document Surgical wound dehiscence	5 (2.3%)	1 (0.2%)
Centres for Disease Control prevention of surgical site infection	9 (4.1%)	8 (3%)
European Wound Management Association Position Document prevention of SSI across health care sectors	2 (0.92%)	2 (0.9%)
National Pressure Ulcer Advisory Panel Guidelines	1 (0.4%)	0
Australian College of Perioperative Nurses Standards	2 (0.92%)	1 (0.2%)
National or International guidelines not listed	34 (15.7%)	2 (0.9%)
Not applicable	6 (2.7%)	0
<b>Total</b>	<b>534</b>	<b>207</b>

both surveys conducted, respondents were mainly from Europe and the UK; Asia Pacific and North America. Most of these individuals were specialist nurses, doctors and physical therapists most commonly practising in a hospital/ward environment or in the home care setting. The findings of this survey highlight ambiguities around the diagnosis, prevention and post-operative management of SWCs, especially SSI and SWD. Interestingly, this is reflected across multiple specialities and disciplines and health sector services, i.e.; surgery, district nursing, acute care and primary care. Therefore, opportunities for improvement are for all disciplines and service sectors and are certainly reflective of the diversity of a patient's entire surgical journey. A potential opportunity for improvement in all sectors is the adoption and consistent application of evidence-based guidelines as this survey has shown close to 30% of the 2019 sample not using evidence-based clinical guidelines in their practice, this is similar to the 2021 results (21%). From these findings it may be inferred there is a gap in the implementation and subsequent measurement of outcomes in clinical guideline use.

Primary diagnosis of SSI in the clinical setting remains under the scope of practice of the attending physician and is therefore reliant on the physicians' level of expertise and knowledge for an accurate and timely diagnosis. The responsibility for this task is enabled through the CDC reporting definition of SSI; one of the key diagnostic criteria requiring the attending physician to make a diagnosis and provide further orders accordingly. The results of the 2019 and 2021 surveys have confirmed this to be the case for most clinical practices, however it is also reported in both surveys that diagnosis is also made by nurses. While the seniority or speciality of the nurse was not captured in this question, the nurse has a significant role to play in early detection and alerting the attending physician to early warning signs of a potential surgical wound complication. This is becoming more relevant in contemporary practice with emerging post-discharge surveillance programmes reliant on nurse specialist assessment and diagnosis conferred with the attending physician (refs).

The survey conducted during the COVID-19 pandemic has yielded interesting findings, especially in the deterioration of clinical services for surgical wound management, due to reprioritising clinical care in response to the pandemic, which has impacted on staff time, resources, and general wellbeing of healthcare professionals. There is no doubt that COVID-19 has changed the way we see, live and move in our

world and for many it has presented with positive and not so positive life changes that impact the delivery of evidence-based care for surgical wounds. With the cancellation of elective surgery lists around the globe, only now resuming in 2021/2022, this survey has captured a snapshot of real-world impact of the pandemic on health care providers who care for those with incisional wounds. The survey has highlighted disparities in the adoption and implementation of evidence-based guidelines that traverse the patient's surgical journey; preoperative, intraoperative and postoperative. Ding et al (2017) and Gillespie et al (2020) reported implementation and consistent use of guidelines in clinical practice for surgical wound management is challenging, our findings also show that adoption and implementation of guidelines is an opportunity for improvement. Apparent is the gap in the clinical armamentarium for evidence-based guidelines for postoperative care, currently under development by the authors.

## Limitations

This survey has several limitations. First the survey was written in English, it is possible that respondents whose first language was not English may not have understood or misunderstood some of the questions and/or responses which may lead to an inaccurate response. Whilst the two surveys were sent to the same respondents during 2019 and 2021, there is no confirmation whether the survey respondents are identical as the surveys were completed anonymously. As such, making assumptions in the differences between survey results is constrained as the homogeneity between the samples remains untested. However, the survey results are representative of real-world data and experiences of clinicians with a specialty in wound care before and during the COVID-19 pandemic. Another limitation may be due to sample bias where potential respondents are a portion of the healthcare population that have surgical wound management in their scope of practice and other speciality areas may not be represented in the population surveyed.

## Conclusion

Two surveys were conducted, one before and one during the COVID-19 pandemic to determine barriers and enablers for surgical wound management. The survey was conducted across an international sample of non-clinical and clinical professionals in wound management. The findings of both surveys have revealed prior to the pandemic considerable variations in

clinical practice, particularly in the adoption and consistent use of evidence-based guidelines for prevention. The question remains how we close the gap between clinical practice and the use of evidence-based guidelines. Is more training required, is it about awareness, or do guidelines need to be simpler and easier to implement? Root-cause analysis may enable clinicians to determine where the gaps are in their clinical practice and address these based on hard evidence. Despite an assumption of universality for guidelines, fit for purpose guidelines that are location specific may be the solution to determine the causative agents relevant to the specific location and clinical setting. This may also be the case for the use of care bundles which have a low uptake according to the findings of this survey. Moreover, the survey has revealed two major barriers for some healthcare professionals in surgical wound management: diagnosis and management of infection and dehiscence. Research and advances in clinical practice addressing this conundrum will be of benefit to the patient and the healthcare provider and several studies are underway by the authors to address some of these challenges. Realignment and deployment of healthcare professionals during the pandemic may have contributed to a decline in specialist prevention and management strategies for the surgical patient. Access to resources such as multidisciplinary teams, specialist nursing care and education were highlighted as key barriers for surgical wound management prior to, and during the pandemic. However great strides in telemedicine and the use of digital technology arose from the pandemic, with clinicians traversing the challenges of remote wound management for the surgical patient with promising outcomes.

The fast tracking of remote clinical management has enabled, for some, a new way to diagnose and manage surgical wounds. Does future research look to understand how clinicians use digital technologies in their wound surveillance compared to face-to-face care? Will remote clinical management stand the test of time? Early detection is one of the key enablers for prevention of a surgical wound complication (Sandy-Hodgetts et al 2020; Rochon et al 2022). Programmes such as post discharge surveillance may assist clinicians in halting the escalation of a minor incisional breakdown to something more catastrophic. The ability to monitor incisional healing after surgery aided by an educated patient may provide further advances in the field of prevention of surgical wound complications, with a number of studies

currently under investigation by the authors. Several opportunities to improve outcomes for the surgical patient have been revealed through the findings of this survey, which can ultimately lead to better healing outcomes for the patient, and reduced impact to wider healthcare settings into the future. WINT

## References

- Ding S, Lin F, Marshall AP, Gillespie BM. (2017) Nurses' practice in preventing postoperative wound infections: an observational study. *J Wound Care* 26(1): 28-37
- Gillespie BM, Walker R, Lin F et al (2020) Wound care practices across two acute care settings: A comparative study. *J Clin Nursing* 29(5-6):831-9
- Guest JF, Fuller GW, Vowden P (2018) Costs and outcomes in evaluating management of unhealed surgical wounds in the community in clinical practice in the UK: a cohort study. *BMJ Open* 8(12): e022591
- Lin F, Gillespie BM, Chaboyer W et al (2019) Preventing surgical site infections: Facilitators and barriers to nurses' adherence to clinical practice guidelines. A qualitative study. *J Clin Nursing* 28(9-10):1643-52
- Mclsaac C (2007) Closing the Gap Between Evidence and Action: How Outcome Measurement Informs the Implementation of Evidence-based Wound Care Practice in Home Care. *Wounds* 19(11): 299-309
- Mulligan SP, Scott L (2011) WoundsWest prevalence survey: 2011 state-wide overview report. Department of Health, Western Australia Ambulatory Care Services; 2011.
- Rochon M, Witter T, Jordan S (2022) Implementing smartphone technology in practice using the Collaborative for Surgical Site Infection Surveillance (CASSIS) project: preliminary findings. *Wounds UK* 18(1):34-41
- Sandy-Hodgetts K, Leslie GD, Lewin G et al (2016) Surgical wound dehiscence in an Australian community nursing service: time and cost to healing. *J Wound Care* 25(7): 377-83
- Sandy-Hodgetts K, Leslie GD, Carville K (2018) Surgical wound dehiscence: a conceptual framework for patient management. *Journal of Wound Care* 27(3):119-26
- Sandy-Hodgetts K, Carville K, Parsons R, Santamaria N, & Leslie G (2019) The Perth Surgical Wound Dehiscence Risk Assessment Tool (PSWDRAT), development and prospective validation in the clinical setting. *J Wound Care* 28(6): 332-44
- Sandy-Hodgetts K, Conway B, Djohan R et al (2020) *International Surgical Wound Complications Advisory Panel Best Practice Statement for the early identification and prevention of surgical wound complications*. Wounds International, London
- Weiser TG, Haynes AB, Molina G et al (2016) Size and distribution of the global volume of surgery in 2012. *Bull World Health Organ* 94(3): 201-9
- World Union of Wound Healing Societies (2018) *Consensus Document; Surgical wound dehiscence: improving prevention and outcomes*. Wounds International, London
- World Health Organization (2018) *Global Guidelines for the Prevention of Surgical Site Infection*. World Health Organization, Geneva, Switzerland