

Review Article

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Performance improvement programs may help reduce the surgical backlog in South African hospitals

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ABSTRACT

The COVID-19 pandemic has presented an unprecedented dilemma to healthcare systems around the world, leaving many countries with the burden of massive surgical backlogs, caused by the postponement or cancellation of elective surgical procedures. Current ideas to reduce the consequential impact of this surgical backlog on patient morbidity and mortality is to increase surgical volumes, however in under-resourced countries such as South Africa this idea may be more difficult to implement due to a shortage of facilities and clinical staff. In addition, the current infrastructure, especially those in many public healthcare facilities are poor and this coupled with limited financial resources presents further challenges. Also, all hospitals both public and private alike, cannot function at full capacity due to COVID-19 protocols. Given these limitations, performance improvement strategies must be implemented with some urgency in order to limit further backlogs and disruptions to surgical outputs. Evidence-based, best practice strategies such as surgical bundles, care pathways and enhanced recovery after surgery programs have been shown to improve surgical outcomes and reduce hospital stay. Since the bottleneck to surgical volume lies in post-operative care and not theatre capacity, implementation of such programs may help to improve patient throughput, thereby increasing surgical volumes and could possibly be the answer towards reducing these overwhelming backlogs.

Keywords: Surgical backlog, ERAS, Bundles of care, Care pathway

INTRODUCTION

Coronavirus disease 2019 (COVID-19) is a global pandemic that has managed to reshape our future in just a matter of months. According to Worldometer, an official statistics website for this disease, there have been approximately 33,878,590 recorded cases globally as at the 30 September 2020, with a mortality rate of 2.99%.¹ On the same date, South Africa recorded a total of 672,572 COVID-19 infections, with 16,667 deaths and therefore a mortality rate of 2.47%. Many data analysts around the globe are of the opinion that if many countries had not reacted immediately by enforcing a hard “lockdown” thereby restricting non-essential movement and limiting person to person contact, that these numbers would be far worse.

On the 15th of March 2020, the South African president, declared a “National state of disaster”, followed by the announcement of a “National Lockdown” on the 23rd of March 2020. The initial lockdown period was proposed to be 21 days ending on the 16th of April 2020, however the increasing number of new daily infections (Figure 1) had subsequently led to further enforcing of lockdown regulations. The ministerial advisory committee proposed a risk adjusted strategy in a phased approach towards the easing of these lockdown regulations. Their proposal involved a 5-level tiered system, where alert level 5 had the most restrictions and alert level 1, the least restrictions. The lowering of the alert levels was based on a number of factors including the rate of new daily infections, recovery rate, mortality rate and pressure from the trade industries for the gradual opening up of the economy. As at the 30 September 2020, South Africa stood on alert level 1 and incurred 187 days of lockdown.

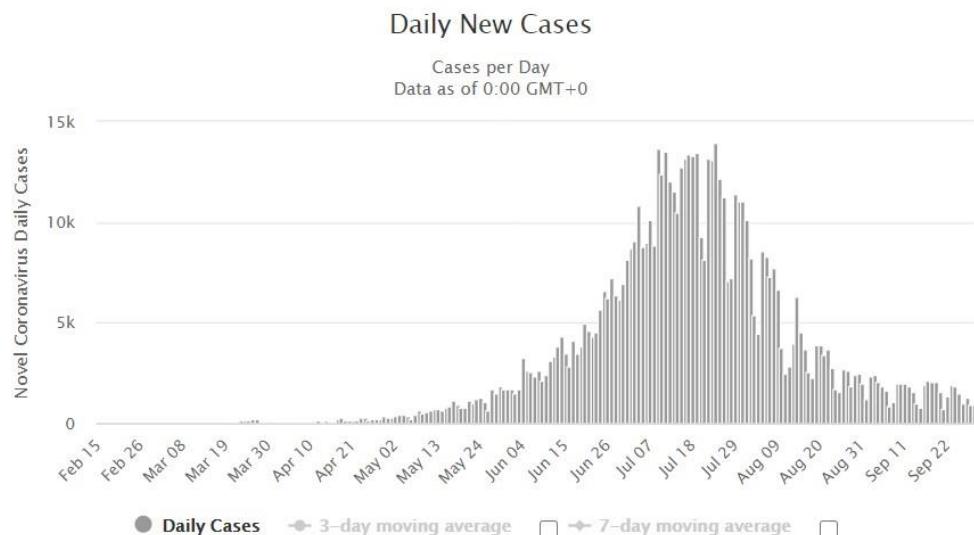


Figure 1: The number of new daily COVID-19 infections in South Africa between the 23rd of March 2020 and the 30 of September 2020.¹

The major aim of this lockdown was to prevent an early peak in infections thereby allowing the South African healthcare sector to adequately prepare for the influx of COVID-19 infections. Both public and private hospitals around the country took an immediate decision to postpone all elective surgical procedures in order to free up hospital beds and healthcare workers in anticipation of the COVID-19 surge. A recent study conducted by Chu et al involving 85 South African hospitals, both private and public alike, showed that access was cancelled or reduced for non-cancer elective procedures in 99% of the hospitals, while 28.1% of the hospitals cancelled cancer related operations and 54.1% of the hospitals cancelled emergency operations.² In addition, 30.6% of the hospitals converted at least one or more operating rooms into ventilated critical care beds, 87.1 % of the hospitals cancelled or reduced new outpatient visits, 75.3% reallocated some surgical beds to COVID-19 cases, routine post-operative visits were cancelled in 36.5% of the hospitals and 34.1% of the hospitals redeployed surgical staff to COVID-19 facilities within the hospital.² It is reasonable to assume that majority of South African hospitals echoed the decisions taken as illustrated in the study by Chu et al resulting in a significant surgical de-escalation across the country.² This in turn, has greatly minimized access to surgical care in South Africa, causing the resultant backlog of surgical procedures.

THE GLOBAL SURGICAL BACKLOG

This surgical backlog is not unique to South Africa as most countries that were severely affected by the pandemic opted for a similar course of action in postponing elective surgical procedures. A global expert response study³ was conducted to project the number of surgical procedures that would be postponed or cancelled in a 12 week period. In this study a Bayesian β regression model was used to estimate 12-week cancellation rates for 190 countries.³ The study factored in the elective

surgical case-mix and categorized procedures as either, surgery for cancer, non-cancer related procedures and obstetric procedures. This case-mix was applied to each country's surgical volume and then the cancellation rate was applied to these values. This study estimated that a massive 28,404,603 surgical procedures would be postponed or cancelled across the globe during the peak 12 weeks for each country respectively.³ The study further showed that 90.2% of these surgical procedures were for benign diseases, while 8.2% of cancer related operations would be postponed and 1.6% of obstetric procedures (elective caesarean sections) would be cancelled.³ This translates into 2,367,050 surgical procedures per week.³ The study concluded that if countries were to increase their normal surgical volume by 10% then it would take a median of 90 weeks to clear the backlog, while a 20% increase would take a median of 45 weeks and a 30% increase would take a median of 30 weeks to clear the backlog.³

SOUTH AFRICA'S SURGICAL BACKLOG AND DILEMMA

Using the available data supplied by the South African collaborators on the CovidSurg collaborative study, the model predicted that 12,795 surgical procedures will be postponed or cancelled per week.³ This value translates to more than 150,000 cases in a 12 week peak period. Given that as at the 30 September 2020, South Africa was on day 187 of a hard lock down, which is roughly 27 weeks, during which very little surgical procedures were conducted, this value now possibly exceeds 320,000 postponed or cancelled surgical procedures. It is no big secret, that even during the pre-COVID-19 era, the South African healthcare sector lacked sufficient capacity to meet the surgical needs of the country, largely due to poor infrastructure, a shortage of skilled healthcare workers and mismanagement of funds. This, in addition to the COVID-19 enforced backlog has exacerbated the

already overwhelmed surgical waiting lists. The CovidSurg collaborative study suggests that the Government will need to provide substantial fund increases to help eradicate the backlog but given the budgetary constraints already seen in most South African hospitals this idea seems far-fetched.³ Herein lies South Africa's biggest dilemma, in that our healthcare infrastructure is already insufficient and we are severely under-resourced both financially and manually. This dilemma has the potential to spiral out of control and possibly cripple the healthcare sector in South Africa unless immediate actions are taken to reduce this backlog.

An influx of funds from the Government at this stage is wishful thinking given their recent history, so other avenues need to be explored and tested with some urgency. One possible solution would be to increase the throughput of surgical patients in our current facilities by improving surgical practices, minimizing the risk for infections and thereby reducing hospital stays. If executed correctly, these strategies on their own will contribute to a sizeable percentage increase in surgical throughput and therefore increase surgical volumes. The good news is that most of these strategies already exist.

THE BUNDLES OF CARE

The “bundles of care” strategy was introduced by the Institute for healthcare improvement (IHI) in 2002. The concept involves implementing a set of evidence-based best practices, usually 3 to 5 collectively, with the aim of reducing the incidence of hospital acquired infections (HAI's).⁴ If applied correctly and consistently, the strategy has since been proven to improve patient outcomes.⁵ The first 2 bundles for central line associated blood stream infections (CLABSI) and ventilator associated pneumonia (VAP) were initially launched in 2002. Later, in 2005, based on the success of the first two bundles, the IHI launched the next two bundles for catheter associated urinary tract infections (CAUTI) and surgical site infections (SSI).⁶

The bundles for SSI, include hand hygiene compliance, appropriate hair removal protocols, administration of parenteral antibiotic prophylaxis, maintenance of perioperative normothermia, intraoperative glycaemic control, increased fraction of inspired oxygen and appropriate surgical skin preparation solutions.⁷ Adherences to these protocols were implemented by means of a checklist for each surgical patient.

South Africa was one of the many countries to quickly adopt this strategy and in 2009 launched this program under the banner “best care always”. The program gained phenomenal momentum in both the South African private and public healthcare sectors and was soon recognized as a “National healthcare priority” by the then serving minister of health. Therein lies the tragedy of its demise because both sectors made it mandatory to complete the checklist for each patient, leading to the strategy being

reduced to an administrative burden rather than a best practice tracker. Soon after, nursing staff were found to be blindly completing the checklist as part of the hospital's requirement and hence the quality of the information was deemed to be unreliable.

ENHANCED RECOVERY AFTER SURGERY

Enhanced recovery after surgery (ERAS) requires multi-disciplinary collaboration due to the multimodal nature of this strategy. The concept was initiated in 1995 where preliminary observations after laparoscopic colon surgery followed by early oral nutrition and mobilization showed significant improvements in patient recovery time.⁸ The concept was refined over time and in 1997, Kehlet proposed a multimodal approach to control postoperative pathophysiology and improve rehabilitation.⁹ Further advancements to this strategy made by Kehlet and Mogensen showed significant improvements in patient recovery following open sigmoidectomy procedures and called it enhanced recovery programs (ERPs) or “fast-track” programs.¹⁰ The concept was further developed by Ljungqvist and Fearon from 2001 onwards, which lead to the development of the ERAS Society. There was a slow adoption of this program as it challenged many surgical norms. Ljungqvist et al best described the ERAS strategy as a paradigm shift in perioperative care, resulting in substantial improvements in clinical outcomes and cost savings.¹¹ Today the ERAS Society has more than 30 published guidelines for different surgical procedures which are easily accessible through their website (www.erassociety.org) . In recent times, the program has gained phenomenal global momentum with more and more scientific evidence emerging to support the implementation of ERAS as part of total perioperative care (Figure 2).¹²

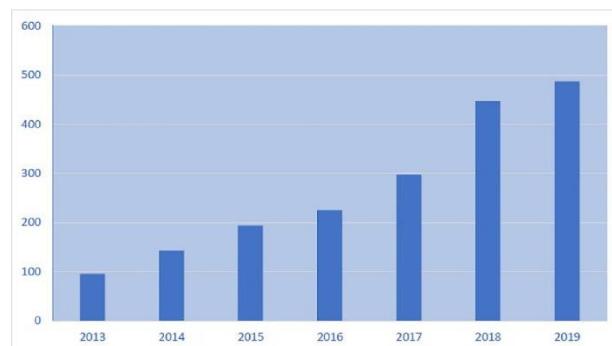


Figure 2: Number of publications indexed in PubMed per year related to enhanced recovery after surgery protocols, search criteria (ERAS+surgery).¹²Figure reproduced with permission from Dr. Santiago McLoughlin, Buenos Aires - Argentina.

The ERAS strategy is based on minimising the peri-operative pathophysiological responses to surgical stress thereby mitigating the subsequent risks of organ dysfunction.¹³ Although protocols may differ slightly from procedure to procedure there are certainly a few common elements amongst them such as early oral

nutrition, maintaining perioperative normothermia, fluid management; pain management; blood management and early mobilization, amongst others.¹³

According to the ERAS society website (www.erassociety.org) the strategy has been successfully implemented in more than 200 medical centres worldwide and used to treat over 80000 patients.¹⁴ South Africa is among the many countries who have adopted the ERAS strategy and a recent publication by Loots et al showed that adherence to ERAS pathways following bariatric surgery at a South African academic hospital significantly shortened hospital stays.¹⁵ Oudit et al suggest that “implementation of the ERAS care system in South Africa could provide a platform to improve patient outcomes, improve service efficiency, reduce hospital bed days and improve the use of limited resources”.¹⁶

Surgical care pathways

A clinical pathway is a series of step by step plans built on evidence-based guidelines that require multidisciplinary interventions to provide care to patients with a specific clinical problem.¹⁷ In the surgical environment, these pathways are usually standardized protocols that are implemented in the pre-operative, intra-operative and post-operative phases of the surgical journey. There are various guidelines for the prevention of surgical site infections however the most popular ones globally are the CDC's guidelines for the prevention of surgical site infections (1999, revised in 2017), the WHO's global guidelines for the prevention of surgical site infections (2016), the NICE guidelines; surgical site infections: prevention and treatment (2019, updated in 2020).¹⁷⁻²⁰ These guidelines are thorough and help draw attention to all the areas for possible infections along a patient's surgical journey.

In a recent study conducted by Ramesar et al in a South African private hospital, it was demonstrated that implementing a surgical care pathway helped to reduce the incidence of surgical site infections in caesarean section deliveries.²¹ The study initially mapped out the surgical journey of these patients from admission to discharge and then conducted an audit using a scoring system regarding compliance to the CDC guidelines for the prevention of surgical site infections.²¹ Once key areas of non-compliance were identified, performance improvement protocols were implemented which saw infection rates reduce from $5.12\pm0.82\%$ to $0.23\pm0.15\%$ ($p<0.0001$) in as little as 30 days.²¹

The COVID-19 pandemic has wreaked havoc across the globe by crashing economies and devastating healthcare systems even in the most well-resourced and technologically advanced countries. The lockdown strategy employed by most of the affected countries saw massive amounts of elective surgical procedures being cancelled or postponed, creating a huge backlog of some 28 million cases globally.³ South Africa possibly sits with

a surgical backlog in excess of 320,000 cases. In a country where the public healthcare system was already inefficient prior to COVID-19, this now overwhelming backlog will have a severe impact on patient morbidity and mortality. Patients who were already on surgical waiting lists have seen their conditions deteriorate as a result of surgical postponement, while others have unfortunately succumbed to their ailments. After 187 days of lockdown, there has been a slow restart to performing elective surgical procedures and many hospitals must stagger their slates to allow for social distancing measures and proper theatre decontamination. Another bottle neck lies in the number of available beds post-surgery, as many hospitals are still reserving space in case of a resurgence of the disease. This cautious approach towards reopening of the hospital's theatre departments are further increasing the surgical backlog.

Studies suggest that if countries can improve their surgical output by 10%, then it will take at least 90 weeks (almost 2 years) to clear the backlog.³ These timeframes for eradicating the backlog obviously decrease if the country can increase the surgical outputs further, where the model predicts that a 20% increase will take about 45 weeks and a 30% increase will take about 30 weeks to clear.³ Comments made by various collaborators on the study echoed sentiments that even in the most well-resourced and established healthcare systems, a 20% or 30% increase is almost unattainable, largely due to the limitation in hospital capacities. This begs the question as to what will happen in South Africa, where our healthcare system, especially in the public sector, is notoriously insufficient due to poor infrastructure, mismanagement of healthcare funds and a shortage of scarce skills? Unless a clear strategy is developed fast, this surgical backlog will worsen and lead to further morbidities thereby reducing the quality of life and in worse case scenarios increase the number of mortalities.

There has never been a better time to engage in public/private partnerships within the healthcare sector in South Africa. The idea is not farfetched as it has already been proposed during discussions around the implementation of the National health insurance (NHI). The private health care facilities around the country are world class and can certainly help reduce the burden of surgical backlog in public hospitals. Of course these private hospitals are big businesses and would therefore require huge cash injections from the department of health. But, even with first world facilities, the limitations in the private hospital sector still remain with the hospital's capacity as a result of bed restrictions during the ongoing COVID-19 pandemic.

Given the current situation in South Africa and across the globe, hospitals must somehow increase their throughput to start chipping away at the immense surgical backlog. To this end the use of evidenced-based best practices for improving surgical outcomes and reducing hospital stay must be employed. Surgical procedures complicated by

post-operative sepsis can increase the length of a hospital stay by 6 to 9 days or often results in readmission within 30 days.²² The frequency of SSI is very difficult to determine because the criteria for its diagnosis may often vary, however the WHO reports that the prevalence of SSI globally ranges between 5 and 21%.²³ In South Africa, it is even more difficult to determine SSI prevalence due to our notoriously poor and often unreliable surveillance systems, however a recent study conducted at a South African academic hospital reports the incidence of nosocomial infections to range between 2.5 to 41%, with SSI being the most prevalent accounting for almost 77% (17/22) of the total number of infections.²⁴ In another study, by Nair et al at a different academic hospital, it was reported that total nosocomial infection rate was 7.6% with SSI being the most prevalent accounting for 4.6% of the total number of infections.²⁵ Although the ranges reported by these two studies vary greatly, the one constant is that SSI's are indeed the most prevalent type of hospital acquired infection.^{24,25} It is therefore reasonable to assume that SSI's are a common problem throughout the country, albeit that the frequency may vary from hospital to hospital, however given the current COVID-19 aftermath, much attention needs to be directed towards minimizing its incidence. A reduction in SSI's will not only result in better patient outcomes but significantly improve hospital throughput by reducing hospital bed days.

Strategies such as the “bundles of care” or the “surgical care pathway” has had phenomenal success both locally and internationally in reducing the incidence of SSI. These strategies do not necessarily introduce new protocols into current practices but simply ensure that guidelines are strictly enforced. Because these guidelines already exist and are meant to be followed anyway, there should be less resistance towards adopting them in both the public and private healthcare sectors. The cost of implementing these strategies would be fractional in comparison to the building of more hospitals or the increase in morbidities or mortalities caused by the delay in treatment.

ERAS, in comparison to the bundles or pathway strategies may take slightly longer to implement, as the protocols are a paradigm shift away from the current surgical norms. However, these guidelines are not complex, nor do they require substantial financial investment but simply requires a hospital to take ownership of the project. The implementation of this program into local hospitals can be achieved by following a step by step guide as illustrated on the ERAS Society website.¹⁴ Guidelines for various surgical procedures are also available on their website and a team of experts are willing to troubleshoot protocols and assist with the implementations. In the meantime, common best practices amongst all three strategies that were mentioned in this article, such as hand hygiene compliance, antibiotic prophylaxis; surgical site skin preparation and

maintaining perioperative normothermia can and should be implemented immediately.

CONCLUSION

In the wake of this ongoing COVID-19 pandemic, hospitals around the world have been left with the burden of huge surgical backlogs caused by the postponement or cancellation of elective surgeries. Furthermore, hospitals cannot run at their full capacities due to COVID-19 protocols. Based on prediction models, South Africa could have in excess of 320,000 surgical cases therefore urgent steps need to be taken to reduce this backlog and to prevent further increases. Prior to the pandemic, the public healthcare system was already overwhelmed largely due to a shortage of hospitals and clinical staff, coupled with limited financial resources and the mismanagement of funds. With this crisis already upon us, there needs to be better public/private partnerships, where private healthcare facilities must assist their public counterparts to reduce this backlog. In addition, both private and public hospitals must implement performance improvement programs, such as surgical bundles, care pathways and ERAS in order to increase patient throughput. These programs have been shown to reduce the number of hospital bed days post-surgery. Since recovery time in hospital is the bottleneck to surgical volumes and not theatre capacity, this will allow for more patients to get into theatres in a shorter time frame. This will ultimately improve our surgical output and volumes, even with the current infrastructure and clinical staff.

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REFERENCES

1. Corona virus cases. Available at: <https://www.worldometers.info/coronavirus/country/south-africa/>. Accessed on 20 February 2021.
2. Chu KM, Smith M, Steyn E, Goldberg P, Bougard H, Buccimazza I. Changes in surgical practice in 85 South African hospitals during COVID-19 hard lockdown. S Afr Med J. 2020;110(9):916-9.
3. CovidSurg Collaborative. Elective surgery cancellations due to the COVID-19 pandemic: global predictive modelling to inform surgical recovery plans. Br J Surg. 2020;107(11):1440-9.
4. Haraden C. Institute for healthcare improvement website: what is a bundle?. Available at: <http://www.ihi.org/knowledge/Pages/ImprovementStories/WhatIsaBundle.aspx>. Accessed October 14, 2013.
5. Resar R, Pronovost P, Haraden C, Simmonds T, Rainey T, Nolan T. Using a bundle approach to

improve ventilator care processes and reduce ventilator-associated pneumonia. *Jt Comm J Qual Patient Saf.* 2005;31(5):243-8.

6. Resar R, Griffin FA, Haraden C, Nolan TW. Using care bundles to improve health care quality. IHI innovation series white paper. Available at: <http://www.ihi.org/resources/Pages/IHIWhitePapers/UsingCareBundles.aspx>. Accessed on 20 February 2021.
7. Wasserman S, Messina A. Guide to infection control in the healthcare setting. Available at: <https://www.urotoday.com/images/catheters/pdf/IHIUsingCareBundlesWhitePaper2012.pdf>. Accessed on 20 February 2021.
8. Bardram L, Funch-Jensen P, Jensen P, Crawford ME, Kehlet H. Recovery after laparoscopic colonic surgery with epidural analgesia, and early oral nutrition and mobilisation. *Lancet.* 1995;345:763-4.
9. Kehlet H. Multimodal approach to control postoperative pathophysiology and rehabilitation. *Br J Anaesth.* 1997;78:606-17.
10. Kehlet H, Mogensen T. Hospital stay of 2 days after open sigmoidectomy with a multimodal rehabilitation programme. *Br J Surg.* 1999;86(2):227-30.
11. Ljungqvist O, Scott M, Fearon KC. Enhanced recovery after surgery: a review. *JAMA Surg.* 2017;152(3): 292-8.
12. Loughlin SM, Alvarez A, Falcão LFDR, Ljungqvist O. The History of ERAS (Enhanced Recovery After Surgery) Society and its development in Latin America. *Rev Col Bras Cir.* 2020;47:e20202525.
13. Kehlet H. Enhanced postoperative recovery: good from afar, but far from good? *Anaesthesia.* 2020;75(1):e54-61.
14. Guidelines. Available at: <https://www.erassociety.org/>. Accessed on 20 February 2021.
15. Loots E, Sartorius B, Paruk IM, Clarke DL. The Successful Implementation of a Modified Enhanced Recovery After Surgery (ERAS) Program for Bariatric Surgery in a South African Teaching Hospital. *Surg Laparosc Endosc Percutan Tech.* 2018; 28(1):26-9.
16. Oudit RL, Ljungqvist O, Moodley J. Can an Enhanced Recovery After Surgery (ERAS) programme improve colorectal cancer outcomes in South Africa? *S Afr J Surg.* 2018;56(1):8-11.
17. Napolitano LM. Standardization of perioperative management: clinical pathways. *Surg Clin North Am.* 2005;85(6):1321-7.
18. Berrios-Torres SI, Umscheid CA, Bratzler DW. Centers for disease control and prevention guideline for the prevention of surgical site infection, 2017. *JAMA Surg.* 2017;152(8):784-91.
19. Global guidelines for the prevention of surgical site infection. Available at: <https://www.who.int/gpsc/ssi-prevention-guidelines/en/>. Accessed on 20 February 2021.
20. NICE guideline, surgical site infections: prevention and treatment.. Available at: <https://www.nice.org.uk/guidance/ng125>. Accessed on 20 February 2021.
21. Kawakita T, Iqbal SN, Landy HJ, Huang JC, Fries M. Reducing Cesarean Delivery Surgical Site Infections: A Resident-Driven Quality Initiative. *Obstet Gynecol.* 2019;133(2):282-8.
22. McCoy A, Das R. Reducing patient mortality, length of stay and readmissions through machine learning-based sepsis prediction in the emergency department, intensive care unit and hospital floor units. *BMJ Open Qual.* 2017;6(2):e000158.
23. Mayon-White RT, Ducel G, Kereselidze T, Tikhomirov E. An international survey of the prevalence of hospital-acquired infection. *J Hosp Infect.* 1988;11:43-8.
24. Dell AJ, Navsaria PH, Gray S, Kloppers JC. Nosocomial infections: A further assault on patients in a high-volume urban trauma centre in South Africa. *S Afr Med J.* 2020;110(2):123-5.
25. Nair A, Steinberg WJ, Habib T, Saeed H, Raubenheimer JE. Prevalence of healthcare-associated infection at a tertiary hospital in the Northern Cape Province, South Africa. *South African Family Pract.* 2018;60(5):162-7.

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