An audit of the incidence of acute hand infections requiring surgery at Worcester Provincial Hospital before and after the implementation of increased hand hygiene awareness during the COVID-19 pandemic

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Background: Acute hand infections are a common occurrence in the South African healthcare setting, often requiring specialist care. This study aimed to describe the incidence of acute hand infections requiring surgery before and after the introduction of COVID-19 hand hygiene guidelines.

Methods: A retrospective cohort study compared acute hand infections at Worcester Provincial Hospital (WPH) during two periods in 2020, before (period 1) and after (period 2) the COVID-19 regulations were implemented. A control, which consisted of data from the same periods in the years 2018 and 2019 was used to compare findings.

Results: A total of 279 acute hand infections were identified for the three years, of which 2020 had the most cases (100 infections). In 2020, the total number of infections decreased by 56% from period 1 (64 infections) to period 2 (36 infections). However, the incidence increased from 12.4% (period 1) to 15% (period 2).

Conclusion: Although the total number of acute hand infections decreased significantly, the incidence increased. These findings occurred during two periods, before and after strict hand hygiene regulations were implemented. The findings of this study could not decisively support that increased hand hygiene had any effect on the incidence of acute hand infections.

Keywords: hand, acute infection, incidence, hygiene, septic

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Introduction

Acute hand infection is a common occurrence in South Africa, often presenting to the emergency unit and requiring specialist care. A study performed within the South African healthcare setting reported 66 cases of acute hand infections requiring surgical intervention within six months.[1] In contrast with developing countries, Türker et al. reported 94 cases of acute hand infections within one year that required surgical drainage.[2]

Acute hand infections, if not treated promptly, can lead to significant morbidity and mortality.[3] Permanent damage is often found in the form of tissue destruction and loss of function, leading to long-term disability.[3] Infections commonly result after a puncture wound or any small penetrating wound to the hand. Often, the wound is ignored, leading to subsequent infection.[4,5]

A study published in the South African Journal of Orthopaedics, found that 24.2% of patients presenting with an acute hand infection were manual labourers.[1] Of the infections, 51.5% were found to have a penetrating injury as the mechanism of infection, while in 82% of cases, *Staphylococcus aureus* (*S. aureus*) was found to be the causative organism.[1] *Staphylococcus* has even been found to be the primary organism in 50–80% of acute hand infections.[6] Despite the previously mentioned studies, the literature surrounding acute hand infections remains limited.

Due to normal hand anatomy, infections can be superficial or deep, and therefore, the extent of infection differs during this pathological process.[4] Contributing factors to the morbidity of acute hand infections include increased length of hospital stay, amputations, and repeat or revision surgeries.[5]

The treatment required for the management of acute hand infections is extensive. It involves appropriate and rapid clinical diagnosis, proper antibiotic therapy selection, immobilisation as part of attempted soft tissue resuscitation, and finally, adequate surgical intervention.[1] Incision, drainage, debridement, and irrigation form the basis of acute hand infection surgical intervention.[5] The mean length of hospital stay following acute hand infections has been reported to be 4.9 days in the South African context.[1] This evidence highlights the significant impact of acute hand infections on bed occupancy and the distribution of resources and time.

The Department of Employment and Labour released COVID-19 guidelines on 17 March 2020 about managing the COVID-19 crisis in the workplace.[7] These guidelines were in line with the Occupational Health and Safety Act 85 of 1993, Section 8(1). The act stated that "every employer shall provide and maintain, as far as is reasonably practicable, a working environment that is safe and without risk to the health of his employees."[8] Section 8(2)(b) stated that the duties of the employer included "taking such steps as may be reasonably practicable to eliminate or mitigate any hazard or potential hazard to the safety

or health of employees, before resorting to personal protective equipment."[8]

The guidelines required employers to establish and ensure a work environment that improves personal hygiene.[7] Guidelines included measures such as frequent hand washing by all employees as well as the availability of alcohol-based hand rubs and/or soap.[7,9]

There is evidence that the implementation of hand hygiene can decrease the transmission of infections between people. A systematic review done in 2012 found that hand hygiene can decrease the transmission of influenza and acute respiratory tract infections.[10] Another study found that frequent and careful hand washing with soap and water partially protected office-working adults from gastrointestinal and respiratory tract infections.[11]

This evidence confirms the decrease of organism transmission with better hand hygiene and thus justifies further investigation concerning its benefits. In the context of the resource constraints of the healthcare system in South Africa, and the implemented hand hygiene policies surrounding the COVID-19 pandemic, this study raised the question: "Was there a difference in the presentation of acute hand infections at Worcester Provincial Hospital (WPH) before the implementation of increased hand hygiene awareness in comparison to after these measures were implemented?"

Methods

A retrospective cohort study was done by looking at acute hand infections requiring surgery at the WPH during two periods (period 1 and period 2) within the year 2020. These two periods represented the time before and after the COVID-19 guidelines were implemented in South Africa. A control, which consisted of data from the same periods of the years 2018 and 2019, was used to compare findings. The periods referred to for each of the three years are 1 January to 16 March (period 1), and 17 March to 31 May (period 2).

The inclusion criteria for this study were all patients older than 18 years who presented to WPH with acute hand infections and received surgical intervention in theatre, during the period from 1 January to 31 May in 2018, 2019, and 2020. The exclusion criteria had three components: (1) patients without acute hand infections, (2) patients presenting with fight bites, and (3) patients younger than 18 years.

For the purpose of this study, acute hand infections included superficial hand infections, deep palmar space infections, web space infections, pulp infections, nail bed infections, tendon sheath infections, and infections due to animal bites if work-related.

All cases of acute hand infections, within the inclusion criteria, that were presented to the WPH from 1 January to 31 May in 2018, 2019, and 2020 were identified by searching the orthopaedic department's operation database.

Ethical approval was obtained from the Health Research Ethics Committee of Stellenbosch University (HREC reference number U20/07/062, project ID 16786). Patients were de-identified by separate documents linking the hospital file number to a unique study number, and the unique study number to the data collected. Descriptive statistics were used to summarise the subjects' baseline demographic data. Comparisons were drawn between the data depicting the incidence of acute hand infections before and after COVID-19 guideline implementation. Deductions and possible conclusions were made based on the data received from the audit.

Results

In the reported periods from 2018 to 2020, the number of patients requiring surgery by the orthopaedic department at the hospital was 2 778. This number included all pathology dealt with in the department. Once the inclusion and exclusion criteria had been applied, 279 cases were identified and included in the study.

The incidence of hand infections for the years 2018, 2019, and 2020 was 8.6 %, 9.6%, and 12.4%, respectively. The total number of infections were 91, 88, and 100, respectively. The periods, number of acute hand infections, total number of cases, and incidence rates are presented in Table I and Figures 1 and 2.

Table I: Summary of the periods investigated, number of acute hand infections, total number of orthopaedic cases, and incidence rates

Period	Number of acute hand infections	Total number of surgical orthopaedic cases	Incidence rate (%)
1/2018	47	529	8.8
1/2019	58	478	12.1
1/2020	64	517	12.4
2/2018	44	528	8.33
2/2019	30	437	6.86
2/2020	36	289	15
Total	279	2 778	10

The following were identified regarding patient profile: 214/279 cases were male while 65 cases were female and the average age of study participants was 36 years (19–72). The following district hospitals were identified as the main referral areas: Ceres, Bredasdorp, Hermanus, Robertson, Swellendam, Montagu, and Caledon. However, the majority of patients presenting to the hospital (179/279 cases, 64% of total cases) were from Worcester.

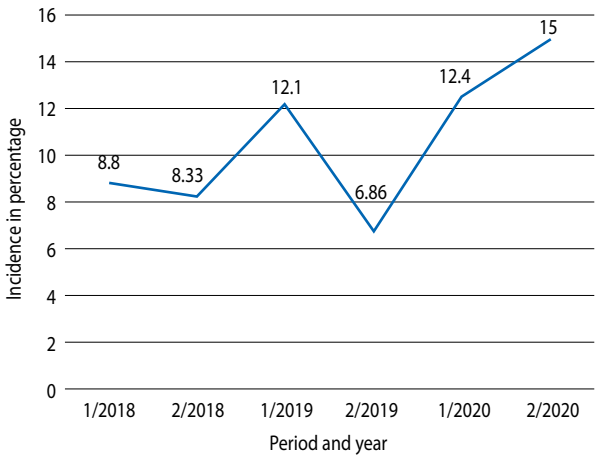

Figure 1: Line graph of the incidence rate by year and period

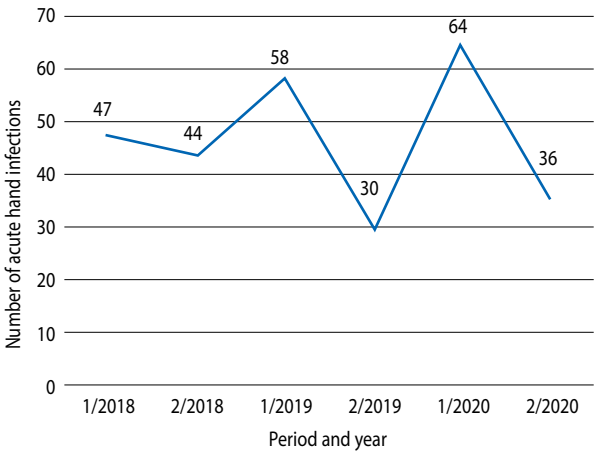

Figure 2: Line graph of the number of acute hand infections

Discussion

The key timeframe the authors attempted to assess were periods 1 and 2 of 2020. The total number of hand infections from period 1 to period 2 in 2020 decreased by 56% (from 64 to 36 infections). It should, however, be noted that the incidence of acute hand infections increased from 12.4% (64 of 517) to 15% (36 of 289) in this period. Compared to the controls, this was the largest increase in the incidence of infections from periods 1 to 2 over the three years in the study.

Multiple factors should be considered in explaining this occurrence:

1. Incidence is calculated as a relative number. Due to a decreased number of total patients who required surgery, the incidence appears higher. The decrease in patient numbers can be explained by the COVID-19 pandemic nationwide lockdown. During the lockdown, the number of interpersonal violence and motor vehicle accident-related injuries was significantly reduced.
2. It was noted that in 2019 the total number of acute hand infections also significantly decreased from period 1 to 2. Worcester and its surroundings support a large community of permanent and seasonal labourers. The wine farms employ the majority of the community. It could be explained that a large number of patients are also seasonal as they are manual labourers working on the surrounding wine farms. Therefore, period 1 is during a time when more manual labour is performed.
3. It is also a possibility that increased hand hygiene awareness has caused a decrease in the total number of acute hand infections. Based on the available data, this explanation is unfortunately unlikely as the steep decline in infections in 2019 occurred without increased hand hygiene awareness.

The largest component of the study population were middle-aged males and a geography focused on Worcester itself, but also the surrounding district hospitals. This leads to a deduction that most of the patients could have been manual labourers, likely on farms, in the surrounding areas.

It should also be noted that by comparing the total number of acute hand infections per year, 2020 had the most cases. This could have been attributed to:

1. Local clinics that closed during the COVID-19 pandemic, which led to small injuries that would have been treated at the clinic progressing to injuries that needed hospital care.
2. Fear of COVID-19 infection prevented earlier presentation to the hospital. The pathology that could have been managed in casualty, worsened at home and then needed admission and surgery when patients presented to the hospital.

As mentioned, there was a decrease in the number of infections observed from period 1 to period 2 across all the years. The conclusion could be that increased hand hygiene awareness played a role; however, due to the presence of that occurrence in all three years of data, it is more likely that workers were seasonal. Consequently, more people would have been exposed to hand infections during period 1 compared with period 2.

Further research will be necessary in which more data is collected over a longer period in a setting with increased hand hygiene awareness to compare the trends of previous years. The authors suggest a clinical trial in which strict hand hygiene protocols are implemented in certain areas and the incidence is monitored compared with places that do not have these protocols. Insight could also be gained by a study of the cost of supplying cleaning solutions and training about hand washing to local working communities, compared to the cost of managing an acute hand infection in a hospital setting.

Conclusion

The findings of this study could not support that increased hand hygiene had any effect on the incidence of acute hand infections. The total number of acute hand infections decreased in 2020, from the period before until the period after strict hand hygiene regulations were implemented. However, the incidence of infections increased during the same periods as a consequence of a decrease in the total number of patients.

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Conflict of interest

The authors declare no conflict of interest.

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Ethical approval

Before the commencement of the study, ethical approval was obtained from the Health Research Ethics Committee of Stellenbosch University (HREC reference number U20/07/062, project ID 16786).

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