

COMPLICATIONS OF WOUND MANAGEMENT BY EMERGENCY DEPARTMENT PHYSICIANS: PATIENTS' PERSPECTIVE

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ABSTRACT

Objective: This research aims to determine the complications of wound management by emergency department physicians from the patient's perspective.

Methods: This study will employ a cross-sectional design to evaluate the complications of wound management from the patient's perspective in emergency departments in the Kingdom of Saudi Arabia (KSA). The cross-sectional approach allows for data collection at a single point in time, providing a snapshot of patient experiences and outcomes related to wound care.

Results: The study included 315 participants. The most frequent gender among them was male (n= 179, 56.8%) and female (n= 136, 43.2%). The most frequent age among study participants was 36-40 years (n= 93, 29.5%), followed by 40 years and more (n= 84, 26.7%), then 31-35 years (n=72, 22.9%). The most frequent education among study participants was university (n= 225, 71.4%), followed by school (n= 72, 22.9%), then illiterate (n=18, 5.7%). Marital status among study participants, with most of them having married (n= 137, 43.5%) followed by single (n= 92, 29.2%), then divorced (n= 56, 17.8%) and widow (n=30, 9.5%). Income among study participants, with most of them having a good (n= 147, 46.7%) followed by weak (n= 97, 30.8%), then high (n= 71, 22.5%).

Conclusion: This study highlights the various complications patients experience in wound management within emergency departments. Despite advancements in medical techniques, infections, delayed healing, pain, and scarring remain prevalent concerns. Effective

communication, pain management, and proper aftercare instructions are crucial for improving patient satisfaction and reducing complications.

INTRODUCTION

About 5.4% of all visits to the emergency department are caused by trauma wounds, making it one of the most frequent reasons individuals go there [1, 2]. Because of the diminishing availability of primary care and 24-hour free access, the emergency department is the most accessible institution for wound treatment. Therefore, the top focus of emergency physicians' (EPs) will be the provision of safe and effective wound care. Additionally, traumatic wounds have traditionally constituted a substantial portion of medical malpractice cases, making up as much as 24% of all medical claims [2]. This is mostly because to the failure to properly diagnose and treat tendon or nerve damage, infections, and foreign substances. While it's true that the majority of wounds will heal on their own, repairing them quickly and carefully may lessen the likelihood of infection and scarring, leading to happier patients and lower healthcare expenses overall [1]. Nonetheless, because to cultural differences, misconceptions, and local traditions, several ways of treating traumatic wounds are still used in modern therapeutic practice.

Wound management in emergency departments (EDs) is a critical component of acute care, encompassing a broad spectrum of injuries from minor abrasions to severe lacerations and complex trauma [3-5]. The primary goal of wound management is to promote healing, prevent infection, and minimize scarring while ensuring patient comfort. Emergency department physicians are often tasked with making rapid decisions under pressure, balancing the need for swift intervention with the necessity of comprehensive care [6-8]. Despite advancements in medical techniques and protocols, complications in wound management remain a significant concern, impacting patient outcomes and satisfaction. These complications can arise from various factors, including the initial assessment, the method of wound closure, and the adequacy of follow-up care [9-10].

The patient perspective is a vital yet often underexplored dimension in evaluating the quality of wound management in emergency settings. Patients' experiences and satisfaction levels provide essential feedback that can inform and refine clinical practices [11-12]. Issues such as pain management, communication about care procedures, and the provision of aftercare instructions play a crucial role in patient recovery and overall satisfaction with their ED experience. By investigating the complications of wound management from the patients' viewpoint, healthcare providers can gain valuable insights into the practical challenges and areas needing improvement [13-14]. This patient-centered approach is essential for developing more effective, responsive, and empathetic wound care strategies in emergency departments, ultimately leading to better health outcomes and enhanced patient trust in emergency medical services [15].

METHODS

Study design

This study will employ a cross-sectional design to evaluate the complications of wound management from the patient's perspective in emergency departments in the Kingdom of Saudi Arabia (KSA). The cross-sectional approach allows for data collection at a single point in time, providing a snapshot of patient experiences and outcomes related to wound care.

Study approach

The study will be conducted in several emergency departments across different hospitals in KSA. These hospitals will include government and private institutions to ensure a comprehensive understanding of wound management practices and patient experiences across various healthcare settings.

Study population

The target population for this study includes patients who have received wound management in the emergency departments of selected hospitals in KSA. These patients will encompass a range of demographics, including different ages, genders, and types of wounds.

Study sample

A sample size of 315 patients will be targeted to achieve a statistically significant understanding of the complications associated with wound management. A stratified random sampling method will be used to ensure that the sample is representative of the broader patient population. Stratification will be based on factors such as age, gender, and type of wound to capture a diverse range of patient experiences.

Study tool

For the current study, a questionnaire was adopted for data collection, which was also categorized as a study tool.

Data collection

Data will be collected through structured interviews using a standardized questionnaire. The interviews will be conducted by trained research assistants to ensure consistency and reliability in data collection. The questionnaire will cover various aspects of wound management, including patient satisfaction, perceived complications, pain management, communication about care procedures, and aftercare instructions.

Data analysis

Data will be analyzed using statistical software such as SPSS. Descriptive statistics will be used to summarize the demographic characteristics of the sample and the frequency of reported complications. Inferential statistics, including chi-square tests and logistic regression, will be employed to identify associations between patient characteristics and reported complications. Qualitative data from open-ended questions will be analyzed thematically to identify common themes and insights.

Ethical considerations

The study will be conducted in accordance with ethical guidelines and principles. Ethical approval will be obtained from the participating hospitals' Institutional Review Board (IRB). Informed consent will be obtained from all participants, ensuring they understand the purpose of the study, the procedures involved, and their right to withdraw at any time without any impact on their medical care. Confidentiality and anonymity of participant information will be strictly maintained throughout the study.

RESULTS

The study included 315 participants. The most frequent gender among them was male (n= 179, 56.8%) and female (n= 136, 43.2%). Figure 1 shows the gender distribution among study participants. The most frequent age among study participants was 36-40 years (n= 93, 29.5%), followed by 40 years and more (n= 84, 26.7%), then 31-35 years (n=72, 22.9%). Figure 2 shows the age distribution among study participants. The most frequent education among study participants was university (n= 225, 71.4%), followed by school (n= 72, 22.9%), then illiterate (n=18, 5.7%). Figure 3 shows the distribution of education among study participants.

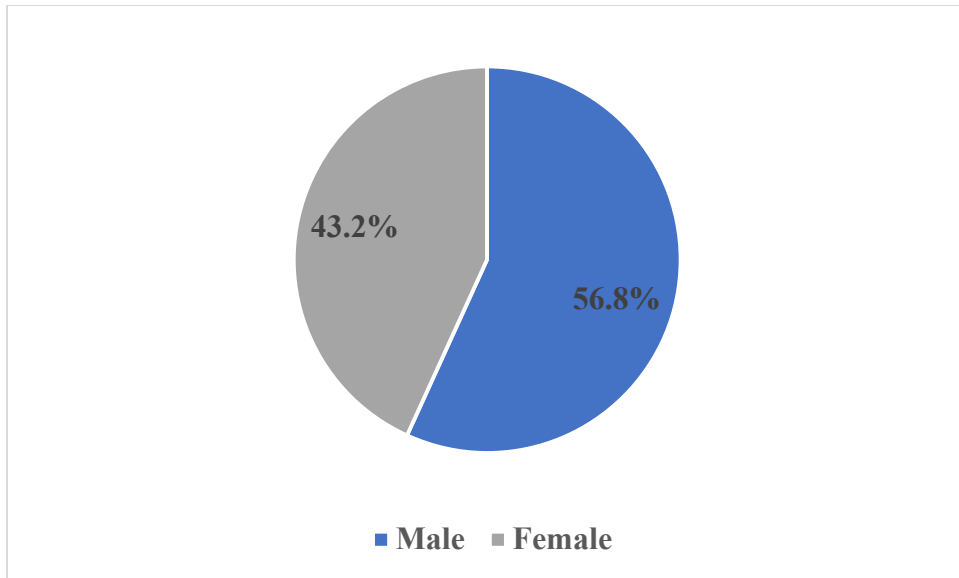


Figure 1: Gender distribution among study participants

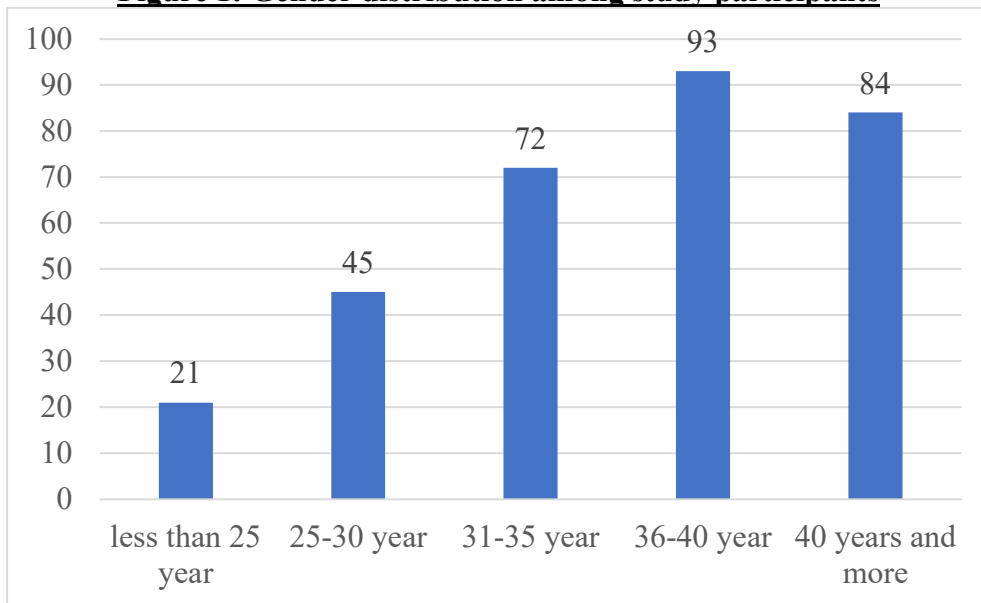


Figure 2: Age distribution among study participants

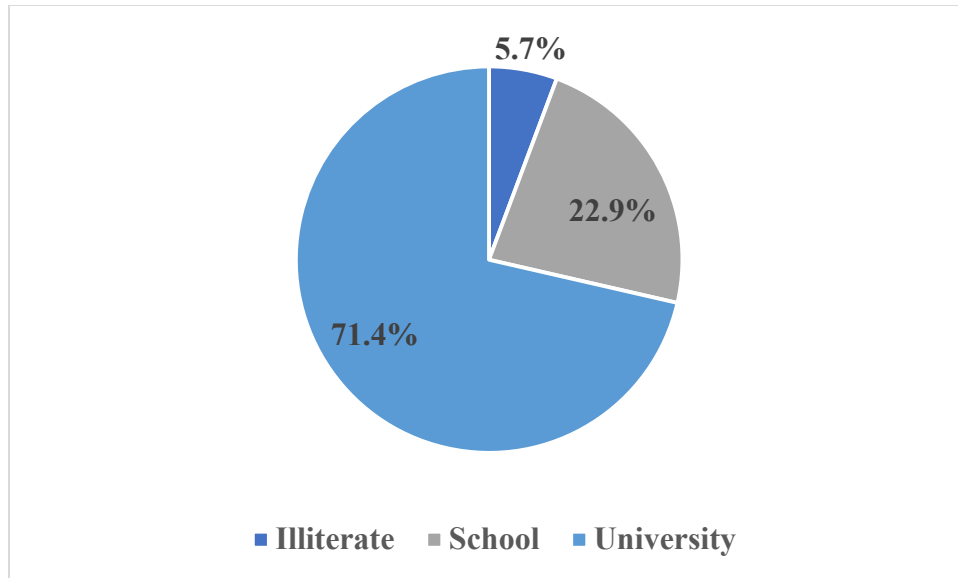


Figure 3: Education distribution among study participants

Marital status among study participants, with most of them having married (n= 137, 43.5%) followed by single (n= 92, 29.2%), then divorced (n= 56, 17.8%) and widow (n=30, 9.5%). Figure 4 shows the marital status among study participants.

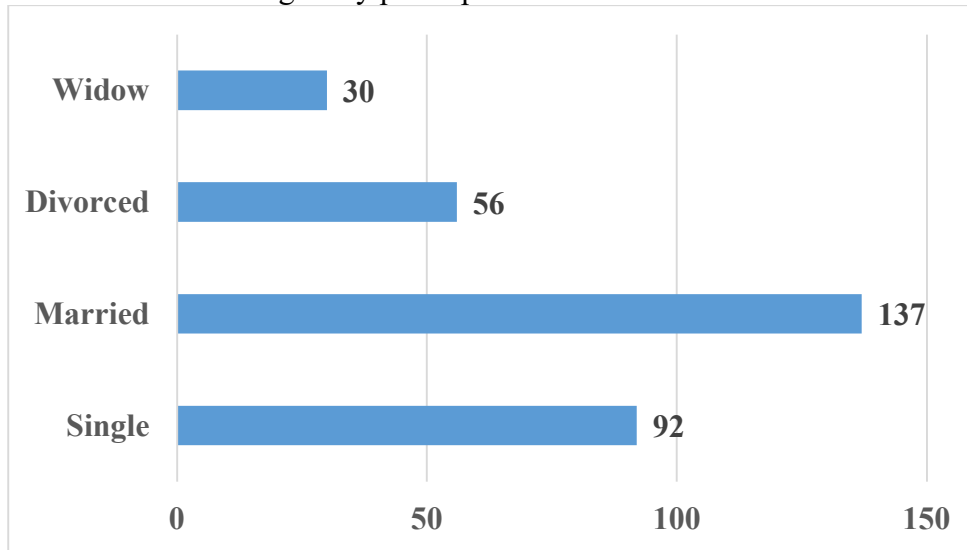


Figure 4: Marital status distribution among study participants

Income among study participants, with most of them having a good (n= 147, 46.7%) followed by weak (n= 97, 30.8%), then high (n= 71, 22.5%). Figure 5 shows the income status among study participants.

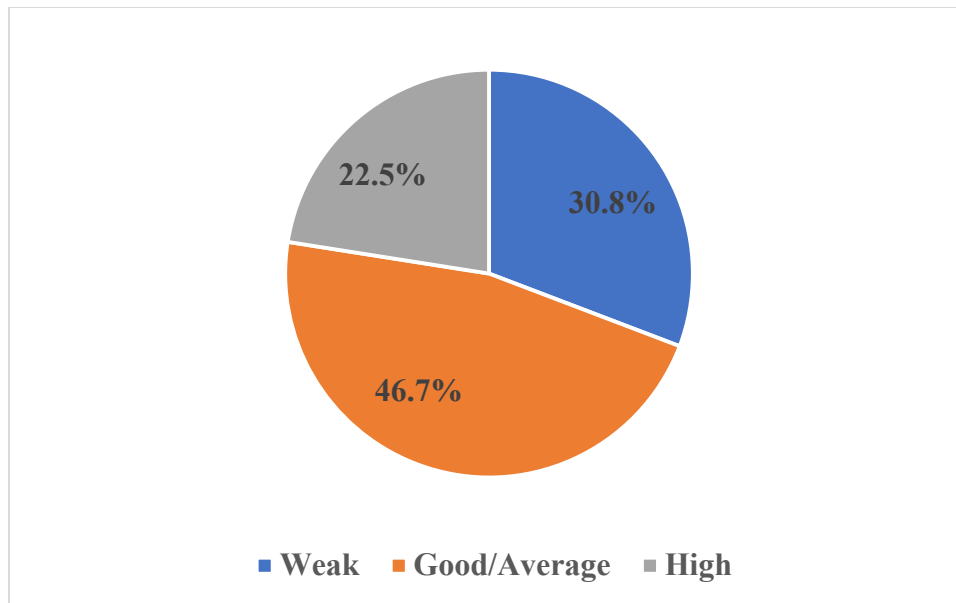


Figure 5: Income distribution among study participants

Participants were asked to assess their Comorbidity. Their responses and results are presented in Table 1.

| Table 1: Comorbidities of the participants | | |
|---|-------------|-----------|
| Comorbidity | Yes | No |
| Type 1 Diabetes Mellitus | 295 (93.7%) | 20 (6.3%) |
| Type 2 Diabetes Mellitus | 300 (95.2%) | 15 (4.8%) |
| Hypertension | 303 (96.2%) | 12 (3.8%) |
| Chronic Renal Disease | 291 (92.4%) | 24 (7.6%) |
| Chronic Liver Disease | 296 (94%) | 19 (6%) |
| Neurological | 303 (96.2%) | 12 (3.8%) |
| Cardiovascular Disease | 298 (94.6%) | 17 (5.4%) |
| Peripheral Vascular Disease | 292 (92.7%) | 23 (7.3%) |
| Asthma | 306 (97.1%) | 9 (2.9%) |
| Chronic Obstructive Pulmonary Disease | 298 (94.6%) | 17 (7.6%) |
| Autoimmune Diseases | 291 (92.4%) | 24 (7.6%) |

Participants were asked to assess their complications. Their responses and results are presented in Table 2.

| Table 2: Complications of the participants | | |
|---|-------------|-----------|
| Infections | Yes | No |
| Localized infection | 303 (96.2%) | 12 (3.8%) |
| Cellulitis | 300 (95.2%) | 15 (4.8%) |
| Abscess formation | 296 (94%) | 19 (6%) |
| Sepsis | 302 (95.9%) | 13 (4.1%) |
| Delayed Healing | Yes | No |

| | | |
|----------------------------|-------------|-----------|
| Chronic wounds | 306 (97.1%) | 9 (2.9%) |
| Non-healing wounds | 304 (96.5%) | 11 (3.5%) |
| Hypertrophic scars | 301 (95.6%) | 14 (4.4%) |
| Scarring | Yes | No |
| Keloids | 297 (94.3%) | 18 (5.7%) |
| Hypertrophic scars | 299 (94.9%) | 16 (5.1%) |
| Contractures | 306 (97.1%) | 9 (2.9%) |
| Pain and Discomfort | Yes | No |
| Acute pain | 301 (95.6%) | 14 (4.4%) |
| Chronic pain | 308 (97.8%) | 7 (2.2%) |
| Neuropathic pain | 302 (95.9%) | 13 (4.1%) |
| Dehiscence | Yes | No |
| Wound reopening | 299 (94.9%) | 16 (5.1%) |
| Partial dehiscence | 306 (97.1%) | 9 (2.9%) |
| Complete dehiscence | 294 (93.3%) | 21 (6.7%) |
| Hemorrhage | Yes | No |
| Persistent bleeding | 295 (93.7%) | 20 (6.3%) |
| Hematoma formation | 302 (95.9%) | 13 (4.1%) |
| Tissue Necrosis | Yes | No |
| Gangrene | 300 (95.2%) | 15 (4.8%) |
| Ischemic wounds | 303 (96.2%) | 12 (3.8%) |
| Edema and Swelling | Yes | No |
| Compartment syndrome | 305 (96.8%) | 10 (3.2%) |
| Persistent swelling | 298 (94.6%) | 17 (5.4%) |
| Loss of Function | Yes | No |
| Impaired mobility | 294 (93.3%) | 21 (6.7%) |
| Loss of limb function | 296 (94%) | 19 (6%) |

DISCUSSION

Wound management in emergency departments (EDs) is a complex and critical aspect of healthcare, requiring timely and effective interventions to promote healing and prevent complications such as infections, prolonged healing, and scarring. The primary aim is to restore the skin's integrity, which acts as a protective barrier against pathogens and environmental factors [16]. Despite advancements in medical techniques and protocols, managing wounds in the ED remains challenging due to the variability in wound types and patient conditions, along with the high-pressure environment in which emergency physicians operate [17].

Complications in wound management can arise from various factors, including the nature of the wound, the patient's overall health, and the quality of care provided. Common complications include infections, delayed healing, dehiscence (wound reopening), and chronic wounds [18]. Infections are particularly concerning as they can lead to systemic issues such as sepsis if not promptly and adequately treated. The incidence of wound infections in the ED varies but has been reported to be between 2% and 30%, depending on the wound type and management protocols [19].

Patient satisfaction is a crucial indicator of the quality of care in wound management. It encompasses various aspects, including pain management, communication with healthcare

providers, and the provision of aftercare instructions [20]. Studies have shown that effective communication and proper education about wound care significantly enhance patient satisfaction and adherence to aftercare protocols [21]. However, patients often report dissatisfaction due to inadequate pain management, lack of clear instructions, and perceived neglect in care [22].

Pain management is a critical component of wound care that significantly impacts patient satisfaction and outcomes. Acute pain is a common experience for patients with wounds, and inadequate pain control can lead to chronic pain and other complications [23]. Effective pain management strategies include the use of local anesthetics, systemic analgesics, and non-pharmacological interventions such as cold therapy and proper wound dressing techniques [24]. However, studies have highlighted gaps in pain management practices in EDs, with many patients reporting inadequate pain relief during and after wound treatment [25].

Effective communication between healthcare providers and patients is essential for successful wound management. It involves explaining the nature of the wound, the treatment process, and the necessary aftercare to ensure proper healing [26]. Patient education has been shown to improve adherence to wound care instructions and reduce the incidence of complications [27]. Despite its importance, communication is often cited as a major area of concern in ED settings, where the fast-paced environment can hinder thorough discussions with patients [28].

Aftercare is a vital component of wound management that involves providing patients with instructions on how to care for their wounds at home, recognizing signs of complications, and knowing when to seek further medical attention [29]. Proper aftercare can prevent many complications and promote faster healing. Studies have found that comprehensive discharge instructions and follow-up appointments significantly reduce the rates of wound-related complications and improve patient outcomes [30]. However, patients frequently report receiving inadequate aftercare instructions, which can lead to improper wound care and increased complications [31].

Effective wound cleaning is crucial to prevent infections and promote healing. The process typically involves irrigation to remove debris and bacteria, followed by the application of antiseptics [32]. The choice of antiseptics and cleaning methods can influence the rate of infection and the healing process. Research indicates that proper wound cleaning significantly reduces the risk of infections and other complications [33]. However, there is variability in the practices used in EDs, leading to differences in patient outcomes [34].

The experience and training of healthcare providers play a significant role in the quality of wound management. Experienced providers are likelier to follow best practices, recognize complications early, and provide effective pain management and aftercare instructions [35]. Training programs and continuous education are essential to ensure that all providers are equipped with the latest knowledge and skills in wound management [36]. Studies have shown that targeted training programs can improve the quality of wound care and reduce the incidence of complications [37]. Several barriers can hinder effective wound management in EDs, including time constraints, resource limitations, and the high patient turnover characteristic of emergency settings [38]. These factors can lead to rushed assessments and treatments, insufficient communication with patients, and inadequate pain management [39]. Addressing these barriers is essential for improving wound management practices and patient outcomes in EDs [40].

CONCLUSION

This study highlights the various complications patients experience in wound management within emergency departments. Despite advancements in medical techniques, infections, delayed healing,

pain, and scarring remain prevalent concerns. Effective communication, pain management, and aftercare instructions are crucial for improving patient satisfaction and reducing complications.

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ANNEX 1: DATA COLLECTION TOOL

| | | | | |
|----------------|------------|--------------|------------|--------|
| Age | | Gender | Male | Female |
| Education | Illiterate | School | University | |
| Marital Status | Single | Married | Divorced | Widow |
| Income | Weak | Good/Average | High | |

| Comorbidity | Yes | No |
|---------------------------------------|------------|-----------|
| Type 1 Diabetes Mellitus | | |
| Type 2 Diabetes Mellitus | | |
| Hypertension | | |
| Chronic Renal Disease | | |
| Chronic Liver Disease | | |
| Neurological | | |
| Cardiovascular Disease | | |
| Peripheral Vascular Disease | | |
| Asthma | | |
| Chronic Obstructive Pulmonary Disease | | |
| Autoimmune Diseases | | |
| Others: | | |

Please specify the type of your wound

| Type of Wound | Yes | No | Type of Wound | Yes | No |
|----------------------|------------|-----------|----------------------|------------|-----------|
| Abrasion | | | Puncture wound | | |
| Avulsion | | | Incisions | | |
| Burns | | | Bites | | |
| Gunshot wound | | | Ulcers | | |
| Degloving injury | | | Surgical wound | | |
| Traumatic wound | | | Laceration | | |

| | | | | | |
|--------------------|--|--|-------------------|--|--|
| Pressure ulcer | | | Contusion | | |
| Amputation | | | Crush injury | | |
| Foreign body wound | | | Electrical injury | | |
| Others: | | | | | |

Management done

| |
|--|
| |
|--|

Complications

| Infections | | |
|-----------------------|-----|----|
| Localized infection | Yes | No |
| Cellulitis | Yes | No |
| Abscess formation | Yes | No |
| Sepsis | Yes | No |
| Delayed Healing | | |
| Chronic wounds | Yes | No |
| Non-healing wounds | Yes | No |
| Hypertrophic scars | Yes | No |
| Scarring | | |
| Keloids | Yes | No |
| Hypertrophic scars | Yes | No |
| Contractures | Yes | No |
| Pain and Discomfort | | |
| Acute pain | Yes | No |
| Chronic pain | Yes | No |
| Neuropathic pain | Yes | No |
| Dehiscence | | |
| Wound reopening | Yes | No |
| Partial dehiscence | Yes | No |
| Complete dehiscence | Yes | No |
| Hemorrhage | | |
| Persistent bleeding | Yes | No |
| Hematoma formation | Yes | No |
| Tissue Necrosis | | |
| Gangrene | Yes | No |
| Ischemic wounds | Yes | No |
| Edema and Swelling | | |
| Compartment syndrome | Yes | No |
| Persistent swelling | Yes | No |
| Loss of Function | | |
| Impaired mobility | Yes | No |
| Loss of limb function | Yes | No |

APPENDIX 2: Participants responses to scale items

gender

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|-------|--------|-----------|---------|---------------|--------------------|
| Valid | Male | 179 | 56.8 | 56.8 | 56.8 |
| | Female | 136 | 43.2 | 43.2 | 100.0 |
| | Total | 315 | 100.0 | 100.0 | |

age

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|-------|-------------------|-----------|---------|---------------|--------------------|
| Valid | less than 25 year | 21 | 6.7 | 6.7 | 6.7 |
| | 25-30 year | 45 | 14.3 | 14.3 | 21.0 |
| | 31-35 year | 72 | 22.9 | 22.9 | 43.8 |
| | 36-40 year | 93 | 29.5 | 29.5 | 73.3 |
| | 40 years and more | 84 | 26.7 | 26.7 | 100.0 |
| | Total | 315 | 100.0 | 100.0 | |

Education

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|-------|------------|-----------|---------|---------------|--------------------|
| Valid | Illiterate | 18 | 5.7 | 5.7 | 5.7 |
| | School | 72 | 22.9 | 22.9 | 28.6 |
| | University | 225 | 71.4 | 71.4 | 100.0 |
| | Total | 315 | 100.0 | 100.0 | |

Marital status

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|-------|----------|-----------|---------|---------------|--------------------|
| Valid | Single | 92 | 29.2 | 29.2 | 29.2 |
| | Married | 137 | 43.5 | 43.5 | 72.7 |
| | Divorced | 56 | 17.8 | 17.8 | 90.5 |
| | Widow | 30 | 9.5 | 9.5 | 100.0 |
| | Total | 315 | 100.0 | 100.0 | |

Income

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|-------|--------------|-----------|---------|---------------|--------------------|
| Valid | Weak | 97 | 30.8 | 30.8 | 30.8 |
| | Good/Average | 147 | 46.7 | 46.7 | 77.5 |
| | High | 71 | 22.5 | 22.5 | 100.0 |
| | Total | 315 | 100.0 | 100.0 | |

| Comorbidity | Yes | No |
|---------------------------------------|-------------|-----------|
| Type 1 Diabetes Mellitus | 295 (93.7%) | 20 (6.3%) |
| Type 2 Diabetes Mellitus | 300 (95.2%) | 15 (4.8%) |
| Hypertension | 303 (96.2%) | 12 (3.8%) |
| Chronic Renal Disease | 291 (92.4%) | 24 (7.6%) |
| Chronic Liver Disease | 296 (94%) | 19 (6%) |
| Neurological | 303 (96.2%) | 12 (3.8%) |
| Cardiovascular Disease | 298 (94.6%) | 17 (5.4%) |
| Peripheral Vascular Disease | 292 (92.7%) | 23 (7.3%) |
| Asthma | 306 (97.1%) | 9 (2.9%) |
| Chronic Obstructive Pulmonary Disease | 298 (94.6%) | 17 (7.6%) |
| Autoimmune Diseases | 291 (92.4%) | 24 (7.6%) |

| Type of Wound | Yes | No | Type of Wound | Yes | No |
|----------------------|-------------|-----------|----------------------|-------------|-----------|
| Abrasion | 295 (93.7%) | 20 (6.3%) | Puncture wound | 301 (95.6%) | 14 (4.4%) |
| Avulsion | 299 (94.9%) | 16 (5.1%) | Incisions | 299 (94.9%) | 16 (5.1%) |
| Burns | 308 (97.8%) | 7 (2.2%) | Bites | 290 (92.1%) | 25 (7.9%) |
| Gunshot wound | 301 (95.6%) | 14 (4.4%) | Ulcers | 295 (93.7%) | 20 (6.3%) |
| Degloving injury | 291 (92.4%) | 24 (7.6%) | Surgical wound | 286 (94.3%) | 29 (9.2%) |
| Traumatic wound | 302 (95.9%) | 13 (4.1%) | Laceration | 297 (94.3%) | 18 (5.7%) |
| Pressure ulcer | 293 (93%) | 22 (7%) | Contusion | 300 (95.2%) | 15 (4.8%) |
| Amputation | 298 (94.6%) | 17 (5.4%) | Crush injury | 306 (97.1%) | 9 (2.9%) |
| Foreign body wound | 294 (93.3%) | 21 (6.7%) | Electrical injury | 305 (96.8%) | 10 (3.2%) |

| Infections | Yes | No |
|----------------------------|-------------|-----------|
| Localized infection | 303 (96.2%) | 12 (3.8%) |
| Cellulitis | 300 (95.2%) | 15 (4.8%) |
| Abscess formation | 296 (94%) | 19 (6%) |
| Sepsis | 302 (95.9%) | 13 (4.1%) |
| Delayed Healing | Yes | No |
| Chronic wounds | 306 (97.1%) | 9 (2.9%) |
| Non-healing wounds | 304 (96.5%) | 11 (3.5%) |
| Hypertrophic scars | 301 (95.6%) | 14 (4.4%) |
| Scarring | Yes | No |
| Keloids | 297 (94.3%) | 18 (5.7%) |
| Hypertrophic scars | 299 (94.9%) | 16 (5.1%) |
| Contractures | 306 (97.1%) | 9 (2.9%) |
| Pain and Discomfort | Yes | No |
| Acute pain | 301 (95.6%) | 14 (4.4%) |
| Chronic pain | 308 (97.8%) | 7 (2.2%) |
| Neuropathic pain | 302 (95.9%) | 13 (4.1%) |
| Dehiscence | Yes | No |
| Wound reopening | 299 (94.9%) | 16 (5.1%) |
| Partial dehiscence | 306 (97.1%) | 9 (2.9%) |
| Complete dehiscence | 294 (93.3%) | 21 (6.7%) |
| Hemorrhage | Yes | No |
| Persistent bleeding | 295 (93.7%) | 20 (6.3%) |
| Hematoma formation | 302 (95.9%) | 13 (4.1%) |
| Tissue Necrosis | Yes | No |
| Gangrene | 300 (95.2%) | 15 (4.8%) |
| Ischemic wounds | 303 (96.2%) | 12 (3.8%) |
| Edema and Swelling | Yes | No |
| Compartment syndrome | 305 (96.8%) | 10 (3.2%) |
| Persistent swelling | 298 (94.6%) | 17 (5.4%) |
| Loss of Function | Yes | No |
| Impaired mobility | 294 (93.3%) | 21 (6.7%) |
| Loss of limb function | 296 (94%) | 19 (6%) |

Chi-Square Test

Frequencies

gender

| | Observed N | Expected N | Residual |
|--------|------------|------------|----------|
| Male | 179 | 157.5 | 21.5 |
| Female | 136 | 157.5 | -21.5 |
| Total | 315 | | |

age

| | Observed N | Expected N | Residual |
|-------------------|------------|------------|----------|
| less than 25 year | 21 | 63.0 | -42.0 |
| 25-30 year | 45 | 63.0 | -18.0 |
| 31-35 year | 72 | 63.0 | 9.0 |
| 36-40 year | 93 | 63.0 | 30.0 |
| 40 years and more | 84 | 63.0 | 21.0 |
| Total | 315 | | |

Education

| | Observed N | Expected N | Residual |
|------------|------------|------------|----------|
| Illiterate | 18 | 105.0 | -87.0 |
| School | 72 | 105.0 | -33.0 |
| University | 225 | 105.0 | 120.0 |
| Total | 315 | | |

Marital.status

| | Observed N | Expected N | Residual |
|----------|------------|------------|----------|
| Single | 92 | 78.8 | 13.3 |
| Married | 137 | 78.8 | 58.3 |
| Divorced | 56 | 78.8 | -22.8 |
| Widow | 30 | 78.8 | -48.8 |
| Total | 315 | | |

Income

| | Observed N | Expected N | Residual |
|--------------|------------|------------|----------|
| Weak | 97 | 105.0 | -8.0 |
| Good/Average | 147 | 105.0 | 42.0 |
| High | 71 | 105.0 | -34.0 |
| Total | 315 | | |

Type.1.Diabetes.Mellitus

| | Observed N | Expected N | Residual |
|-------|------------|------------|----------|
| Yes | 295 | 157.5 | 137.5 |
| No | 20 | 157.5 | -137.5 |
| Total | 315 | | |

Type.2.Diabetes.Mellitus

| | Observed N | Expected N | Residual |
|-------|------------|------------|----------|
| Yes | 300 | 157.5 | 142.5 |
| No | 15 | 157.5 | -142.5 |
| Total | 315 | | |

Hypertension

| | Observed N | Expected N | Residual |
|-------|------------|------------|----------|
| Yes | 303 | 157.5 | 145.5 |
| No | 12 | 157.5 | -145.5 |
| Total | 315 | | |

Chronic.Renal.Disease

| | Observed N | Expected N | Residual |
|-------|------------|------------|----------|
| Yes | 291 | 157.5 | 133.5 |
| No | 24 | 157.5 | -133.5 |
| Total | 315 | | |

Chronic.Liver.Disease

| | Observed N | Expected N | Residual |
|-------|------------|------------|----------|
| Yes | 296 | 157.5 | 138.5 |
| No | 19 | 157.5 | -138.5 |
| Total | 315 | | |

Income

| | Observed N | Expected N | Residual |
|--------------|------------|------------|----------|
| Weak | 97 | 105.0 | -8.0 |
| Good/Average | 147 | 105.0 | 42.0 |
| High | 71 | 105.0 | -34.0 |
| Total | 315 | | |

Type.1.Diabetes.Mellitus

| | Observed N | Expected N | Residual |
|-------|------------|------------|----------|
| Yes | 295 | 157.5 | 137.5 |
| No | 20 | 157.5 | -137.5 |
| Total | 315 | | |

Type.2.Diabetes.Mellitus

| | Observed N | Expected N | Residual |
|-------|------------|------------|----------|
| Yes | 300 | 157.5 | 142.5 |
| No | 15 | 157.5 | -142.5 |
| Total | 315 | | |

Hypertension

| | Observed N | Expected N | Residual |
|-------|------------|------------|----------|
| Yes | 303 | 157.5 | 145.5 |
| No | 12 | 157.5 | -145.5 |
| Total | 315 | | |

Chronic.Renal.Disease

| | Observed N | Expected N | Residual |
|-------|------------|------------|----------|
| Yes | 291 | 157.5 | 133.5 |
| No | 24 | 157.5 | -133.5 |
| Total | 315 | | |

Chronic.Liver.Disease

| | Observed N | Expected N | Residual |
|-------|------------|------------|----------|
| Yes | 296 | 157.5 | 138.5 |
| No | 19 | 157.5 | -138.5 |
| Total | 315 | | |

Test Statistics

| | gender | age | Education | Marital.status | Income | Type.1. Diabetes. Mellitus | Type.2. Diabetes. Mellitus | Hypertension |
|-------------|--------------------|---------------------|----------------------|---------------------|---------------------|----------------------------------|----------------------------------|----------------------|
| Chi-Square | 5.870 ^a | 55.714 ^b | 219.600 ^c | 82.067 ^d | 28.419 ^c | 240.079 ^a | 257.857 ^a | 268.829 ^a |
| df | 1 | 4 | 2 | 3 | 2 | 1 | 1 | 1 |
| Asymp. Sig. | .015 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 |

- a. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 157.5.
- b. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 63.0.
- c. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 105.0.
- d. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 78.8.

| Chronic.Renal. Disease | Chronic.Liver. Disease | Neurological | Cardiovascular .Disease | Peripheral. Vascular. Disease | Asthma | Chronic. Obstructive. Pulmonary. Disease | Autoimmune. Diseases |
|---------------------------|---------------------------|----------------------|----------------------------|-------------------------------------|----------------------|---|-------------------------|
| 226.314 ^a | 243.584 ^a | 268.829 ^a | 250.670 ^a | 229.717 ^a | 280.029 ^a | 250.670 ^a | 226.314 ^a |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 |