

Exploration of critical care nurses' challenges in caring for enterocutaneous fistula as a complication for an open abdomen: A qualitative study

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Abstract

Background and Aims: Enterocutaneous fistula is a severe complication of an open abdomen, which poses devastating challenges for critical care nurses. The study aimed to explore and describe the challenges faced by critical care nurses caring for patients with enterocutaneous fistulas in a tertiary public hospital in Gauteng, South Africa.

Methods: A qualitative, exploratory, descriptive, and contextual design was conducted to understand the challenges experienced by the critical care nurses caring for patients with enterocutaneous fistulas. The standards for reporting qualitative research checklists are utilized. The study conducted four semistructured focus group interviews with six members in each group.

Results: Critical care nurses revealed two overarching themes: the challenges regarding difficult nursing care and the lack of resources to provide quality patient care. Care of patients with ECF highlighted that nurses were not coping with the care of such patients.

Conclusion: Collaboration of a multidisciplinary team involving dietitians, surgeons, and enterostomal therapy nurses could improve the management of ECF without surgical intervention, increase the knowledge and skills of nurses, alleviate their challenges, and yield safe patient outcomes. Standardized and updated protocols will ensure the best practices toward quality patient care that facilitate healing, closure, and reducing mortality and morbidity rates. The key principles for caring for patients with open abdomen, presenting with enterocutaneous fistulas, are based on correcting fluids and electrolytes, nutritional optimization and support, control of abdominal sepsis, wound care management, pain control, and emotional support to critical care nurses and ward nurses.

KEYWORDS

challenges, critical care nurses, electrolytes, enterocutaneous, fistula, intensive care units, nutrition, open abdomen, stoma, wound

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1 | INTRODUCTION

Enterocutaneous fistula (ECF) is a severe and challenging complication occurring after an open abdominal surgery.¹ Statistics from different studies revealed that 85%–95% of causes of ECF occur postoperatively, while mortality rates range between 6% and 33%.^{2–4} ECF is defined as an abnormality in connection between two epithelial surfaces, the gastrointestinal tract and the skin.² The complexity of patients with ECF increases hospital stay, costs, mortality, and morbidity rates. The ECF can involve either the duodenum, jejunum, ileum, colon, stomach, esophagus, or rectum postopen abdominal surgery.⁵ The ECFs are classified according to the anatomical site and the drainage amount of the fistula output in 24 h.^{6–8} The low-output fistula drains less than 200 mL/day, the medium-output fistula drains between 200 and 500 mL/day, and the high-output fistula drains an excess of 500 mL/day. High output fistula poses significant challenges and demands for critical care nurses (CCNs) in the ICU, resulting in leakages of stomach contents, skin excoriation, and difficulty in stoma bags sticking on the skin.^{4,9}

The complexity of ECF complications demands a multi-disciplinary team approach.¹⁰ A triad of complications poses challenges for CCNs, including fluid and electrolyte abnormalities, sepsis, and malnutrition.¹¹ Patients with ECF become dehydrated and present with derangements of electrolytes such as sodium, potassium, and magnesium. These patients require high-dependency units for resuscitation and continuous vigilant monitoring by CCNs.¹² Approximately 15% of patients with ECF require extensive care postoperatively in tertiary hospitals, high care, or intensive care units for wound management.^{13,14} The treatment of ECF should be adopted according to the patient, and a thorough assessment should determine the characteristics of the fistula. Furthermore, the management of ECF aims to facilitate temporary abdominal closure to enhance wound healing.¹⁵

The principles of nonsurgical treatment for ECF patients include correction of fluid and electrolyte repletion, nutritional support, control of fistula drainage, and skin protection.¹⁶ The utilization of the mnemonic SNAP, which stands for sepsis and skincare, nutritional support, definition of intestinal anatomy, and proposing a procedure for fistula management, is prioritized.¹⁷ Antibiotic therapy is only initiated based on the elevation of the inflammation markers.¹⁸ CCNs spend the most prolonged hours around the patient's bedside observing patients with ECF who may show symptoms such as abdominal pain, distension, tenderness, fever, and the discharge of enteric contents from a drain. Nursing care of patients with ECF is time and resource-consuming.^{19,20}

A study conducted in South Africa addressed other challenges for CCNs, such as shortage of staffing and consumables.²¹ Kong, Cao, Yang, and Zhang indicated that CCNs are physically and psychologically drained by the demands of patients with ECF.²² There needs to be more studies on the challenges of CCNs providing care to patients with ECF. These challenges need to be successfully investigated to reduce morbidity and mortality rates and improve the quality of nursing care for patients with ECF. Hence, the study is designed to bridge the gap by describing and exploring the challenges critical care

Key points

- Describes the challenges experienced by critical care nurses in caring for patients with enterocutaneous fistulas.
- The importance of a multidisciplinary approach in caring for patients with enterocutaneous fistulas.
- The fundamental principles of management of patients with ECF are correcting fluid and electrolytes, malnutrition, infection source control, and wound care.

nurses face when caring for patients with ECF in a tertiary public hospital in Gauteng, South Africa.

2 | MATERIALS AND METHOD

2.1 | Aims

This study explores and describes the challenges critical care nurses face in caring for patients with ECF postabdominal surgery in a level 1 public hospital in Gauteng, South Africa.

2.2 | Study design

The study employed a qualitative, exploratory, descriptive, and contextual design to explore the experiences and challenges faced by critical care nurses caring for patients with an open abdomen who developed ECF complications. The standards for reporting qualitative research checklist were used for this research.²³

2.3 | Setting and sampling

The study was conducted in a selected tertiary public hospital situated in Gauteng Province, South Africa, serving referrals of complicated trauma patients from other provinces in the country. The hospital comprises 1005 functional beds with 5 intensive care units admitting a total of 86 patients. The five ICUs include general, medical, trauma, neurological, and cardiac patients. The trauma ICU under study admitting patients with assaults, gunshots, car accidents, bicycle or motorcycle accidents and pedestrian-vehicle accidents for example, referrals from other provincial or private hospitals around South Africa of complicated patients with open abdomen and ECF are admitted in this ICU.

2.4 | Data collection

Semistructured focus group interviews were selected to describe the experiences of caring for patients with ECF. Informed written

consent forms were signed by the participants before conducting the interviews. Each focus group session consisted of six participants that were purposively chosen from the intensive care unit of an academic hospital. The demographic data of the participants included in the focus group interviews are indicated in Table 1. The participants were recruited via the operational managers who were the gatekeepers. A total of four focus group interviews were performed by the researcher. One interview was conducted at night because the participants were working night duty and three interviews were conducted during the day.

Focus group interviews, lasting between 45 and 90 min, were conducted by the researcher. Interviews were guided by unstructured semi questions which were "Can you describe your challenges of providing care for patients with enterocutaneous fistulas?" Anonymity and confidentiality were maintained throughout the study. Open-ended questions with probing, clarifying and summarizing interviewing skills were utilized by the researcher. The

researcher wrote field notes during the interviews. The interviews were audio-recorded and data saturation was reached after the fourth interview.

2.5 | Data analysis

Data analysis was done by transcribing the four audio-taped focus group interviews verbatim. The researcher and independent coder used Tesch's eight coding steps²⁴ to make sense of the information obtained during the interviews. The independent coder experienced in qualitative interviews analyzed the data. The raw data from the transcripts were reread, and their meaning was clarified. Transcripts were repeated to make a list of topics. Clusters were formed and abbreviated into codes. Topics related to one another were grouped, and descriptive words were turned into themes and subthemes. Data was analyzed using thematic analysis, as indicated in Table 2.²⁵

TABLE 1 The demographic characteristics of the participants.

Participant number	Focus group number	Qualifications	Age	Gender	Years of experience
Participant 1	1	RN	28	Male	2 years 2 months
Participant 2	1	ICU trained	46	Female	6 years
Participant 3	1	ICU trained	37	Female	10 years
Participant 4	1	RN	43	Female	12 years 7 months
Participant 5	1	ICU trained	54	Male	14 years 7 months
Participant 6	1	RN	54	Female	14 years 2 months
Participant 7	2	RN	30	Female	4 years
Participant 8	2	RN	47	Female	6 years
Participant 9	2	Trauma trained	50	Male	12 years
Participant 10	2	RN	57	Female	8 years
Participant 11	2	RN	58	Female	6 years
Participant 12	2	RN	35	Female	3 years
Participant 13	2	RN	32	Male	7 years
Participant 14	3	RN	36	Female	5 years
Participant 15	3	ICU trained	41	Female	8 years
Participant 16	3	ICU trained	58	Female	10 years 5 months
Participant 17	3	RN	36	Male	5 years
Participant 18	3	ICU trained	40	Female	2 years
Participant 19	3	Trauma trained	45	Female	8 years
Participant 20	4	RN	38	Female	5 years
Participant 21	4	ICU trained	50	Female	10 years
Participant 22	4	RN	44	Female	7 years
Participant 23	4	RN	40	Female	7 years
Participant 24	4	ICU trained	58	Female	12 years

TABLE 2 Themes, subthemes, and extracts from participants' quotes.

Theme	Subtheme	Extracts from quotes
1. Difficult nursing care	a. Fluid and electrolyte imbalances	Urgent resuscitation with fluids and electrolytes, especially potassium and magnesium replacements
	b. Malnutrition	<ul style="list-style-type: none"> • No bed scales to weigh these patients • Require collaboration with a dietician in calculating patients' calories
	c. Increased analgesic usage	<ul style="list-style-type: none"> • Hard and challenging, especially regarding pain control • Demand more analgesics irrespective of the pain medications being given to them. • Will ask for morphine, which is not prescribed, anytime they feel like even if the medications are not due
	d. Difficult in hiding feelings	<ul style="list-style-type: none"> • The odor when changing stoma bags
	e. Difficulty in handling sepsis	<ul style="list-style-type: none"> • Continuously prone to infection
	f. Wound leakages	<ul style="list-style-type: none"> • Leaking, and patients are forever wet. It becomes difficult to apply the stoma bags.
	g. Increased fistula output	<ul style="list-style-type: none"> • If diarrhea is controlled, it can minimize skin complications
2. Lack of resources	a. Shortage of enterostomal therapy nurses	<ul style="list-style-type: none"> • We have a shortage of stoma sisters in our hospital
	b. Shortage of stoma bags	<ul style="list-style-type: none"> • We end up running out of supplies • Low quality and difficult to stick
	c. Shortage of nasogastric tubes/feeding pumps and feeding administration sets	<ul style="list-style-type: none"> • Lack of resources such as nasogastric tubes, feeding pumps, and feeding administration sets

TABLE 3 Overarching themes and subthemes.

Difficult nursing care	Lack of resources
<ul style="list-style-type: none"> • Fluid and electrolyte imbalances • Malnutrition • Increased analgesic usages • Difficult to hide feelings • Difficulty in handling sepsis • Wound leakages • Increased fistula output 	<ul style="list-style-type: none"> • Shortage of enterostomal therapy nurses • Shortage of stoma bags • Shortage of nasogastric tubes/feeding pumps and feeding administration sets

2.6 | Trustworthiness

Trustworthiness was demonstrated throughout the study by adopting Lincoln and Guba criteria of trustworthiness such as credibility, transferability, dependability, confirmability, and authenticity.²⁴ The researcher adhered to the research process as described. The proposed research was subjected to a rigorous process, during which ethics approval to conduct the study was provided by the Health Sciences Research and Ethics Committee in the University of Johannesburg. Informed consent forms were obtained from the participants before data collection.

3 | RESULTS

This study explored the challenges faced by CCNs in the South African intensive care unit when caring for patients with an open abdomen who developed enterocutaneous fistulas. The findings

highlighted the physical and psychological demands experienced by the critical care nurses caring for ECF. Twenty-four CCNs participated in the focus group interviews, which revealed two overarching themes (difficulty in nursing care, and lack of resources), which were further divided into nine subthemes as illustrated in Table 3.

3.1 | Theme 1: Difficult nursing care

The participants indicated the frustrations and physical demands the CCNs experiences caring for ECF in the intensive care units. Nursing care of these patients is complex, complicated and time consuming due to extreme fluid losses from the fistula outputs. CCNs experience difficulty in nursing care due to fluid and electrolyte imbalances, malnutrition, increased analgesia usage, and difficulty in handling sepsis, wound leakages and increased fistula output. They became physically exhausted in replacing, monitoring, and ensuring the stability of these patients in the ICU.

3.1.1 | Subtheme: Fluids and electrolyte imbalances

The participants verbalized that patients with ECF are at risk of developing dehydration, hypovolemia, haemorrhagic shock, hypokaemia, metabolic acidosis, and fluid depletion. The routine demands of these patients require competencies of trained ICU nurses, continuous vital signs monitoring, strict intake and output, fluid resuscitations, and electrolyte replacement.

The patients require urgent resuscitation with fluids and electrolytes especially potassium and magnesium replacements. These patients should be nursed in an ICU environment by trained professional nurses. The patients need close monitoring of vital signs such as arterial blood pressures and arterial blood gases. The doctors should insert a central line to monitor the central venous pressure.

3.1.2 | Subtheme: Malnutrition

Critical care nurses indicated that the patients with ECF present with malnutrition. Participants complained of a need for more resources such as nasogastric tubes, feeding administration sets, and feeding pumps, which are needed for nutritional optimization and prevention of malnourishment. There needs to be more collaboration with other multidisciplinary teams, such as dieticians, in administering appropriate nutrition. Malnutrition is worsened or not properly monitored due to the lack of ICU beds with weight scales to monitor the improvement of the body weights of bedridden patients. Most patients with ECF do not absorb feeds and frequently vomit or have diarrhea. This can strain the critical care nurses to change linen often and maintain patient hygiene. Patients commenced on enteral feeding, or total parental nutrition, have fluctuating glucose levels, requiring vigilant hourly monitoring and control. Other patients require continuous insulin infusions and trained ICU nurses with technological competencies.

Dietician should participate in nutrition of patient with open abdomen and enterocutaneous fistulas. The dietician is responsible for calculating calories required by the patients to enhance wound healing.

There are no bed scales in the intensive care units to weigh these patients. All intensive care units' beds should have scales to avoid us estimating the patients weight all the time.

3.1.3 | Subtheme: Increased analgesic usages

The participants verbalized their frustrations and found difficulty in hiding their feelings when patients were requesting more analgesics than the doctor's prescriptions. Some of the patients were on

morphine and dormicum infusions but still requiring more sedations. Patients with ECF were given analgesia as prescribed by the doctors but still required more. Patients stated having excruciating pain from the operation site, skin irritations and wound excoriations. Frequent positioning of the patients and turnings made the situation worse and patients demanded increased analgesic support. One participant reiterated:

Nursing patients with open abdomen and fistula is hard and challenging, especially regarding pain control. The patients are always experiencing excruciating pains in the abdomen, on the fistula site where the skin is excoriated by the effluent, and demand more analgesic irrespective of the pain medications being given to them. The patients are always complaining of pain and will ask for morphine, which is not prescribed, anytime they feel like even if the medications are not due. FG4

3.1.4 | Subtheme: Difficult to hide feeling

The participants verbalized that critical care nurses experience difficulty in hiding their feelings when changing wound dressings and emptying stoma bags. The smell from the colostomy bags becomes unbearable and not contained. At times they verbalize their feelings not being aware that they are hurting the patients. The patients feel embarrassed, isolated, and become uncooperative in communicating with the critical care nurses and interacting with other patients. The patients exclude from participating in daily activities. This is evidenced from one participant saying:

We end up frustrated on how to assist patients. The smell from the colostomy bag is unbearable. FG2

We changed the stoma bag, and within ten minutes, the patient was calling that the bag was leaking again. The bed linen is always wet despite patients being changed several times. The patient is complaining of the odor from the leaking stoma. Other patients, doctors, and relatives are complaining and feel that nurses are neglecting the patients. FG3

3.1.5 | Subtheme 2: Difficulty in handling sepsis

Participants stated that the patients with ECF develop intra-abdominal sepsis which prolong ICU and hospital. Sepsis delays wound healing contributing to increased mortality rates. Invasive lines such as the urethral catheters, arterial lines, and central lines are other sources of infections. Patients require expensive antibiotics to treat the infections. This is evidenced by the following quotation from one participant:

Patients are continuously prone to infection if having open abdomen and enterocutaneous fistulas. Other infections are caused by urethral catheters and central line. FG1

Patients stay long in ICU; we isolate them, change invasive lines, wash hands, but they still develop infections. Antibiotics are ordered and administered. They get resistant from antibiotics. FG3

Patients with ECF are often prone to infections, which further prolong their hospital and ICU stay. Their care is costly as they require isolation from other patients to avoid spreading infection. Blood cultures are collected to identify the source of infection, and patients are commenced on antibiotic therapy based on the culture results. Strict infection prevention and control measures should be adhered to, such as hand hygiene and collaboration with the infection control sisters and the microbiologist, which are vital in the care.

3.1.6 | Subtheme: Wound leakages

The worst challenge for the critical care nurses is uncontrollable leakages from the enterocutaneous fistulas leading to skin irritation and excoriation. The leakages lead to difficulties for critical care nurses to apply collecting bags. Most of the fistula contents are fluid-like and contribute to the failure of the stoma bags to stick to the patient's skin. The participants highlighted that the leakages lead to skin irritation and excoriation. The patients' beds are always wet despite the linen being changed and bed bathing done. Patients develop pressure ulcers on the sacral area, around the stoma site, at the back, and on the occipital areas. Patients experience skin pain and become reluctant to turn to the lateral sides. There is a shortage of stoma therapy nurses in training the CCNs on the application of difficult stoma bags. One participant said:

You find that dressings are leaking and therefore patients are forever wet. It becomes difficult to apply the stoma bags. FG4

The doctors or nurses should call the wound stoma specialist to change the dressing.

If dressings are not done properly then they leak. The fluid causes the skin to be eroded. They develop pressure injuries, and their wounds doesn't heal properly.

Participants verbalized the difficulty in nursing care when facing complicated fistula, which requires the knowledge and skills of enterostomal nurses. A shortage of enterostomal nurses in the

hospital causes delays in changing the dressings. Wound leakages continuously corrode the skin, resulting in complications further to pressure injuries and skin excoriations.

3.1.7 | Subtheme: Increased fistula output

The majority of the participants mentioned that the fistula output is uncontrollable despite the medication being administered, such as antidiarrhoea, octreotide, and somatostatin. Patients with increased fistula output make nursing care unbearable. Doctors prescribe high doses of somatostatin, which does not help in reducing the output and the critical care nurses become frustrated while the patients become embarrassed. Participants verbalized that other patients present with diarrhea and uncontained smell.

Control of diarrhoea is very important. If diarrhoea is controlled then it can minimize complications such as skin excoriation, pain and pressure injuries. FG3

We are frustrated especially that medication such as somatostatin are prescribed to reduce fistula output. Irrespective of the medications being given as per prescription, patients with ECF still experience high fistula output.

Participants indicated that the complexity of patients with ECF results in faecal effluent leakages. Patients are having diarrhea, which is difficult to control with prescribed antidiarrhea treatment. Diarrhea contributes to the odor experienced by patients and further excoriates the skin.

3.2 | Theme 3: Lack of resources

The participants complained of lack of resources to care for patients with ECF such as shortage of enterocutaneous therapy nurses, shortage of stoma bags and shortage of nasogastric tubes, feeding pumps, and feeding administration sets.

3.2.1 | Subtheme: Shortage of enterostomal therapy nurses

The participants verbalized shortage of enterostomal nurses to assist in training the staff and assist in connecting the difficult stoma dressings.

In other hospitals whenever we have patients having colostomies, the enterostomal therapy nurses come to show everyone how to change the colostomy and how many days it is supposed to be changed. FG1

We have a shortage of stoma sisters in our hospital. We changed the stoma bags and applied dressings. At times, the fistula is complex and complicated; we should wait a long time for them to show us how to apply the stoma bags in difficult fistulas. While still waiting, patients are wet, uncomfortable, and embarrassed. FG4

A shortage of enterostomal nurses delays quality patient care, and it becomes difficult for them to arrange in-service training for critical care nurses on caring for complicated stomas.

3.2.2 | Subtheme: Lack of stoma bags

The participants raised concerns about shortage of stoma bags and the suction machines that have malfunctional pressure gauges to connect on the abdominal wound dressings. These can result in sucking more blood from the abdominal wounds or sucking less fluids leading to accumulation and leakages.

We don't have equipment to change the dressings. The stoma bags are always leaking and are being changed frequently. We end up running out of supplies. FG1

The supplies of abdominal dressings, stoma bags, and creams to apply on the excoriated site are depleted due to frequent usage. At times, the hospital is supplying stoma bags, which are of low quality and difficult to stick, and this further causes frustrations for the CCNs caring for the patients with ECF.

3.2.3 | Shortage of nasogastric tubes/feeding pumps and feeding administration sets

Participants complained that the shortage of nasogastric tubes, feeding pumps, and feeding administration sets is a barrier to administering feeds as per prescription. This affects the collaboration of the professional nurses with other multidisciplinary teams such as dietitians and surgeons as feeds are not given as per ICU protocols. Patients end up malnourished, which affects wound healing and contributes to increased mortality rates.

Sometimes, we lack resources such as nasogastric tubes, feeding pumps, and feeding administration sets. Feeding the patients with ECF becomes a struggle, and patients end up not getting the required calories as prescribed by the dietitians. FG3

Patients with ECF often require enteral nutrition via the nasogastric tube. The feeds should be connected to the feeding pumps via administration sets for proper, accurate monitoring of calorie intake per day. The participants struggle to insert NG Tubes

due to shortage of NG Tubes. Shortage of the prescribed enteral feeds can result in professional nurses only administering the feeds that are available in the hospital irrespective of what the patients require according to the dietician.

4 | DISCUSSIONS

There were few studies on the nursing challenges of caring for patients with enterocutaneous fistula postopen abdominal surgery. Our study aimed to bridge this gap by addressing the findings from the focus group interviews that illuminated challenges experienced by CCNs caring for patients with ECF in South African intensive care units. Four focus group interviews were conducted, and data was analyzed using qualitative thematic analysis. This present study indicated the importance of the multidisciplinary approach and explored overarching themes such as difficulty in nursing care and lack of resources.

The participants verbalized their frustrations with difficulty in nursing care. The participants struggled with derangements of fluids and electrolyte balances, malnutrition, requiring increased analgesic usages, difficulty hiding feelings when changing the stoma bags, difficulty in handling sepsis, wound leakages, skin excoriations, increased fistula output, and difficulty in containing the fistula effluent. The study conducted by Härle et al.¹⁰ demonstrated similar results that the demands of ECF patients are time-consuming and can cause physical and emotional exhaustion. The condition's complexity and complications require multidisciplinary teamwork. The principles for managing complications focus on ensuring the excellent hydration status of the patient utilizing intravenous fluid.²⁶ Alegbeye et al.²⁷ and Noori²⁸ supported this statement by stating that fluid resuscitation and hemodynamic monitoring are critical in the first 24–48 h of developing ECF. The depletion of fluid can reach 3000 mL/day, and other patients not responding to fluid management might require inotropic support.²⁹ Hence, patients with ECF need continuous monitoring of vital signs, pallor, dehydration, and nutritional status in the intensive care unit—arterial blood gases to correct metabolic acidosis, hyponatremia, and hyperkalemia.³⁰

Participants revealed malnutrition as a challenge that was caused by several factors, such as a lack of nasogastric tubes, feeding administration sets, feeding pumps, and weight scales for bedridden patients in a public hospital. Other factors included the failure of ECF patients to absorb feeds due to diarrhea and vomiting. Nathania and colleagues highlighted the importance of early enteral feed initiation in patients with ECF. The participation of the dietician in assessing malnutrition and advocating for appropriate nutrition is essential in preventing malnutrition. A dietician is highly recommended to suggest appropriate treatment based on the patient's nutritional needs.³¹ Studies conducted by Gefen et al.³² and Ishaq et al.³³ demonstrated that the commencement of feeds prioritizes enteral feeding over total parental nutrition. Other methods of enteral feeding that can be regarded as in managing fistulas include fistuloclysis and relay perfusion (refeeding). Patients with ECF require 25–32 kcal/kg/day, a calorie-to-nitrogen ratio ranging from 150 to

200:1, and a protein intake of 1.5 g/kg/day.³⁴ Total parental nutrition should not be mandatory; enteral feeds should be prioritized.

The participants demonstrated that patients with ECF required more analgesic support than what is recommended in the doctor's prescriptions. This is in line with previous studies by White et al.³⁵ and Grainger et al.³⁶ who highlighted that fistula effluent leakages are corrosive and excoriate the skin. Patients suffer from skin complications, pain, and discomfort. Patients with ECF become dependent on large doses of opioids and nonopioid analgesics. Parli et al.³⁷ and Härle et al.³⁸ both argued that opioid usage decreases gastric motility while somatostatin reduces gastric hormones.^{37,38} Critical care nurses should provide emotional support by assisting the patients, ensuring comfort, and guiding them through their disease process.³⁹

The CCNs stated the frustrations in patients with ECF frequently developing infections. Participants verbalized patients experiencing wound leakages, which further excoriate the skin. Sepsis is the leading cause of mortality in patients with postoperative enterocutaneous fistula.^{6,40} Fistula-associated abdominal sepsis accounts for more than 70% of mortality rates and needs prompt treatment with antibiotics.^{6,41} Other sources of sepsis are central venous catheters, intra-abdominal collections, and urethral catheters.¹⁸ Recommended antibiotic therapy should be limited to not more than 2 weeks and target the specific culture.²⁸

Participants emphasized that increased fistula output results in fistula leakages contributing to skin irritation and excoriation, and these challenges cause CCNs to find it difficult to hide their negative feelings when providing care to patients with stomas.^{16,42} At times, professionalism is not maintained by critical care nurses. The dressings do not stick; gastrointestinal juice leakages result in a bad odor, and critical care nurses found difficulty in hiding or expressing feelings.^{21,35} The enteric contents become problematic when more fluid than solid comes from the enterocutaneous fistula. Applying the stoma bag over the fistula becomes difficult.⁹ The leakages of intestinal juice from the digestive tract to the skin result in excoriation, and 30% of patients with ECF develop pressure injuries. Infrequent repositioning due to many stomas or drainage tubes contributes to pressure injuries.⁴³ The study by Himmer and colleagues emphasized that ostomy transparent pouches are advisable for high fistula output, while zinc oxide creams are utilized for low output fistula.⁴

Critical care nurses felt frustrated by leaking stomas that were not sticking. The factors contributing to leaking stomas include lack of utilization of the correct type of products, shortage of the number of products, the retracted stoma, type of stoma, incorrect product usage, poorly performed surgery, and poorly located stomas.⁴⁴ The main source of chemical skin irritation in leaking stomas is faecal effluent. The small bowel secretions contain enzymes that erode the skin, such as trypsin, lipase, and peptidase. The epidermis of patients with ECF are exposed to fluid, digestive enzymes, and pH extremes, which results in maceration, denudation, erythema, and erosion.^{35,42} Participants indicated that patients with ECF present with continuous diarrhea that is difficult to control by utilizing anti-diarrhea treatments. Several studies highlighted that fistula output remains increased despite administering loperamide, an anti-diarrhoeic. The

studies conducted by Shover and Todorow³⁰ and Ballard et al.⁴⁵ confirmed that octreotide and lanreotide inhibit the effect of gastrointestinal juices and lessen fistula output.^{30,35,39}

The participants indicated challenges experienced from lack of resources, such as a shortage of stoma bags. This challenge of shortage of good quality stoma appliances and shortage of stoma care staff was confirmed in a study by Down et al.⁴⁶ The study by Erbe¹⁴ indicated increased utilization of supplies such as stoma bags because of fistula being difficult to pouch.¹¹ Other barriers in nursing care of patients with ECF were finding the missing tools, such as the suction devices to connect to the dressing or getting hold of the hospital's enterostomal therapy nurses. An integrative approach between critical care nurses and ostomy nurses is recommended as appropriate.²¹ The participant indicated challenges with regulating pressure on the suction apparatus used for negative pressure wound dressings. The negative pressure wound dressings are recommended for managing patients with enterocutaneous fistula. Vacuum-assisted closure (VAC) dressings should be used cautiously as this can contribute to bowel injury and lead to fistula formation. A layer of material between the bowel and the sponge of the device should be placed to avoid complications.⁴⁷ The study was conducted in only one public hospital, and the sample size of critical care nurses was too small to promote the findings' generalizability. The study only focused on critical care nurses' experiences and not on the experiences of other multidisciplinary teams, such as doctors, physiotherapists, radiographers, and social workers.

5 | CONCLUSIONS

This study's findings and literature integration emphasized the challenges CCNs face in caring for patients developing ECF. The aim of this study was achieved, and the challenges regarding the CCNs caring for patients with ECF post open abdominal surgery were explored. Data was extracted from the participants using focus group interviews. Four focus group interviews were conducted, each composed of six members. Data was analyzed using thematic analysis, and two themes emerged: difficulties in nursing care and lack of resources were revealed. The participants verbalized that the complications that require intensive care treatments are fluids, electrolyte imbalances, malnutrition, and infections. The specific nursing interventions for the CCNs should be ensuring rehydration of the patients, electrolyte replacements, nutritional optimization, skin integrity, wound management, and preventing and controlling sepsis. Furthermore, the article encourages teamwork and collaboration with the multidisciplinary team, such as the dietician, enterostomal nurses, and surgeons. The goal of management is the facilitation of fistula closure postoperatively.

6 | RELEVANCE TO CLINICAL PRACTICE

The findings of this study revealed the challenges of complications for patients with open abdomen, such as enterocutaneous fistulas. The findings can be utilized to develop standardized operating

procedures in clinical practice. The findings of this study can be integrated into the nursing curriculum to equip nursing graduates with the knowledge and skills to manage patients with enterocutaneous fistula. A multidisciplinary approach composed of critical care nurses, surgeons, social workers, physiotherapists, dieticians, radiographers, and enterostomal therapy nurses is beneficial to improving quality care and facilitating healing. The findings indicate the significance of collaborating with enterostomal therapy nurses to assist when complicated enterocutaneous fistulas or stomas continuously leak. Conservative management of enterocutaneous fistulas should be encouraged for 4–6 weeks before patients can be surgically operated.

AUTHOR CONTRIBUTIONS

Mpho G. Chipu: Conceptualization; methodology; formal analysis; investigation; resources; data curation; writing the original draft preparation. **Mantji J. Modula:** Conceptualization; methodology; formal analysis; investigation; resources; data curation; writing the original draft preparation. **Irene Kearns:** Supervised; edited and reviewed the manuscript.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

Research data can be shared on request.

ETHICS STATEMENT

Ethical clearance was approved by the Academics Ethics Committee AEC01-91-2014 Higher Degrees Committee HDC-01-77-2014 from the University of Johannesburg. Permission to conduct the research was obtained from the Gauteng Department of Health. The proposed research was subjected to a rigorous process, during which ethics approval to conduct the study was provided by the Health Sciences Research and Ethics Committee at the University of Johannesburg. The researcher provided the participants with written and verbal information about the study. The participants were informed that participation in this study is voluntary and that they have rights to withdraw from the study. Anonymity and confidentiality were maintained throughout the study. Informed written consent forms were obtained from the participants before conducting focus group interviews.

TRANSPARENCY STATEMENT

The lead author M. G Chipu affirms that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any

discrepancies from the study as planned (and, if relevant, registered) have been explained.

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