WOC Complex Plan of Care

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Pertinent Medical/Nursing History	Pertinent lab/diagnostic test results
JD is a 55 year-old male with history of Type 2 DM, HTN, HLD, OSA, CKD with AKI leading to ESRD and need for hemodialysis. He was originally admitted to an outside community hospital for respiratory failure and AKI. He was discharged from there to an LTAC facility where he was noted to have a Stage 4 sacral pressure injury. Pressure injury was being managed by an outpt wound clinic with dressing changes between visits being performed by LTAC staff. Wound care included Santyl with NS moist dressing and several debridements. JD became hemodynamically unstable and was admitted to a level 1 trauma center. He was noted to be septic with wound cultures positive for Pseudomonas and Enterococcus Fecalis. Placed on IV Zosyn, Linezolid and Daptomycin. Pt went into septic shock and was placed on a Levophed gtt and intubated. Pt noted to have bloody stools. Sigmoidoscopy performed. Noted to have large rectal ulcers with moderate bleeding draining into the pelvis with additional enterocutaneous fistulas communicating with the Stage 4 sacral pressure injury. Patient transfused over next 10 days receiving a total of 4 u PRBC. Loop Sigmoid Colostomy performed. WOC nursing consulted for ostomy and wound care. Pt noted to be intubated. Arouses to voice and follows commands. Agreeable to visit, ostomy and wound care. Abdomen noted to be rotund/obese, soft and tender to palpation. Loop colostomy in LLQ. Appliance system removed. No rod in place. Documentation indicates removed per protocol on POD #2. Stoma noted to be completely retracted below skin level with circumferential mucocutaneous junction separation. Stoma is not visible in opening. Depth measures 7 cm with fat exposed. Peristomal plane is flat. Denuded at 7 o'clock with superficial, weepy breakdown. Colorectal surgeon aware of clinical findings. Peristomal plane cleansed with soap and water. Patted dry. Ostomy opening measures 2 inches by 1 ¾ inches. Peristomal irritation crusted utilizing stomahesive powder followed by skin barrier wipe. Three layers applied. Paste applied around opening. Coloplast Sensura Mio Flex Convex Light skin barrier wafer applied. High volume	February 14, 2020 WBC 14.52 HGB 7.9 HCT 23.3 Platelets 143 Neutrophils 78% Bands 0 Sodium 142 Potassium 4.6 Chloride 99 CO2 26 Protein 5.3 Albumin 2.2 Calcium 7.9 Alkaline Phosphatase 158 Glucose 173 BUN 23 Creatinine 0.94 Lactate 1.2 PT/PTT not drawn Prealbumin not drawn HgbA1C not obtained Wound Culture: Pseudomonas and Enterococcus Fecalis sensitive to Vancomycin & Meropenem

output pouch attached to barrier. Oozed liquid stool on turning to side. Stage 4 pressure injury noted to sacral/buttock area. Dakin's solution 0.125% moistened gauze dressing removed. Noted to have moderate amount of serosanguinous drainage on dressing. Site cleansed with NS. Wound measures 15 cm x 21.5 cm x 8 cm. Wound edges noted to be macerated, white in color. Wound bed with 80% slough, 10 % exposed bone and 10 % exposed muscle. Zinc oxide moisture barrier applied to periwound. Wound lightly packed with 0.125% Dakin's moistened gauze. Covered with foam. Perianal area cleansed using soft cloth. Noted to have red rash with satellite lesions and superficial open area. Antifungal zinc barrier applied. Indwelling foley catheter to gravity drainage with amber colored urine in moderate amount noted in drainage bag. No sediment. BLE with pitting edema up to the knees. RLE measures 39 cm at calf with reference point of 12 cm, 22 cm at ankle with reference point 2 cm and 19 cm at dorsum of foot. LLE measures 41cm at calf, 13 cm at ankle and 20 cm at dorsum of foot with same reference points. Mepilex foam dressing noted to BLE heels. Dressings removed. Unstageable pressure injury noted to right lateral heel measuring 3 cm x 4 cm x 0.1 cm. Eschar moist and detached at edges. Mild peri-wound erythema without induration. Site cleansed with NS. Foam dressing reapplied. No evidence of breakdown noted to left heel. Heels elevated off bed. Pt tolerated visit and care provided. No evidence of discomfort; grimacing, pulling away. Current Medications: Potassium 40 meq per feeding tube q 2 hr and prn Magnesiuim Sulfate 4-6 g IV prn Sodium phosphate 45 mmol IV prn Dextrose 50% 12.5-25 g IV prn Vancomycin 2 gm IV q 24 hr Meropenem 500 mg IV BID Sodium Thiosulfate 25 g IV q 24 hr Pantoprozole 40 mg per feeding tube q 24 hours Chlorhexidine Rinse 15 ml orally with suction q 6 hrs IV GTTS: Heparin 10,000/250 ml @ 0.5 ml/hr TPN 62.5 ml/hr Fat Emulsion 20 ml/hr	Blood Culture: Negative CT Abdomen Pelvis: Moderate subcutaneous emphysema in right gluteal fold. Enterocutaneous fistula from Rectum to Stage 4 sacral pressure ulcer. Severe rectal wall thickening. Suspicion for osteomyelitis of sacrum. No evidence of drainable fluid. Stool Culture: C Diff Positive

Insulin (regular) gtt. 0.5-30 u/hr Fentanyl 50 mcg/hr Propofol 25 mcg/kg/min Levophed 12 mcg/min CVVHD Intake: 3263.3 Output: 918 Ostomy and Wound Recommendations: Loop Colostomy: Coloplast Sensura Mio Flex Convex Light skin barrier wafer with high volume output pouch. Pressure Injury to coccyx/sacral area: 0.125% Dakin's Solution moistened gauze Pressure injury to right heel: foam dressing Perianal care: antifungal zinc barrier WOC service will continue to follow at intervals.	

WOC Complex Plan of Care

Assessment	Plan/Interventions/Alternatives	Evaluation	Rationale
Altered wound healing related to stage 4 pressure injury to sacrum with enterocutaneous fistula and possible osteomyelitis. Skin breakdown to right heel with bilateral lower extremity edema related to limited mobility and altered sensory perception due to sedation -Pertinent History/Test Results: -Health history of DM 2, HTN, OSA, CKD -History of Santyl use and multiple debridements to sacral PI. -Enterocutaneous fistula from rectum to pressure sacral injury on CT -Possible osteomyelitis of sacrum on CT -Wound infection of Pseudomonas and Enterococcus Faecalis on wound culture, blood cultures negative. -Assessment: -Macerated, white wound edges related to wound drainage -Reddened perianal rash with satellite lesions -Stage 4 sacral wound 15 x 21.5 x 8cm with moderate	1. Wound care: Sacral PI a. Daily dressing change with 0.125% Dakins Solution moistened gauze for autolytic debridement b. Cleanse wound with saline or wound cleanser c. Place fluffed moistened gauze to lightly pack wound d. Cover with foam dressing e. Cleanse, dry, and apply zinc oxide barrier to irritated perianal area as needed for any soiling f. WOC RN to evaluate wound healing weekly Alternative: Medline Therahoney wound dressing sheet as contact layer, moistened, fluffed gauze as filler dressing, Optifoam bordered foam dressing for bacterial barrier. Change every other day and as needed for drainage. Periwound skin: spray with Cavilon no-sting skin protectant. 2. Continue antibiotic therapy per MD orders a. Assess wound for	1. a. Decrease in slough by 50% in 1 week and growth of granulation tissue b. Wound edges clean without maceration 2. a. Wound remains clean without purulent drainage, odor, or induration	1. a. Dakin solution is used on infected and necrotic wounds to cleanse and promote debridement by loosening slough and eschar without affecting fibroblasts (Ramundo, J., 2022 p. 179). c. Zinc oxide acts as a moisture barrier to moist, denuded skin that but is difficult to remove with cleansing and can increase friction injury (Thayer & Nix, 2022 p. 372). Alternative dressing: Manuka honey dressings have antimicrobial effects on organisms such as Pseudomonas, and the acidity of the dressing inhibits bacterial growth. It also provides a moist wound bed, and promotes autolytic debridement (Weir & Schultz, 2022 p. 205). Skin protectant spray provides protection from moisture and the no sting formula does not contain alcohol. 2. Further erythema, induration, purulent and malodorous drainage along with fever, and chills are

serosanguineous drainage. -Wound with 80% slough, 10% exposed bone, 10% exposed muscle. Braden Scale: 55 year-old male, intubated, sedated. Sensory Perception: 2 Very Limited Moisture: 2 Very Moist Activity: 1 Bedfast Mobility: 1 Completely Immobile Nutrition: 2 Probably Inadequate Friction & Shear: 1 Problem Score: 9 -Right heel unstageable wound with moist eschar 3 x 4 x 0.1cm, mild periwound erythema -BLE pitting edema LLE: calf 41cm, ankle 13cm, dorsum of foot 20cm RLE: calf 39cm, ankle 22cm, dorsum of foot 19cm -Other Factors/Medications: -High dose Levophed drip for low blood pressure management -TPN with fat emulsion -Insulin infusion for blood glucose control, no HbA1c drawn -No prealbumin drawn -Electrolyte WNL with replacement PRN -No grimacing or nonverbal pain indicators assessed with dressing change	erythema, induration, purulent drainage, odor b. Monitor patient for fever, chills, monitor WBC and vital signs. Report to MD if fever over 100.5F c. Consult infectious disease if wound does not show signs of healing within 2 weeks d. Possible MRI to further evaluate osteomyelitis/fistula 3. Right heel care: a. Change Mepilex foam dressing every 3 days and as needed for any drainage b. Gently cleanse with normal saline with dressing change c. Notify MD or WOC RN with any induration, odor, or purulent drainage. Alternative: Consider surgical consult for crosshatching eschar and apply Santyl collagenase daily at 2mm	b.Patient free from fevers, WBC WNL c. Patient receiving optimal treatment for infection. 3. No further breakdown noted on right heel, wound free from infection. No breakdown noted on left heel.	signs of spreading infection and should be closely monitored. If infection spreads further and appropriate therapy is not quickly initiated, severe sepsis, shock, and even death can occur (Ramundo, 2022 p. 195). Literature is limited on osteomyelitis in stage 4 sacral injuries, and only bone biopsies may be accurate in diagnosing osteomyelitis. MRI may not be able to differentiate between osteomyelitis and bone remodeling or fibrosis, but it may be helpful in determining the depth of soft tissue involvement (Wong, et al., 2019). A consult to infectious disease may further help with antibiotic selection if current treatment is not sufficient and wound healing remains stagnant or patient develops a fever. 3-4. Protecting and offloading pressure points such as the heels reduces occlusion of blood and lymph vessels related to pressure that can lead to tissue ischemia and edema (Edsberg, 2022 p. 379). Foam dressings are more often being used for the prevention of pressure injury in patients with fragile skin or points that are at risk for PI or friction/shear injuries (Jaszarowski & Murphree, 2022 p. 164). Alternative: Collagenase applied daily promotes debridement of necrotic tissue by

	thickness, cover with saline moistened gauze and wrap with kerlex rolled gauze. 4. Float heels off bed using pillows or consider use of heel protector pillows. Ensure heels are offloaded every 2 hours and assess heels once per shift for any breakdown on left heel or further deterioration of right heel. 5. Elevate BLE above level of heart. Use Venodyne dynamic intermittent compression therapy to bilateral calves while immobile. 6. Turn patient side to side every 2 hours in bed to offload trochanters, coccyx, and sacrum. Allow 5-10 minutes for vitals to stabilize after repositioning. 7. Utilize bed lift to reduce friction and shear injury when repositioning patient 8. Consider low air loss mattress with alternating pressure overlay	4. Documentation shows heels offloaded and assessed once per shift for breakdown. 5. Reduced swelling noted to BLE when measured 1 week later. 6-8. No further breakdown to sacrum, coccyx, or buttocks. Documentation states patient tolerating turning side to side every 2 hours and use of bed lift for repositioning. Patient currently on low air loss mattress with alternating pressure relief.	dissolving the collagen anchors that adhere necrotic tissue to the wound bed over several days or weeks. Manufacturer recommendations are covering collagenase with saline moistened gauze or moisture retentive dressing (Ramundo, 2022 p. 177). 5. Elevation of lower extremities above the level of the heart promotes venous return to the heart and helps reduce edema. In immobile patients, intermittent dynamic compression therapy, the sleeves alternately inflate to promote venous return without interfering with arterial blood flow. (Kelechi, et al., 2022 p. 465). 6-8. A 30-degree side lying tilt is recommended to protect both the trochanter and sacrum/coccyx. In hemodynamically unstable patients, repositioning is still recommended, and waiting 5-10 minutes after repositioning for HR and BP to stabilize is used to determine tolerance. The use of a bed lift reduces friction with repositioning patient by lifting the patient rather than dragging them against the mattress and reduces shearing of tissue layers (Borchert, 2022 p. 411). Low air loss mattresses control heat and humidity to promote a healthy microclimate of the skin and are reported as effective treatments for patients with pressure

			injuries. Alternating pressure overlays can be cyclically inflated and deflating at intervals to redistribute pressure. (Mackey & Watts, 2022 p. 434).
	9. Nutrition consult to monitor TPN and possibility of enteral feedings a. Consider monitoring triglyceride levels weekly while on propofol b. Closely monitor glucose levels and titrate insulin drip per orders c. Monitor and replace electrolytes per order	9. Patient receiving optimal nutrition for protein and calorie needs. Triglyceride levels WNL while patient is on propofol. Tight glucose control maintained with insulin drip. Electrolytes are replaced per order to maintain levels WNL.	9. Patients needs adequate levels of calories (30-35 kcal/kg per day), protein (1.25-1.5 g/kg per day), carbohydrates, fats, and electrolytes to promote wound healing. Prealbumin levels can be affected by states of inflammation such as infection, causing increased capillary permeability and lowering serum levels and may not be helpful in determining nutrition status in this patient (Friedrich, et al., 2022 p. 120). Patients receiving propofol are at risk for hypertriglyceridemia (levels above 400 mg/dL) and can lead to pancreatitis (Corrado, et al., 2020). This patient is also receiving lipids along with TPN. Normal glucose levels range between 90-130 mg/dL, and poorly managed glucose levels can impede wound healing (Friedrich, et al., 2022 p. 131).
	10. Monitor patient for pain using nonverbal cues such as grimacing or flinching, medicate for dressing changes as needed. Patient currently on fentanyl drip for pain and sedation.	10. Patient is free from pain during dressing changes, ostomy appliance changes, and with turning and repositioning.	10. Patient is intubated and sedated and may not be able to effectively communicate pain, surrogate pain indicators such as grimacing or flinching can help the clinician assess pain if the patient cannot answer questions.
Fluid balance alteration related to blood loss requiring blood transfusions	1. Closely monitor fluid intake and output, measure urine	1. Fluid balance maintained based on intake and output assessments.	1. Adequate fluid intake is important to prevent dehydration. This

and renal failure requiring CVVHD -Foley catheter with moderate amounts of amber urine without sediment -No perineal skin breakdown noted on assessment -Low H/H requiring multiple blood transfusions and on Heparin drip	every hour. Notify MD if urine output <30cc/hr.	Patient producing adequate amounts of urine, >30cc/hr.	patient may be difficult to assess fluid status as they developed renal failure requiring CVVHD but is continuing to make urine. This patient is showing positive fluid balance on CVVHD intake and output. Fluid removal however may cause other hemodynamic issues when the rate of removal is too high. Cardiac arrhythmias and hypotension may occur if too much fluid is taken off too quickly, so a slow rate is recommended (Murugan, et al. 2020). Normal urine output can show improvement of kidney function while CVVHD continues to remove excess fluid.
	2. H/H 7.9/23.3, monitor for increased bloody drainage in wound or in stool especially while on Heparin and notify MD immediately. a. Consider monitoring PTT while on Heparin drip.	2. H/H remains stable, no further bleeding noted. PTT levels within therapeutic range for facility Heparin protocol.	2. Heparin increases risk of bleeding and PTT is a measurement of clotting time of the blood in seconds. This is time becomes prolonged with continuous infusions of heparin, so wounds, mucous membranes, and stool should be assessed for bleeding (StatPearls, 2022). Low H/H levels reduce oxygen carrying capacity of the blood, so transfusions may be necessary to promote perfusion to tissues (Cleveland Clinic, 2022).
	3. Monitor foley catheter for leakage, and perineal skin for irritation or breakdown. a. Cleanse and dry perineal skin every shift and for any soiling.	3. Perineal skin clean, dry, and intact without irritation or breakdown. Foley catheter continues to drain clear urine without odor, sediment, or cloudiness. Daily documentation of catheter need	3. Leakage of urine can cause skin irritation and incontinence-associated dermatitis to perineal skin. Blockages may occur with sediment buildup and the catheter may need to be replaced so that

	b. Assess for catheter need daily, remove as soon as able to reduce risk of CAUTI per order or protocol. Alternative: Male condom catheter if anatomy allows or retracted penis pouch to collect and measure urine. Monitor urine output and for retention, bladder scan if no urine output within 6 hours after catheter removal and as needed. Follow catheter removal protocol or notify MD of urine retention.	noted in chart.	urine is not retained in the bladder causing infection. The catheter tubing should also not have any dependent loops, the bag should be below the level of the bladder, the catheter should be secured to prevent trauma, and a closed system must be maintained to prevent CAUTI. The CDC outlines appropriate uses for indwelling catheters such as acute retention or accurate measurements of critically ill patients (to name a few). Prompt removal of an indwelling catheter when no longer indicated is important to reduce CAUTI. Many hospitals have protocols for catheter removal, and 6 hours seems to be the standard to assess for post removal retention (Newman, 2022 p. 417). Alternative: Male condom catheters or retracted penis pouches are noninvasive measures to accurately measure urine output, reducing CAUTI occurrence while protecting skin. If the patient does not void within 6 hours, bladder scan to determine urine retention (Kent & Holderbaum, 2022 p. 341).
Alteration in bowel elimination related to new loop sigmoid colostomy with stoma retraction and mucocutaneous separation and peristomal skin irritation -Complete mucocutaneous separation after stoma rod	1. Assess stoma site for any necrotic tissue with appliance changes and notify MD 2. Continue crusting with stoma powder to fill separation (see next step). Alternative dressing: Medline Maxsorb	1. Mucocutaneous separation has not deteriorated, wound remains clean. No necrotic tissue noted with assessment on appliance changes.	1. Mucocutaneous separation may result from tension, infection, or poor wound healing, poorly controlled diabetes, and malnutrition. Treatment consists of wound care, and recommendations include use of stoma powder to fill the wound if it

removed POD 2. -7cm depth with fat exposed -Peristomal skin denuded at 7 o clock -Abdomen soft/obese with flat peristomal plane, tender to palpation -Stoma opening 2 x 1.75in -Stoma not visible for assessment -Stool positive for Cdiff -liquid stool from colostomy	alginate dressing to fill separation and cover with Hollister Adapt Ceraring around stoma site to protect from stool output.		is shallow or use an alginate for full thickness with a hydrocolloid to protect from output. Mucocutaneous separation is mostly medically managed. Stoma retraction can occur secondary to ischemia and difficulty mobilizing the bowel to the skin. It was found that stoma rods did not reduce the risk of stoma retraction. Local repair of the retraction or revision surgery can fix the retraction to provide adequate bowel length and blood supply (Tsujinaka et al., 2019).
-Feeding tube in place -No enteral feedings noted	3. Appliance change: every 3 days and as needed for leakage a. Remove pouching system using push/pull method b. Gently cleanse and dry area with warm water and soft cloth. c. Crust denuded and irritated skin with stoma powder followed by skin prep wipe for 3 layers. d. Use stoma paste around opening to protect surrounding skin and enhance seal of pouching system e. Cut barrier wafer opening to fit around stoma opening. f. Place Coloplast Mio Convex Light barrier and high-volume output pouch. g. WOC RN will change	3.Pouching system lasts 3 days without leakage. Peristomal skin dry without irritation on removal. Documentation of crusting method to mucocutaneous separation noted in chart with pouching changes. Barrier wafer cut to appropriate size upon assessment.	3. The push/ pull method to remove the barrier wafer reduces trauma to the peristomal skin. Crusting using skin barrier powder and liquid skin barrier treats and seals denuded skin and creates a dry surface for the pouching system to better adhere and reduce leakage. Stoma paste is used like caulking to prevent undermining of the pouching seal, which would be beneficial for this patient as the stoma is retracted and the skin is at greater risk of contact with effluent. Convex pouching systems can help with stoma protrusion to decrease risk of pouch leakage. High output pouches are longer and are able to hold more volume than standard pouches if the ostomy has increased output (Colwell & Hudson, 2022).

	pouching system weekly h. Notify WOC RN if pouching system does not last more than 1 day or for increased leakage Alternative pouching system: Hollister New Image flextend cut to fit barrier wafer with high output pouch (Use with alginate dressing and Adapt Ceraring for mucocutaneous separation).		Alternative pouching system: The Hollister Flextend barrier wafer is an extended wear barrier to increase wear time. The Ceraring that is placed before the pouching system to protect the mucocutaneous separation wound contains ceramides which protect the skin's natural moisture barrier.
	4. Monitor stool output, notify surgeon if output greater than 1000cc/day. a. Continue treatment per order for CDiff infection. b. Avoid hypertonic fluids c. Consult surgeon and dietician if initiation of enteral feedings is appropriate	4.Stool output decreased and more formed. Enteral feedings initiated with good tolerance.	4. This patient has a new loop colostomy but appears to have high output liquid stool postoperatively, especially since this patient has a Cdiff infection, which causes diarrhea. Fluid and electrolytes are being closely monitored. Hypertonic fluids pull fluid out of the cell and excretes it, causing increased fluid loss (Carmel & Scardillo, 2022 p. 207). Since this patient has an intact small intestine, and the enterocutaneous fistula is within the rectum with output maintained with daily dressings, enteral feedings to supplement TPN may be appropriate. Enteral nutrition improves intestine barrier function, improves immunity, and reduces infection, and is believed to maintain better gastrointestinal function as opposed to bowel rest and TPN. Both EN and TPN may be used in conjunction to promote better protein and calorie intake to better promote wound healing

			(Tang, et al., 2020).

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