**Supplementary data B: Refinement of guideline after Round 2**

|  |  |  |  |
| --- | --- | --- | --- |
| **Refined nursing guideline statement** | **Comments from experts** | | **Refined nursing guideline statement** |
| **Nursing guideline statement 1: Assessing for intra-abdominal hypertension/abdominal compartment syndrome** | | | |
| **Measure intra-abdominal pressures when any known risk factors for intra-abdominal hypertension/abdominal compartment syndrome is present in a critically ill or injured patient, using invasive or non-invasive methods (depending on availability). Note: It is important to recognize that the patient with an “open” abdomen and temporary abdominal closure dressing are still at risk for developing intra-abdominal hypertension/abdominal compartment syndrome and provide ongoing assessment for the organ system manifestations of intra-abdominal hypertension/abdominal compartment syndrome.** | * Possible Risks to identify IACS should be shared with staff at handover, especially Agency staff. * Measurement is IAP will prevent multi organ failure due to sepsis. * I fully agree with the statement including the open abdomen risk. The last part of the sentence on the open abdomen however is not clear and concise enough in my opinion. * Intra-abdominal compartment syndrome is a preventable cause of organ ischaemia. Early detection can lead to favourable clinical outcomes. * Proper abdominal assessment to confirm any change caused by internal bleeding. * Training should be given the emphasis | | Measure intra-abdominal pressures when any known risk factors for intra-abdominal hypertension/abdominal compartment syndrome is present in a critically ill or injured patient, using invasive or non-invasive methods (depending on availability). Note: It is important to recognize that the patient with an “open” abdomen and temporary abdominal closure dressing are still at risk for developing intra-abdominal hypertension/abdominal compartment syndrome.  Provide ongoing assessment for the organ system manifestations of intra-abdominal hypertension/abdominal compartment syndrome. |
| **Accompanying nursing interventions** | | | |
| **Refined nursing intervention** | **Comments from panel of experts** | | **Refined nursing intervention** |
| **1.1 Nursing interventions on assessing for intra-abdominal hypertension/abdominal compartment syndrome.** | | | |
| **1.1a) Initiate intra-abdominal pressure measurements in a patient with suspected intra-abdominal hypertension or abdominal compartment syndrome.** | * Early identification and treatment can reduce the mortality rate. * Accurate measurements are important to ensure appropriate interventions. | | 1.1a) No refinement required |
| **1.1b) Implement, monitor, and record intra-abdominal pressures, 4 to 8 hourly.** | * 1.1b - more frequent monitoring should be considered based on the patient's response to treatment. | | 1.1b) Implement, monitor, and record intra-abdominal pressures, 4 to 8 hourly. Monitor more frequently if IAH identified. |
| **1.1c) Calculate and record abdominal perfusion pressure (APP): APP = MAP-IAP, using invasive or non-invasive methods, depending on device availability.** | * It might be laborious for nursing to calculate the APP. As long as the IAP is recorded, it should be relatively simple for managing doctors to calculate and assess this parameter. | | 1.1c) No refinement required |
| **1.2 Nursing interventions to decrease intra-abdominal pressure (IAP).** | | | |
| **1.2 b) Use evidence-based methods to identify tube location. Latest evidence suggests taking an abdominal x-ray to identify the tube location. Examine the visual appearance of tube aspirate and tube auscultation can also be done.** | * It is mandatory to confirm tube position with X-rays. Clinical confirmation is not adequate and not supported. * Continuous monitoring of an NGT should be practical. Yes, CXR to initially confirm position but after that we need to ensure it stays safe. Length of NGT at nose? Is the NGT visibly coiled in the mouth? pH &lt;5.5? Has the patient had any invasive procedures that could have moved the NGT i.e TEE/Bronchoscopy. Is there evidence to support auscultation? | | 1.2 b) Use evidence-based methods to identify tube location. Latest evidence suggests taking an abdominal x-ray to identify the tube location. |
| **1.2 c) Prevent constipation, ensure gut motility, and prevent the development of a paralytic ileus, by ensuring adequate nutrition and hydration.** | * None | | 1.2c) No refinement required |
| **1.2 e) Discuss with the treating physician/surgeon whether a rectal tube will assist with decompression.** | * None | | 1.2e) No refinement required |
| **1.2 i) Administer medications as prescribed (eg, stool softeners, laxatives, and prokinetic agents).** | * None | | 1.2i) No refinement required |
| **1.2 j) Administer enemas as prescribed.** | * None | | 1.2 j) No refinement required |
| **1.2 k) Positioning: avoid high Fowler position, if possible. Allow for head of bead elevation of 30°.** | * None | | 1.2 k) No refinement required |
| **1.2 l) Assessment of patient: Continuous monitoring of surgical and drain sites for signs of infection, skin integrity surrounding the surgical site and surgical drain sites, the volume and appearance of surgical site and surgical drain output, and for the formation of enteroenteric fistulae.** | * None | | 1.2 l) No refinement required |
| **1.2 m) Management of the patient: Initiate measures to maintain skin integrity adjacent to surgical wound and drains, measures to maintain patency of drains, and measures to contain fistula drainage.**  **Consider consult with wound care specialist. Ensure replacement of ongoing losses with appropriate fluids as prescribed.** | * None | | 1.2 l) No refinement required |
| **Refined nursing guideline statement** | **Comments from experts** | | **Refined nursing guideline statement** |
| **Nursing guideline statement 2: Optimizing regional perfusion and damage control** | | | |
| * 1. **Optimizing regional perfusion: Fluid balance**   **Consider using ROSE (Resuscitation, Optimising, Stabilisation, Evacuation) concept to manage fluid balance and try to avoid a positive cumulative fluid balance in critically ill or injured patients with or at risk of intra-abdominal hypertension/abdominal compartment syndrome after resuscitation has been completed and the inciting issues have been addressed. Note that a positive fluid balance may contribute to intra-abdominal hypertension and negatively affect the ability to achieve fascial closure.**  **\*ROSE concept: R:Resuscitation; O:Optimization; S: Stabilisation; E: Evacuation (Malbrain, Van Regenmortel, Saugel, De Tavernier, Van Gaal, Joannes-Boyau et al., 2018:11)** | | * Handover of high-risk pts should be highlighted to staff, especially Agency staff. * Even though fluid balance is not controlled by nursing staff is more controlled by doctors. They decide how much fluid the patient receives and a patient with severe oedema will have trouble with wound healing. * Getting rid of the fluid may not always be an easy process, particularly with reduced renal perfusion when the patient already has an acute kidney injury with anuria/oliguria. | 2.1) No refinement required |
| **2.2 Optimizing regional perfusion: Damage Control**  **a) Latest evidence suggests a 1:1:1 ratio of plasma/platelets/packed red blood cells for resuscitation of massive haemorrhage instead of crystalloid resuscitation in patients in need of a massive transfusion of blood products in collaboration with the treating doctor/surgeon.**  **b) When patient presents as septic, incorporate the latest sepsis guidelines (2023) in the ICU management of the patient with an open abdomen in collaboration with the treating doctor/surgeon.**  **c) No recommendation could be made regarding the use of diuretics, renal replacement therapy, and albumin to mobilize fluids in haemo-dynamically stable patients with intra-abdominal hypertension after resuscitation has been completed and the inciting issues have been addressed. It is suggested to manage according to patient specifation.**  **Note: If intra-abdominal pressure is more than 25 mm Hg and new organ dysfunction/failure is present, the patient’s intra-abdominal hypertension/abdominal compartment syndrome is refractory to medical management.**  **d) Use strategies such as negative pressure wound therapy with temporary abdominal closure devices on critically ill or injured patients with open abdomens.**  **e) Nurses should be familiar with systems used in their individual practice environments, allowing for regular in-service training.** | | * Should be communicated to staff where pts receive blood products. * Yes, in an ideal hospital which is not always the case blood and blood products are expensive if available yes if not crystalloids should still be used. * Possible addition of blood/pathology providers as they have input into massive transfusion activation. * This may pose a challenge for patients who do not receive blood products for religious reasons. The second challenge is the blood products are not always readily available. * Continuous in-service training of permanent staff is crucial. * Sepsis guidelines dictate crystalloid fluid resuscitation 30ml/kg /bolus. Do we follow the guidelines or stay on the conservative side case of abdominal surgery? * Possible inclusion of infectious diseases specialist if multi antibiotics or resistant organism is detected to aid in choice of antibiotics and they ongoing management post the ICU. * Appropriate and targeted treatment options applied correctly and timeously in the early stages of the disease process are more likely to be effective than any treatment modality that's not guided by evidence-based interventions. * Individualized management per patient. Agree with the statement , not sure that this is the correct place to put the note however. * A more direct approach would be required. Surgery is not always ideal in all patient populations. Therefore, management should be Tailored from patient to patient. * See White et al. 2023 Sepsis-associated acute kidney injury in intensive care unit: incidence, patient characteristics, timing, trajectory, treatment, and associated outcomes. A multicentre, observational study. More info on physiological VS pathophysiological response of AKI. Could be useful for lit review * How will Agency staff be managed is important for excellence in ptcare service delivery and care in CCU. * This would be very helpful and in ICUs where this is not practised it should be introduced. * Absolutely essential -in service training is mandatory. * If education is lacking nurses can bring this up with education department of the hospital to facilitate knowledge gaps being filled. * Know what you have at your disposal will aid in aiming your expectations with regards to patient outcomes. It may also be helpful in decisions regarding referral of patients to institutions that can manage their condition appropriately when resources are in question. | **2.2) No refinement required** |
| **Accompanying nursing interventions** | | | |
| **Refined nursing intervention** | | **Comments from panel of experts** | **Refined nursing intervention** |
| **2.1 Nursing interventions for optimizing regional perfusion and fluid balance:** | | | |
| **2.1 a) Monitor intake and output. Take in consideration the insensible losses.** | | * None | 2.1a) No refinement required |
| **2.1 b) Notify treating doctor/surgeon if the patient has a positive fluid balance and/or has a urine output of < 0.5 mL/kg per hour.** | | * None. | 2.1b) No refinement required |
| **2.1 c) Continuous assess for peripheral oedema.** | | * None | 2.1c) No refinement required |
| **2.1 d) Monitor laboratory results, including haemoglobin and haematocrit levels, blood urea nitrogen and creatinine levels, and serum/urine osmolality, albumin, and report as needed.** | | * None | 2.1d) No refinement required |
| **2.1 f) Establish patient-specific goal-directed parameters for volume resuscitation in collaboration with the provider to prevent volume overload and positive fluid balance. Consider using the ROSE concept in collaboration with the treating doctor/surgeon** | | * None | 2.1e) No refinement required |
| **2.1 g) When possible and depending on availability, use advanced haemodynamic monitoring, as a guide on fluid status and fluid resuscitation. Such as (Stroke Volume (SV), Pulse Pressure Variation (PPV), or Stroke volume variation (SVV) and EVLWI (Extra vascular lung water index).** | | * None | 2.1g) No refinement required |
| **2.2. Nursing interventions for managing the fluid balance:** | | | |
| **2.2 b) When interventions to lower intra-abdominal hypertension are failing in the presence of worsening organ failure, early collaboration with the surgical team will become necessary.** | | * I would suggest - add "consulting the treating team to involve the surgeon" in cases where the patient is a medical ICU patient. | 2.2b) When interventions to lower intra-abdominal hypertension are failing in the presence of worsening organ failure, early collaboration with the surgical team will become necessary. Note: In a medical patient, advocate to consult the treating team to involve the surgeon. |
| **Refined nursing guideline statement** | | **Comments from experts** | **Refined nursing guideline statement** |
| **Nursing guideline statement 3: Abdominal closure** | | | |
| **Aim for early and same hospital stay abdominal fascial closure, ensuring that the negative pressure wound therapy is optimal and functional. Ensure for adequate wound care and wound care training for the nurses.** | | * None | No refinement required |
| **Accompanying nursing interventions** | | | |
| **Refined nursing intervention** | | **Original nursing intervention** | **Refined nursing intervention** |
| **3.1. Nursing interventions for facilitating abdominal closure:** | | | |
| **3.1 a) Various methods may be used to help close the abdomen, depending on availability, including, but not limited to negative-pressure wound therapy and dynamic fascial tension devices/systems.** | | * None | 3.1a) No refinement required |
| **3.1 b) Nurses should be competent with systems used in their individual practice environments. Allow for regular in-service and training on latest devices available** | | * Collaboration between Wound care staff Representative of company and nursing staff for effective use of systems. * Nurses to be trained in monitoring IAP. Management of complex wounds should be included in the nursing curriculum. | 3.1b) No refinement required |
| **3.2. Nursing assessment and management of the temporary abdominal closure device.** | | | |
| **3.2 b) Continuous monitoring of the integrity and function of the temporary abdominal closure device and monitor for changes in drainage volume and appearance.** | | * None | 3.2b) No refinement required |
| **Refined nursing guideline statement** | | **Comments from experts** | **Refined nursing guideline statement** |
| **Nursing guideline statement 4: Nutrition** | | | |
| **a) No recommendations can be made related to the optimal timing of nutrition in intra-abdominal hypertension/abdominal compartment syndrome, as it is patient specific. However, several studies suggest that the use of early enteral nutrition in the open abdomen is safe and have demonstrated earlier fascial closure rates and fewer complications.** | | * Importance of daily monitoring...inputs of dieticians in CCU...staff need to monitor blood results indicating pts protein and feeding profile. * If it is safe enteral feeding is recommended otherwise in my practice most patients with open abdomens are put on TPN. * Emphasis on individualised assessment and decision making. * Involving a dietician to facilitate optimal early nutrition, either enteral or parenteral is best for optimal healing. Delaying nutrition can lead to other complication including malnutrition, refeeding syndrome, and poor wound healing. * Early feeding has its advantages, but adverse outcomes may persist, like a paralytic ileus which may worsen the compartment syndrome. * The patient’s abdomen may be too sensitive post operatively. TPN good be a preferred alternative to prevent necrosis in the bowel. | 4a) No refinement required |
| **b) Advocate for gastric and colonic prokinetic agents.** | | * Both are good for the gastrointestinal system. * Gastric prokinetics yes, personally I am unsure of the role of colonic prokinetics in this patient population. * Addition of "where appropriate" as prokinetics may be contraindicated in ileus. * If available. * Provided patency of the gastrointestinal tract has been confirmed. * Decreasing the acid content in the gut could promote "good" bacteria in the gut. | 4b) No refinement required |
| **c) Work closely with the dietician and surgeon for an early and optimal feeding plan to ensure gastric motility and to prevent paralytic ileus. (Multidisciplinary approach)** | | * Early "interventions" from nursing side - practical care to enhance GIT recovery. * Early feeding helps improve patient’s condition. * A functional Gastrointestinal system may reduce one of the factors that can worsen a compartment syndrome. * Avoid the routine measurement of gastric residuals | 4c) No refinement required |
| **d) Monitor for refeeding syndrome, by monitoring for hypophosphatemia and hypomagnesemia. Replace electrolytes as needed in collaboration with unit protocol or treating doctor/surgeons’ prescription.** | | * Should Lactulose be given prophylactically to all patients on opioids. * In addition to replacing the electrolytes, thiamine must be added in refeeding syndromes. * Replacing electrolytes should be done intravenously to make sure it's effective in its action. * Are we checking on a daily basis? | 4d) No refinement required |
| **Accompanying nursing interventions** | | | |
| **Refined nursing intervention** | | **Comments from experts** | **Refined nursing intervention** |
| **4.1 a) Formal nutrition evaluation should be considered in the patient with an open abdomen in collaboration with the dietician and the treating doctor/surgeon.** | | * A multidisciplinary team approach is the way to go. | 4.1 a) No refinement required |
| **4.1 c) Initiate enteral nutrition as soon as possible in the patient with an open abdomen who is not in shock or post damage control surgery or undergoing active resuscitation, in collaboration with the treating doctor/surgeon and dietician.** | | * None | 4.1 c) No refinement required |
| **4.1 d) Limit interruptions in enteral nutrition. Aspirate enteral feeds to monitor absorption.** | | * 4.1d - there is increasing evidence that measurement of gastric residual is not to be standard of care - Diamond, S.J., Medici, V., Rice, T.W. et al. Should We Stop Using Gastric Residual Volumes?. Curr Nutr Rep 4, 236–241 (2015). https://doi.org/10.1007/s13668-015-0129-3 and Monitoring of gastric residual volume during enteral nutrition Hideto YasudaNatsuki KondoRyohei YamamotoSadaharu AsamiTakayuki AbeHiraku TsujimotoYasushi TsujimotoYuki Kataoka. Cochrane Systematic Reviews https://doi.org/10.1002/14651858.CD013335.pub2 | 4.1 d) Limit interruptions in enteral nutrition. Latest evidence suggests discontinuing routine monitoring of gastric residual volumes as it decreases the enteral nutrition delivery. |
| **4.1.e) If IAP remains elevated, discuss with treating doctor/surgeon whether gastric and colonic prokinetic agents (eg, metoclopramide, erythromycin, neostigmine) are appropriate for the patient.** | | * None | 4.1 e) No refinement required |
| **4.1 f) If intra-abdominal pressure remains elevated, collaborate with the nutritionist and treating doctor/surgeon to minimize or discontinue enteral nutrition.** | | * None | 4.1 f) No refinement required |
| **Refined nursing guideline statement** | | **Comments from experts** | **Refined nursing guideline statement** |
| **Nursing guideline statement 5: Analgesia and sedation** | | | |
| **It is suggested to ensure that critically ill or injured patients receive optimal pain and anxiety relief. Consider non-opioid based analgesia to prevent the development of a paralytic ileus, post-surgery. Make use of pain assessing tools to guide pain management, as suggested in latest research, the Critical care pain observation tool (CPOT) or the Behavioural pain scale (BAS).** | | * **None** | No refinement required |
| **Accompanying nursing interventions** | | | |
| **Refined nursing intervention** | | **Comments from experts** | **Refined nursing intervention** |
| **5.1 b) Use pharmacologic and nonpharmacologic pain management strategies to relieve pain as prescribed, while limiting associated complications such as oversedation or paralytic ileus.** | | * None | No refinement required |