**Table 2: Summary of results**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Summary Nursing guideline statement** | **Round 1 (n=31)** | | **Consensus decision** | **Round 2 (n=23)** | | **Consensus decision** | **Round 3 (n=17)** | | **Consensus decision** |
| **Important** | **I-CVI (%)** | **Agree** | **I-CVI (%)** | **Agree** | **I-CVI (%)** |
| **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. 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. | 31 | 100 | R2 | 23 | 100 | R3 | 18 | 100 | A |
| **2.1 Optimizing regional perfusion: Fluid balance**  Use a protocol to 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. | 31 | 100 | R2 | 23 | 100 | R3C | 18 | 100 | A |
| **2.2 Optimizing regional perfusion: Damage control resuscitation.**  a) Use an enhanced ratio of plasma/packed red blood cells for resuscitation of massive hemorrhage instead of low or no attention to plasma/packed red blood cell ratios. | 30 | 97 | R2++ | 21 | 90 | R3C | 18 | 100 | A |
| b) No recommendation could be made regarding the use of diuretics, renal replacement therapy, and albumin to mobilize fluids in hemodynamically stable patients with intra-abdominal hypertension after resuscitation has been completed and the inciting issues have been addressed. 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. | 30 | 97 | R2 | 22 | 95 | R3C | 18 | 100 | A |
| c) Use strategies such as negative pressure wound therapy with temporary abdominal closure devices on critically ill or injured patients with open abdomens. | 29 | 94 | R2 | 23 | 100 | R3C | 18 | 100 | A |
| d) Nurses should be familiar with systems used in their individual practice environments. | 29 | 94 | R2 | 23 | 0 | R3C | 18 | 100 | A |
| **3. Abdominal closure**  It is recommended that conscious and/or protocolized efforts be made to obtain early or at least same hospital-stay abdominal fascial closure in patients with open abdominal wounds. | 29 | 94 | R2 | 23 | 0 | R3C | 18 | 100 | A |
| **4. Nutrition**  a) No recommendations can be made related to the optimal timing of nutrition in intra-abdominal hypertension/abdominal compartment syndrome. 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. | 31 | 100 | R2+A | 21 | 90 | R3C | 18 | 100 | A |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| b) It is recommended to initiate gastric and colonic prokinetic agents. | 29 | 94 | R2+A | 22 | 1 | R3C | 18 | 100 | A |
| **Added:**  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) | - | - | - | 22 | 95 | R3C | 18 | 100 | A |
| **Added:**  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. | - | - | - | 23 | 100 | R3C | 18 | 100 | A |
| **5. Analgesia and sedation**  It is suggested that clinicians ensure that critically ill or injured patients receive optimal pain and anxiety relief. | 31 | 0 | R2 | 22 | 95 | R3C | 18 | 100 | A |

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Nursing interventions** | **Round 1 (n=31)** | | | | **Consensus decision** | **Round 2 (n=23)** | | **Consensus decision** | **Round 3(n=17)** | | **Consensus decision** |
| **Important** | **I-CVI (%)** | **Practical** | **I-CVI (%)** |  | **Agree** | **I-CVI (%)** |  | **Agree** | **I-CVI (%)** |  |
| **1.1 Nursing interventions on assessing for intra-abdominal hypertension/abdominal compartment syndrome.** |  | | | | | | | | | | |
| 1.1a) Initiate intra-abdominal pressure measurements as ordered. | 31 | 100 | 24 | 75 | R2+ | 23 | 100 | R3C | 18 | 100 | A |
| 1.1b) Implement, monitor, and record intra-abdominal pressures. | 31 | 100 | 25 | 84 | R2 | 23 | 100 | R3 | 18 | 100 | A |
| 1.1c) Calculate and record abdominal perfusion pressure (APP): APP = MAP-IAP. | 31 | 100 | 27 | 90 | R2 | 22 | 95 | R3C | 18 | 100 | A |
| 1.1d) Consider developing a nurse-driven protocol. | 31 | 100 | 27 | 90 | A | - | - | R3C | 18 | 100 | A |
| **1.2 Nursing interventions to decrease intra-abdominal pressure (IAP).** |  | | | | | | | | | | |
| 1.2a) Ensure that gastric/intestinal tubes are patent and functioning as ordered | 31 | 100 | 31 | 100 | A | - | - | R3C | 18 | 100 | A |
| 1.2b) Use evidence-based methods to identify tube location. Two or more methods are recommended. Observe for respiratory distress. If available, use capnography and use pH strips to measure pH of aspirate. Examine the visual appearance of tube aspirate. Review radiographic reports for confirmation of blind-inserted nasogastric tube. | 30 | 97 | 26 | 84 | R2 | 22 | 95 | R3 | 18 | 100 | A |
| 1.2c) Prevent constipation, by ensuring adequate nutrition and hydration. | 29 | 94 | 29 | 94 | R2 | 23 | 100 | R3C | 18 | 100 | A |
| 1.2 d) If the patient is constipated, advocate for a laxative and stool softener. | 30 | 97 | 30 | 97 | A | - | - | R3C | 18 | 100 | A |
| 1.2 e) Discuss with provider whether a rectal tube will assist with decompression. | 28 | 90 | 31 | 100 | R2 | 23 | 100 | R3C | 18 | 100 | A |
| 1.2 f) Monitor and record bowel movements. | 30 | 97 | 31 | 100 | A | - | - | R3C | 18 | 100 | A |
| 1.2 g) Monitor accurate input and output. | 31 | 100 | 30 | 97 | A | - | - | R3C | 18 | 100 | A |
| 1.2 h) Ensure adequate hydration. | 31 | 100 | 31 | 100 | A | - | - | R3C | 18 | 100 | A |
| 1.2 i) Administer medications as ordered (e.g., stool softeners, laxatives, and prokinetic agents). | 31 | 100 | 31 | 100 | R2 | 23 | 100 | R3C | 18 | 100 | A |
| 1.2 j) Administer enemas as ordered. | 30 | 97 | 29 | 94 | R2 | 22 | 95 | R3C | 18 | 100 | A |
| 1.2 k) Positioning: avoid high Fowler position, if possible. | 29 | 94 | 28 | 90 | R2+ | 23 | 100 | R3C | 18 | 100 | A |
| 1.2 l) Assessment of patient: Monitor 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. | 31 | 100 | 31 | 100 | R2 | 23 | 100 | R3C | 18 | 100 | A |
| 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 in collaboration with provider where indicated. | 31 | 97 | 29 | 94 | R2 | 23 | 100 | R3C | 18 | 100 | A |

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Nursing Interventions** | **Round 1 (n=31)** | | | | **Consensus decision** | **Round 2 (n=23)** | | **Consensus decision** | **Round 3 (n=17)** | | **Consensus decision** |
| **Important** | **I-CVI** | **Practical** | **I-CVI (%)** |  | **Agree** | **I-CVI (%)** |  | **Agree** | **I-CVI (%)** |  |
| **2.1 Nursing interventions for optimizing regional perfusion and fluid balance:** |  | | | | | | | | | | |
| 2.1 a) Monitor intake and output. | 30 | 97 | 30 | 97 | R2+ | 22 | 95 | R3C | 18 | 100 | A |
| 2.1 b) Notify provider if the patient has a positive fluid balance and/or has a urine output of < 0.5 mL/kg per hour. | 90 | 97 | 29 | 94 | R2 | 23 | 100 | R3C | 18 | 100 | A |
| 2.1 c) Assess for peripheral edema. | 29 | 94 | 31 | 100 | R2 | 22 | 95 | R3C | 18 | 100 | A |
| 2.1 d) Monitor laboratory results, including hemoglobin and hematocrit levels, blood urea nitrogen and creatinine levels, and serum/urine osmolality, and report as needed. | 31 | 100 | 30 | 97 | R2 | 22 | 95 | R3C | 18 | 100 | A |
| 2.1 e) Assess patient response to fluids, blood transfusions, and diuretics needed. | 31 | 100 | 30 | 97 | A | - | - | R3C | 18 | 100 | A |
| 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. | 30 | 97 | 28 | 93 | R2 | 23 | 100 | R3C | 18 | 100 | A |
| 2.1 g) When possible, use volumetric (Stroke Volume (SV), Pulse Pressure Variation (PPV), or Stroke volume variation (SVV) rather than pressure-based (Central venous pressure (CVP) or Pulmonary Capillary Wedge Pressure (PCWP) end points of volume resuscitation. | 28 | 90 | 22 | 71 | R2+ | 23 | 100 | R3C | 18 | 100 | A |
| **2.2. Nursing interventions for managing the fluid balance:** |  | | | | | | | | | | |
| 2.2 a) Maintain euvolemia or negative fluid balance through patient-specific strategies for fluid management. | 31 | 100 | 28 | 90 | A | - | - | R3C | 18 | 100 | A |
| 2.2 b) When interventions to lower intra-abdominal hypertension are failing in the presence of worsening organ failure, collaboration with the surgical team will become necessary. | 31 | 100 | 26 | 84 | R2 | 23 | 100 | R3 | 18 | 100 | A |
| **3.1. Nursing interventions for facilitating abdominal closure:** |  |  |  |  |  |  |  |  | 18 | 100 | A |
| 3.1 a) Various methods may be used to help close the abdomen, including but not limited to negative pressure wound therapy and dynamic fascial tension devices/systems. | 31 | 100 | 23 | 74 | R2 | 23 | 100 | R3C | 18 | 100 | A |
| 3.1 b) Nurses should be competent with systems used in their individual practice environments. | 31 | 100 | 26 | 84 | R2 | 23 | 100 | R3C | 18 | 100 | A |
| **3.2. Nursing assessment and management of the temporary abdominal closure device.** |  | | | | | | | | | | |
| 3.2 a) Monitor for proper function of the temporary abdominal closure device, skin/tissue circulation and integrity compromise that may be associated with dynamic tension or closure devices, fistula formation, increase in intra-abdominal hypertension after application or adjustment  of dynamic tension devices, and intra-abdominal hypertension after fascia and/or skin closure. | 31 | 100 | 28 | 90 | A | - | - | R3C | 18 | 100 | A |
| 3.2 b) Monitor the integrity and function of the temporary abdominal closure device and monitor for changes in drainage volume and appearance. | 31 | 100 | 28 | 90 | R2 | 23 | 100 | R3C | 18 | 100 | A |
| 3.2 c) Maintain the function of the temporary abdominal closure device. | 31 | 100 | 26 | 84 | A | - | - | R3C | 18 | 100 | A |

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Nursing interventions** | **Round 1 (n=31)** | | | | **Consensus decision** | **Round 2 (n=23)** | | **Consensus decision** | **Round 3 (n=17)** | | **Consensus decision** |
| **Important** | **I-CVI (%)** | **Practical** | **I-CVI (%)** |  | **Agree** | **I-CVI (%)** |  | **Agree** | **I-CVI (%)** |  |
| **Nursing interventions regarding the assessment and management of nutrition:** |  | | | | | | | | | | |
| 4.1 a) Formal nutrition evaluation should be considered in the patient with an open abdomen. | 31 | 100 | 27 | 87 | R2 | 23 | 100 | R3C | 18 | 100 | A |
| 4.1 b) Monitor accurate intake and output and consult dietician for recommendations. | 31 | 100 | 27 | 87 | A | - | - | R3C | 18 | 100 | A |
| 4.1 c) Initiate enteral nutrition as soon as possible in the patient with an open abdomen who is not in shock or undergoing active resuscitation. | 31 | 100 | 26 | 84 | R2 | 23 | 100 | R3C | 18 | 100 | A |
| 4.1 d) Limit interruptions in enteral nutrition. | 30 | 96 | 26 | 84 | R2 | 21 | 90 | R3 | 18 | 100 | A |
| 4.1.e) If IAP remains elevated, discuss with provider whether gastric and colonic prokinetic agents (e.g., metoclopramide, erythromycin, neostigmine) are appropriate for the patient. | 29 | 94 | 26 | 84 | R2 | 22 | 95 | R3C | 18 | 100 | A |
| 4.1 f) If IAP remains elevated, collaborate with the nutritionist and provider to minimize or discontinue enteral nutrition. | 29 | 94 | 26 | 84 | R2 | 23 | 100 | R3C | 18 | 100 | A |
| **Nursing interventions regarding the management of pain and anxiety** |  | | | | | | | | | | |
| 5.1 a) Assess for pain by using a standardized pain assessment scale; assess for anxiety. | 31 | 100 | 31 | 100 | A | - | - | R3C | 18 | 100 | A |
| 5.1 b) Use pharmacologic and nonpharmacologic pain management strategies to relieve pain, while limiting associated complications such as oversedation. | 31 | 100 | 29 | 94 | R2 | 23 | 100 | R3C | 18 | 100 | A |

\*R2- Refined and added to Round 2; R2+ - Refined and attached more information and added to Round 2; A- Accepted – not included in Round 2; R3- Refined for Round 3; R3C- Completed included in R3

\*IAP: Intra-abdominal pressure; MAP: Mean arterial pressure; APP: Abdominal perfusion pressure