



Evaluation & Management of a Patient with SIP/NEC

Description of the Activity	<p>Pediatric surgeons are frequently called upon to evaluate a neonate with bloody stools, abdominal distension, abdominal tenderness, or laboratory or radiographic evidence of necrotizing enterocolitis (NEC) or perforated viscus. The pediatric surgeon must be able to expeditiously evaluate and manage these patients often in the neonatal intensive care unit (NICU) but also occasionally in the emergency department, pediatric or cardiac ward, or intensive care unit. The pediatric surgeon must decide when medical or surgical treatments are most appropriate and choose the appropriate intervention (eg, peritoneal drain, laparotomy), taking into account the infant's clinical status, stability, gestational age/weight, and presumed diagnosis.</p>
Functions	<ul style="list-style-type: none">❖ Nonoperative/Preoperative<ul style="list-style-type: none">➤ Synthesize information from the patient's referring providers, medical records, history, physical examination, and diagnostic evaluations to develop a differential diagnosis.➤ Determine whether immediate surgery is indicated or if medical management is the most appropriate initial strategy.➤ For medically managed NEC, understand the need for ongoing reevaluation to include operative intervention for those patients failing medical management.➤ Select the most appropriate location of intervention (bedside in the NICU versus the operating room) depending on patient stability, urgency of procedure, and local resources.➤ Select a safe anesthetic and surgical approach that is consistent with the patient's diagnosis, corrected gestational age, and comorbidities.➤ Obtain appropriate preoperative consultation with the anesthesia, cardiology, neonatology, or other teams as dictated by the infant's comorbidities.➤ Synthesize an operative plan that demonstrates understanding of the operative anatomy, physiology, indications, contraindications, risks, benefits, alternatives, and potential complications of:<ul style="list-style-type: none">▪ Nonperforated necrotizing enterocolitis/NEC totalis▪ Perforated necrotizing enterocolitis▪ Spontaneous or focal intestinal perforation (SIP/FIP)➤ Obtain informed consent with recognition of urgency, parental distress, and unclear intraoperative findings.➤ Describe the indications, risks, benefits, alternative therapies, and potential complications of the planned procedure in the context of the neonate presenting with NEC.➤ If necessary, identify the appropriate substitute decision-maker ("caregiver"), and ensure caregiver comprehension using applicable language services and audio/visual aids as required.➤ Ensure that the family/caregiver has the opportunity to ask questions, and address any expressed concerns.➤ Document the consent process.❖ Intraoperative<ul style="list-style-type: none">➤ Manage the perioperative environment, including room setup, equipment check, preprocedural time-out, counts, wound classification, and debriefing functions.➤ Perform the procedures required to manage an infant with NEC:



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- Position the patient, and ensure availability of relevant equipment, including heating the patient.
- Ask for the correct instruments.
- Visualize tissue planes, and identify and dissect relevant normal and abnormal anatomy.
- Perform operative steps efficiently, including:
 - Peritoneal drain placement
 - Laparotomy
 - Bowel resection with stoma or anastomosis
 - Temporary abdominal closure
- Integrate new information discovered intraoperatively to modify the surgical plan or technique in patients with:
 - Focal NEC
 - Multifocal NEC
 - SIP/FIP
 - Very proximal disease
- Give special consideration for NEC totalis and non-salvageable disease and the potential for short bowel syndrome and intestinal transplantation. (special skills: communication of the urgent, difficult conversation)
- Work with the anesthesia and nursing teams as well as other perioperative health care professionals to create and maintain an intraoperative environment that promotes patient-centered care.
- ❖ Postoperative
 - Initiate and oversee postoperative care, including postoperative disposition.
 - Communicate with the caregiver and members of the health care team to ensure an understanding of the procedure findings and their potential implications regarding short- and long-term recovery.
 - Recognize and manage the common complications following surgery for NEC in an infant, such as:
 - Anastomotic leak
 - High-output stoma
 - Indications for formal laparotomy following failed peritoneal drainage
 - Recurrent NEC
 - Short-bowel syndrome
 - Stoma-related complications (prolapse, retraction)
 - Stricture (anastomotic or related to prior medically managed NEC)

Scope

- ❖ In scope
- ❖ Diagnoses
 - NEC
 - SIP/FIP
 - NEC stricture
- ❖ Procedures



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- Bowel anastomosis
- Neonatal laparotomy
- Peritoneal drainage
- Stoma
- Temporary closure

- Special populations
 - NEC totalis

- ❖ Out of scope
 - Diagnoses/procedures
 - Gastric perforation or other causes of neonatal pneumoperitoneum
 - Intestinal failure



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Level	Nonoperative/Preoperative	Intraoperative	Postoperative
<p>1</p> <p>Framework:</p> <p>The learner demonstrates understanding of information and has basic skills</p> <p>What a new pediatric surgery fellow should know</p> <p>Entrustment:</p> <p>The attending will show and tell or the learner acts as first assistant.</p>	<ul style="list-style-type: none">• When a neonate presents with bloody stools, abdominal distension, or abdominal tenderness, performs a focused H&P, reviews diagnostic reports, and develops a differential with active assistance• With active assistance, distinguishes between surgical and nonsurgical NEC and between SIP and NEC, formulates an appropriate treatment plan including appropriate resuscitation• With active assistance, recognizes abnormal vital signs and lab values in a neonate• With active assistance, recognizes potentially inappropriate intervention in NEC (eg, unnecessary laparotomy)• With active guidance, works within a multidisciplinary team to manage a neonate with NEC in a timely manner• With active assistance, discusses the diagnosis of NEC with a patient's family and treatment team, answers basic questions; demonstrates understanding of the components of informed consent	<ul style="list-style-type: none">• With active guidance, proceeds through the operative steps of abdominal exploration, bowel resection/anastomosis, and ostomy creation• Places a peritoneal drain with active assistance• With active guidance handles delicate bowel with appropriate care to minimize further bowel loss• With active assistance, identifies when further discussion with a patient's family and the health care team is needed to facilitate ethical shared decision-making	<ul style="list-style-type: none">• With direct supervision, provides surgical management for the postop care of an uncomplicated neonate with NEC• With active assistance, recognizes the physiology of a neonate that can influence postop recovery• With active assistance, discusses the ethical considerations for a neonate with significant bowel loss• With assistance, discusses intraop findings and a plan for postop care with the multidisciplinary team• With active assistance, discusses surgery findings with a patient's family and answers basic questions about postop care



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<p>2</p> <p>Framework:</p> <p>The learner demonstrates understanding of the steps of the operation but requires direction through principles and does not know the nuances of a basic case</p> <p>Entrustment:</p> <p>The learner can use the tools but may not know exactly what, where, or how to do it.</p> <p>The attending gives active help throughout the case to maintain forward progression or may need to take over the case at a certain point</p>	<ul style="list-style-type: none">• When a neonate presents with bloody stools, abdominal distension, or abdominal tenderness, performs a focused H&P, reviews diagnostic reports, and develops a differential with direct supervision• With direct supervision, distinguishes between surgical and nonsurgical NEC and between SIP and NEC, formulates an appropriate treatment plan including appropriate resuscitation• With direct supervision, recognizes abnormal vital signs and lab values in a neonate• With passive assistance, recognizes and discusses potentially inappropriate intervention in NEC (eg, unnecessary laparotomy)• Under direct supervision, can work within a multidisciplinary team to manage a neonate with NEC in a timely manner• Under direct supervision, initiates and engages a family and the treatment team in empathetic and appropriate discussion of potential operative findings and subsequent interventions for a stable neonate with a low predicted risk of periop mortality or massive bowel loss	<ul style="list-style-type: none">• With direct supervision, proceeds through the operative steps of abdominal exploration, bowel resection/anastomosis, and ostomy creation• Places a peritoneal drain with direct supervision• With direct supervision, handles delicate bowel with appropriate care to minimize further bowel loss• With direct supervision, identifies when further discussion with a patient's family and the health care team is needed to facilitate ethical shared decision-making	<ul style="list-style-type: none">• With indirect supervision, provides surgical management for the postop care of an uncomplicated neonate with NEC• With direct supervision, recognizes and responds to the physiology of a neonate that can influence postop recovery• With passive assistance, discusses the ethical considerations for a neonate with significant bowel loss• With direct supervision, discusses intraop findings and a plan for postop care with the multidisciplinary team• With indirect supervision, discusses surgery findings with a patient's family and healthcare team and answers questions about postop care in the uncomplicated patient



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<p style="text-align: center;">3</p> <p>Framework:</p> <p>The learner has a good understanding of surgical options and techniques but does not recognize abnormalities and does not understand the nuances of a complicated case</p> <p>Entrustment:</p> <p>The learner can perform the operation/task independently in the uncomplicated patient</p> <p style="text-align: center;">or</p> <p>The attending provides passive/indirect supervision/suggestions in the complicated patient but still allows the learner to perform the operation/task themselves</p>	<ul style="list-style-type: none"> When a neonate presents with bloody stools, abdominal distension, or abdominal tenderness, performs a focused H&P, reviews diagnostic reports, and develops a differential with indirect supervision With indirect supervision, distinguishes between surgical and nonsurgical NEC and between SIP and NEC, formulates an appropriate treatment plan including appropriate resuscitation With indirect supervision, recognizes abnormal vital signs and lab values in a neonate Analyzes complex situations, seeking help as needed to recognize and discuss potentially inappropriate intervention in NEC (eg, unnecessary laparotomy) With indirect supervision, works within a multidisciplinary team to manage a neonate with NEC in a timely manner Independently initiates and engages a family and the treatment team in empathetic and appropriate discussion of potential operative findings and subsequent interventions for a stable neonate with a low risk of mortality and significant bowel loss but requires passive assistance in the high risk neonate 	<ul style="list-style-type: none"> With indirect supervision, proceeds through the operative steps of abdominal exploration, bowel resection/anastomosis, and ostomy creation Places a peritoneal drain with indirect supervision Consistently handles bowel delicately and with indirect supervision, adapts an operative plan to manage an infant with bowel loss With indirect supervision, analyzes a complex situation and identifies when further discussion with a patient's family and the health care team is needed to facilitate ethical shared decision-making 	<ul style="list-style-type: none"> With indirect supervision, provides surgical management for the postop care of a medically complex neonate with NEC With indirect supervision, recognizes and responds to the physiology of a neonate that can influence postop recovery Analyzes a complex situation to facilitate discussion of the ethical considerations for a neonate with significant bowel loss With indirect supervision, discusses intraop findings and a plan for postop care with the multidisciplinary team Independently discusses surgery findings with a patient's family and healthcare team and answers questions about postop care in the uncomplicated patient but requires passive assistance in the complex neonate with NEC (bowel loss, short gut or prematurity)



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<p style="text-align: center;">4</p> <p>Framework:</p> <p>The learner has a strong and in-depth understanding of surgical options and techniques</p> <p>Entrustment:</p> <p>Can perform the operation/task independently in complicated cases</p> <p style="text-align: center;">or</p> <p>The attending may need to provide indirect supervision or suggestions in the context of extremely rare or severely complicated cases</p>	<ul style="list-style-type: none"> Independently performs a focused H&P, requests and interprets appropriate investigations, and efficiently formulates a treatment plan for a critically ill neonate with suspected NEC or SIP; formulates a preop plan that incorporates patient-related factors and local resources Independently distinguishes between surgical and nonsurgical NEC and between SIP and NEC, formulates an appropriate treatment plan including appropriate resuscitation Recognizes subtle deviations in neonatal physiology that may indicate severity of disease, response to medical treatment, or failure of medical treatment to guide ongoing decision-making Displays understanding of the differing concepts of patient/family autonomy and potential inappropriate intervention (eg, futile treatment) in NEC totalis and independently counsels a family appropriately Works independently within a multidisciplinary team to manage a neonate with NEC in a timely manner Independently initiates and engages a family and the treatment team in empathetic and appropriate discussion of potential operative findings and subsequent interventions for an unstable 	<ul style="list-style-type: none"> Independently performs operative steps, including evaluation of the bowel, assessment of viability, primary anastomosis vs stomas, abdominal closure vs second look, and consideration of the need for vascular access Independently places a peritoneal drain Consistently handles bowel delicately and Independently adapts an operative plan to manage an infant with bowel loss Independently initiates a discussion with the family and health care team to disclose catastrophic intraop findings and reinitiates the goals of care, building on the preop consent discussion 	<ul style="list-style-type: none"> Independently provides ongoing surgical management and follow-up for the postop care of a neonate with complicated NEC, including management of a neonate with a peritoneal drain, stoma, or open abdomen and nutritional care Recognizes the postop physiology of a critically ill neonate and independently interprets when there is a role for reoperation for progressive disease or surgical complication Independently recognizes and leads discussions for the ethical considerations for a neonate with significant bowel loss and directs the plan for long-term follow-up and surveillance for any sequelae of NEC management Leads a discussion of surgery findings and a plan for postop care with the multidisciplinary team Independently engages the family and treatment team in a goals-of-care or quality-of-life discussion regarding a complex neonate with NEC with bowel loss/short gut syndrome in the context of other issues related to prematurity



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	neonate with a high predicted risk of periop mortality or massive bowel loss		