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Fluid management

Orthostatic hypotension: definition, classification and evaluation. Transaminases: An elevation in aspartate aminotransferase or alanine aminotransferase can occur due to hepatic tissue hypoperfusion and subsequent tissue hypoxia, leading to a condition known as hepatocyte injury or shock liver. Maintenance fluids address the patient's physiological needs, accounting for sensible and insensible fluid losses. Holliday, MD, and William E. Patients should be weighed daily on a standardized scale to monitor patterns in weight fluctuations. 2010 Mar;25(1):97-106. Nat Rev Nephrol. Blend evidence with clinical observations. Standards of recording and monitoring IV fluid and electrolyte therapy may also be poor in these settings. If patients are receiving IV fluids for resuscitation, reassess the patient using the ABCDE approach (Airway, Breathing, Circulation, Disability, Exposure), monitor their respiratory rate, pulse, blood pressure and perfusion continuously, and measure their venous lactate levels and/or arterial pH and base excess according to guidance on advanced life support (Resuscitation Council UK, 2011). Conversely, fluid overload may result in congestive heart failure, pulmonary edema, and abdominal compartment syndrome.Careful consideration of each patient's current clinical status and relevant past medical history is essential when devising a fluid management strategy. Assessing for dehydration in adults. In many cases, a simple calculation called the 4-2-1 rule can determine the hourly rate of fluid maintenance required for a child based on their body weight.[13]The formula outlined below illustrates its application, where fluid maintenance rates are calculated based on the following criteria:First 10 kg: 4 mL/kg/hNext 10 to 20 kg: 2 mL/kg/hAny remaining weight more than 20 kg: 1 mL/kg/hFor example, a child whose body weight is 22 kg would have the following requirements for maintenance fluid:First 10 kg: 4 mL/kg/h x 10 kg = 40 mL/hNext 10 to 20 kg: 2 mL/kg/h x 10 kg = 20 mL/hRemaining 2 kg: 1 mL/kg/h x 2 kg = 2 mL/hTotal hourly rate: 40 + 20 + 2 = 62 mL/hAnother commonly used formula predicts fluid requirements over 24 hours. Development of a clinical dehydration scale for use in children between 1 and 36 months of age. For instance, a 3-month-old infant's fluid requirements significantly differ from those of a fully grown child aged 8 or older. Normal saline contains a higher chloride concentration compared to plasma, rendering it hyperchloremic. Colloid solutions are albumin solutions, hyperoncotic starch, dextran, and gelatin. The most commonly used fluids in the medical settings are:Sodium chloride (0.9%) or normal saline, with or without potassium Sodium chloride (0.45%) or half normal saline, with or without potassium Lactated Ringer solutionDextrose (5%) in sodium chloride (0.9%), with or without potassium Dextrose (5%) in sodium chloride (0.45%), with or without potassium Healthcare providers frequently use isotonic saline and lactated Ringer solution for both adults and children. The National Early Warning Score (NEWS) combines clinical analysis and vital signs to aid in predicting patients who might deteriorate, develop sepsis, or require fluid administration.The NEWS score uses the following parameters:Respiration rateOxygen saturationSystolic blood pressurePulse rateLevel of consciousness or new confusionTemperatureA NEWS score of ≥5 indicates the potential presence of hypovolemia and the need for possible fluid administration. [PMC free article: PMC5746968] [PubMed: 28834618]6.Tzur I, Izhakian S, Gorelik O. 2003 Feb;41(2):196-205. In developing the guideline, it was necessary to limit the scope by excluding patient groups with more specialised fluid prescribing needs. However, the challenge lies in the variability of scales used in hospitals. Blood pressure : Healthcare providers should contemplate fluid administration when the systolic blood pressure falls below 100 mm Hg. A declining blood pressure is an ominous finding often linked with tachycardia. Before and after administering a fluid bolus, it is crucial to evaluate the patient's vital signs, clinical response, and the presence or absence of pulmonary edema. Placing the IV When it comes to placing an IV line, a specific set of equipment and supplies is essential for ensuring proper and safe insertion, which includes nonsterile gloves, tourniquet, antiseptic solution (2% chlorhexidine in 70% isopropyl alcohol) or wipes, IV needle, 2- × 2-inch gauze, adaptor, saline or heparin lock, saline or heparin solution, transparent dressing, and paper tape. Additional parameters: Elevated serum urea, osmolality, sodium, urine osmolality, and specific gravity can indicate dehydration. 2003 Aug;96(8):601-10. Diagnosis and management of dehydration in children. Surveys have shown that many staff who prescribe IV fluids know neither the likely fluid and electrolyte needs of individual patients, nor the specific composition of the many choices of IV fluids available to them. Pediatrics. Electrolyte Derangements Hyponatremia: Hyponatremia requires regular monitoring of serum sodium levels, with a heightened risk associated with using hypotonic solutions. They include nasogastric, orogastric, gastric, nasoduodenal, and gastrojejunal tubes. Be aware that: Patients receiving IV fluid therapy to address replacement or redistribution problems may need more frequent monitoring. 2016 Aug 02;17(1):109. Metab Brain Dis. Adults with sepsis or severe hypovolemic shock should be administered 30 mL/kg of fluid in 500 mL boluses within the initial hours of treatment. However, urinary sodium values may be misleading in the presence of renal impairment or diuretic therapy.) Patients on longer-term IV fluid therapy whose condition is stable may be monitored less frequently, although decisions to reduce monitoring frequency should be detailed in their IV fluid management plan. Trials cannot easily be included in meta-analyses because they examine varied outcome measures in heterogeneous groups, comparing not only different types of fluid with different electrolyte content, but also different volumes and rates of administration and, in some cases, the additional use of inotropes or vasopressors. IV fluid management in hospital is often delegated to the most junior medical staff who frequently lack the relevant experience and may have received little or no specific training on the subject. All patients continuing to receive IV fluids need regular monitoring. Most trials have been undertaken in operating theatres and critical care units rather than admission units or general and elderly care settings. The aim of this NICE guideline is to help prescribers understand the: physiological principles that underpin fluid prescribing pathophysiological changes that affect fluid balance in disease states indications for IV fluid therapy reasons for the choice of the various fluids available and principles of assessing fluid balance. Hospitals should establish systems to ensure that all healthcare professionals involved in prescribing and delivering IV fluid therapy are trained on the principles covered in this guideline, and are then formally assessed and reassessed at regular intervals to demonstrate competence in: understanding the physiology of fluid and electrolyte balance in patients with normal physiology and during illness assessing patients' fluid and electrolyte needs (the 5 Rs: Resuscitation, Routine maintenance, Replacement, Redistribution and Reassessment) assessing the risks, benefits and harms of IV fluids prescribing and administering IV fluids monitoring the patient response evaluating and documenting changes and taking appropriate action as required. Fluid overload in the ICU: evaluation and management. Orthostatic vital signs : These signs involve a reduction of at least 20 mm Hg in systolic blood pressure or 10 mm Hg in diastolic blood pressure within 2 to 5 minutes of standing quietly after 5 minutes of supine rest, which signifies the presence of orthostatic hypotension.[6] These findings may be evident in dehydrated or older patients who have experienced reduced sensitivity in the baroreceptors of their blood vessels. In addition, subcutaneous, intraosseous, central venous, and enteral tube routes are other available options. Randomised controlled trial of intravenous maintenance fluids. Fluid management is crucial in inpatient medical settings, where each patient presents unique and individual requirements. Assess the patient's likely fluid and electrolyte needs from their history, clinical examination, current medications, clinical monitoring and laboratory investigations: History should include any previous limited intake, thirst, the quantity and composition of abnormal losses (see the diagram of ongoing losses), and any comorbidities, including patients who are malnourished and at risk of refeeding syndrome (see the NICE guideline on nutrition support for adults). Patients may be at risk for developing hyperchloremic metabolic acidosis if significant quantities of normal saline are required for resuscitation. The value of parental report for diagnosis and management of dehydration in the emergency department. Other Complications Additional complications associated with fluid management include hematoma, phlebitis and thrombophlebitis, air embolism, infiltration, extravascular and intraarterial injections, infection, and device embolism.Maintaining an appropriate intravascular volume ensures sufficient organ perfusion and upholds electrolyte and pH balance. Inadequate fluid management can result in substantial complications. Metabolic Acidosis Compared to the body's normal pH, normal saline is a slightly acidic solution that can potentially lead to metabolic acidosis.[17] Although lactated Ringer solution offers a closer approximation to the body's natural pH, the choice between lactated Ringer solution and normal saline for fluid maintenance administration is often influenced by their availability at individual hospital institutions, which is an evolving paradigm currently under discussion on a national level. However, this approach comes with challenges, including the need for central venous access and the risk of central line-associated bloodstream infections. Sometimes, these patients may require a lower maintenance fluid rate than their body weight might initially suggest. Typical symptoms include oliguria, a tense abdomen, and increased airway pressure. It is hoped that this guideline will lead to better fluid prescribing in hospitalised patients, reduce morbidity and mortality, and lead to better patient outcomes. Therefore, it is essential to carefully assess the specific type and quantity of fluids required for each patient. Collaborative discussions within the team are instrumental in optimizing the administration of fluids for hospitalized patients.[17] Documenting vital signs and urinary output and conducting routine visual assessments are essential to evaluating a patient's volume status.Recognizing the signs and symptoms of hypovolemia and fluid overload is crucial for improving patient outcomes and preventing morbidity and mortality. The National Confidential Enquiry into Perioperative Deaths report Extremes of age in 1999 highlighted that a significant number of hospitalised patients were dying as a result of infusion of too much or too little fluid. Slide clamps: They are used to open and close the infusion pump. Nonetheless, tachycardia can have various other causes, including pain, fever, and anxiety. Rehydration corrects an ongoing or preexisting deficit that the patient cannot rectify with oral fluids alone. Respiratory rate : Healthcare providers should contemplate fluid administration when the patient's respiratory rate exceeds 20 breaths per minute. Dextrose is not recommended for patients with uncontrolled diabetes or hypokalemia. When prescribing intravenous (IV) fluids, remember the 5 Rs: Resuscitation, Routine maintenance, Replacement, Redistribution and Reassessment. Isotonic versus hypotonic solutions for maintenance intravenous fluid administration in children. [PubMed: 20182780]17.Kraut JA, Madias NE. [PubMed: 27583707]12.Claure-Del Granado R, Mehta RL. Primary IV Fluid Equipment Sterile spike: This connects the tubing to the IV bag. The following example shows an application of this formula:First 10 kg: 100 mL/kg/dNext 10 to 20 kg: Additional 50 mL/kg/dAny remaining weight more than 20 kg: Additional 20 mL/kg/dFor example, the maintenance fluid requirements of an adult man whose body weight is 70 kg man are calculated as follows:First 10 kg: 100 mL/kg/d x 10 kg = 1000 mL/dNext 10 to 20 kg: 50 mL/kg/d x 10 kg = 500 mL/dRemaining 50 kg: 20 mL/kg/d x 50 kg = 1000 mL/dTotal fluids per day: 1000 + 500 + 1000 = 2500 mL/dHourly fluid rate: 2500/24 = 104 mL/hExercising caution when applying these weight-based formulae, especially in patients who are older or suffering from obesity, is essential.[14] The intricacies of selecting the appropriate tonicity and volume of fluid administration extend beyond the scope of this article. Clinical evaluation is often sufficient based on physical examination and vital signs. [PubMed: 30982364]7.McGuire D, Gotlib A, King J. Tachycardia may indicate a compensatory physiological response to preserve perfusion in hypovolemia and can manifest as an early sign of compensated hypovolemic shock. Healthcare providers should administer fluids cautiously to avoid fluid overload, which may result in adverse patient outcomes.The indications for fluid administration encompass resuscitation, rehydration, and maintenance. Deciding on the optimal amount and composition of IV fluids to be administered and the best rate at which to give them can be a difficult and complex task, and decisions must be based on careful assessment of the patient's individual needs. If patients need IV fluids for routine maintenance alone, restrict the initial prescription to: 25 to 30 ml/kg/day of water and approximately 1 mmol/kg/day of potassium, sodium and chloride and approximately 50 to 100 g/day of glucose to limit starvation ketosis. Intravenous maintenance fluids revisited. Central pontine myelinolysis: historical and mechanistic considerations. Depending on the patient's medical conditions, these losses can vary in volume and composition. The guideline will assume that prescribers will use a drug's summary of product characteristics to inform decisions made with individual patients. 2014 Dec 18;2014(12):CD009457. Patients with traumatic brain injury (including patients needing neurosurgery) are also excluded. Notably, it is essential to recognize that many hospitalized patients have underlying risks, including elevated ADH release, which can result in volume retention and the exacerbation of hyponatremia.[15] In patients with inappropriate ADH secretion (SIADH), isotonic fluids are the preferred choice for maintenance fluids.The risks associated with hyponatremia encompass the possibility of cerebral edema, carrying the potential for severe neurological complications, including seizures. Compartment Syndrome Abdominal compartment syndrome can become a complication when administering large volumes of fluids exceeding 5 L in 24 hours. IV Fluid Solutions The choice of IV fluid depends on the type of body fluid lost and any associated electrolyte or acid-base abnormalities. How to select optimal maintenance intravenous fluid therapy. [PubMed: 11219224]16.Norenberg MD. Nutritional experts and dietitians assess caloric requirements for patients. TPN may be needed for patients who cannot consume enteral fluids. In cases of dehydration, the pulse will typically be fast and thready.[10] Skin turgor and appearance of eyes: In severe cases of dehydration, one may observe flaccid or tented skin, and the eyes may appear sunken back into the orbital cavities. Furthermore, consistent monitoring of the patient's clinical status, vital signs, daily weights, and appropriate laboratory assessments, in conjunction with effective communication among healthcare team members, can help alleviate these potential problems.An interprofessional healthcare team plays a critical role in fluid management. Similarly, a patient admitted for dehydration due to severe diarrhea may require different fluid solutions than a patient with hypovolemic shock due to a significant upper gastrointestinal bleed.When administering intravenous (IV) fluids, it is crucial to consider their potential impact on the patient. Cochrane Database Syst Rev. Although fluid management is crucial for providing quality patient care, it can also lead to complications that require careful consideration and monitoring. 2009 Oct 01;80(7):692-6. They also do not apply to patients needing inotropes and those on intensive monitoring, and so they have less relevance to intensive care settings and patients during surgical anaesthesia. The following recommendations have been identified as priorities for implementation. However, it is essential to avoid hypertonic starch solutions in patients with hypovolemia due to the potential risk of acute kidney injury.Maintenance fluids address the patient's physiological needs, encompassing sensible and insensible fluid losses. Hyperkalemia: Hyperkalemia can be a significant concern for patients with renal failure who receive potassium-containing solutions. In such situations, alternative routes, such as IV access, offer a direct means to administer fluids into the vascular system. 2009 Apr;39(4):14. 2009 Jan-Feb;45(1-2):9-14. Each fluid has a distinct composition with varying solutes, possibly leading to metabolic changes.[1] For the safe use of fluids, the "Four Rights" of fluid stewardship emphasizes the importance of the right drug, right duration, right dose, and right patient.[1] The 2 primary types of IV fluids include crystalloid and colloid solutions. Supporting laboratory data include an elevated BUN/Cr ratio and elevated kidney and liver function tests. J Paediatr Child Health. Monitoring fluctuations in a patient's body weight is valuable for assessing fluid status. IV pole: The IV pole is a common fixture in healthcare settings, providing stable and adjustable support for IV bags and tubing. Dextrose can trigger insulin release, which may exacerbate hypokalemia by shifting potassium into the intracellular space.Patients with severe hypovolemia or hypovolemic shock may achieve better outcomes with lactated Ringer solution or 0.45% sodium chloride. Clear incidents of fluid mismanagement (for example, unnecessarily prolonged dehydration or inadvertent fluid overload due to IV fluid therapy) should be reported through standard critical incident reporting to encourage improved training and practice (see the table on consequences of fluid mismanagement to be reported as critical incidents). An elevated respiratory rate suggests a compensatory response to metabolic acidosis resulting from lactic acidosis due to inadequate tissue perfusion. Additional monitoring of urinary sodium may be helpful in patients with high-volume gastrointestinal losses. Various methods are available to assess a patient's volume status. Timely communication and addressing any alterations in physical examination findings and abnormal laboratory results can aid in preventing further deterioration and disturbances in electrolyte and acid-base balances.Frontline healthcare team members can evaluate patients' ability to tolerate enteral fluids and promote oral intake without contraindications. [PubMed: 12897346]15.Miller M. Clinicians can adjust the proportions, as required, based on the patient's ability to drink.Assessment of vital signs, physical examinations, and supplementary laboratory data will help determine the appropriateness of each patient's fluid management strategy. If patients need IV fluids to address existing deficits or excesses, ongoing abnormal losses or abnormal fluid distribution, follow algorithm 4: replacement and redistribution. If patients need IV fluids for routine maintenance, follow algorithm 3: routine maintenance. Laboratory markers serve as useful supplementary information. For instance, a patient with severe burns will encounter more substantial fluid losses than a relatively healthy patient placed on nothing by mouth (NPO) before a procedure. This should initially include at least daily reassessments of clinical fluid status, laboratory values (urea, creatinine and electrolytes) and fluid balance charts, along with weight measurement twice weekly. Improper fluid management can cause significant morbidity and mortality from volume depletion or overload. Urinary sodium may also indicate the cause of hyponatraemia, and guide the achievement of a negative sodium balance in patients with oedema. Clinical monitoring should include current status and trends in: National Early Warning Score (NEWS) fluid balance charts weight. (This quantity will not address patients' nutritional needs; see the NICE guideline on nutrition support in adults.)Weight-based potassium prescriptions should be rounded to the nearest common fluids available (for example, a 67 kg person should have fluids containing 20 mmol and 40 mmol of potassium in a 24-hour period). This activity reviews the assessment of patients' volume status, the selection of intravenous solutions, and potential complications associated with fluid management in hospitalized patients. [PubMed: 24196097]4.Friedman JN, Goldman RD, Srivastava R, Parkin PC. Crit Care Clin. Patients needing resuscitation lack hemodynamic stability, and fluids are used to address acute volume loss or an existing intravascular depletion resulting in a deficit. [PubMed: 9651436]14.Shafiee MA, Bohn D, Hoorn EJ, Halperin ML. 2015 Dec;2(4):106-115. Tear production: This is particularly pertinent in infants and children, making it essential to inquire about parents' observations and assess the child while in the examination room.[9] Peripheral pulses: When evaluating peripheral pulses, examining brachial and femoral pulses in infants and radial or dorsalis pedis pulses in older patients is crucial. This approach is crucial to prevent iatrogenic complications, including dehydration, volume overload, electrolyte imbalances, and pH imbalances. Potassium should not be added to IV fluid bags as this is dangerous. Urine output : In clinical practice, healthcare providers should anticipate a minimum urine output of 1.5 mL/kg/h in children and more than 1 mL/kg/h in adults. In cases of severe hypovolemic shock in children without signs of fluid overload, it is recommended to administer 10 to 20 mL/kg of fluid boluses at intervals of 20 to 30 minutes, repeating 2 to 3 times. Crystalloid solutions are typically preferred as the first-line treatment, whereas colloid solutions are not the recommended initial option for hypovolemia, unless it is not due to bleeding. [2] Occasionally, colloid solutions, such as albumin, may be considered for patients who do not respond to crystalloid solutions or when hypoalbuminemia contributes to shock. Tactile skin temperature: Traditionally, cool and clammy skin can be a sign of hypovolemic shock attributed to peripheral vasoconstriction, especially in the hands and feet. Ann Emerg Med. In the event of significant hyponatremia, it is crucial to avoid correcting the serum sodium levels too rapidly, as this could lead to severe neurological complications known as osmotic demyelination syndrome.[16] Hypernatremia: Hypernatremia can occur due to administering hypertonic saline or incorrectly formulated hyperalimentation solutions. Weight gain may indicate fluid excess, whereas weight loss can signify fluid deficits. [PubMed: 22945490] Disclosure: Mark Castera declares no relevant financial relationships with ineligible companies. Syndromes of excess antidiuretic hormone release. Many trials inferring best therapy for fluid resuscitation after acute fluid loss have actually examined situations of hypovolaemia induced by anaesthesia. Mucous membranes: Mucous membranes may exhibit a dry, sandpaper-like texture on the oral mucosa or tongue in cases of dehydration.[11] Jugular vein appearance: Although a distended jugular vein (JVD) can indicate volume overload, it may also be observed in a euvolemic patient with congestive heart failure who is not effectively pumping blood.[12] Laboratory Findings Blood urea nitrogen/creatinine (BUN/Cr): Reduced renal blood flow due to decreased intravascular volume can lead to acute kidney injury and an elevated BUN/Cr ratio. [PMC free article: PMC4970195] [PubMed: 27484681]13.Chesney CR. [PubMed: 12548269]9.Canavan A, Arant BS. Fluid management can vary from a straightforward necessity, satisfying daily water and electrolyte requirements, to a complex procedure required for patients who have experienced extensive trauma, undergone surgical tissue injury, suffered burns, endured critical illness, or faced sepsis. Pediatr Emerg Care. Enteral Fluid Solutions Enteral fluid solutions are diverse and cater to different medical requirements, ranging from clinical rehydration to sustaining infant nutrition and supplementing electrolytes in athletes. However, many patients cannot tolerate oral intake due to an acute illness. Capillary Refill Time. Although there is no universal, one-size-fits-all formula or strict guidelines for fluid management, replenishing lost fluids when a deficit is detected is a fundamental principle applicable to all patients. There is also considerable debate about the best IV fluids to use (particularly for more seriously ill or injured patients), resulting in wide variation in clinical practice. Segar, MD, Pediatrics, 1957;19:823-832. [PubMed: 18036144]2.McNab S, Ware RS, Neville KA, Choong K, Coulthard MG, Duke T, Davidson A, Dorofaeff T. Many adult hospital inpatients need intravenous (IV) fluid therapy to prevent or correct problems with their fluid and/or electrolyte status. Hypotension and tachycardia indicate that the cardiovascular system can no longer compensate for hypovolemia effectively. Treatment of acute metabolic acidosis: a pathophysiologic approach. Drip chamber: This monitors the flow of IV fluids and calculates the rate of drops per minute. It is important to emphasise that the recommendations do not apply to patients under 16 years, pregnant women, and those with severe liver or renal disease, diabetes or burns. [PubMed: 19817339]10.Rushing J. StatPearls Publishing; Treasure Island (FL): Apr 23, 2023. Hemoconcentration: An elevated hematocrit results from a relative excess of red blood cells compared to intravascular fluid volume. If patients need IV fluids for fluid resuscitation, follow algorithm 2: fluid resuscitation. QJM. [PubMed: 15289767]5.Kataoka H. 2004 Aug;145(2):201-7. Hypertension, peripheral edema, pulmonary edema, and JVD may indicate possible fluid overload.The IV administration of fluids is a common practice when oral intake cannot sufficiently address a fluid deficit and ongoing losses. Patients should have an IV fluid management plan, which should include details of: the fluid and electrolyte prescription over the next 24 hours the assessment and monitoring plan.Initially, the IV fluid management plan should be reviewed by an expert daily. BMC Nephrol. This activity also highlights the crucial role of the interprofessional healthcare team in managing patients' volume status, optimizing patient outcomes and reducing morbidity and mortality. Although mismanagement of fluid therapy is rarely reported as being responsible for patient harm, it is likely that as many as 1 in 5 patients on IV fluids and electrolytes suffer complications or morbidity due to their inappropriate administration. Access ports: These are utilized for administering secondary medications and IV push medications. The report recommended that fluid prescribing should be given the same status as drug prescribing. This can be easily assessed on the fingertips and toes.[7] Fontanelle: The presence of a sunken fontanelle on an infant's skull is indicative of hypovolemia.[8] Edema: Peripheral edema may indicate either volume overload or the third spacing of intravascular fluid. 1998 Jul;102(1 Pt 2):229-30. Specific clinical scenarios may necessitate higher urine output thresholds to minimize the risk of renal toxicity, especially when administering nephrotoxic medications such as acyclovir. Pharmacists are critical in recommending appropriate IV fluid formulations and collaborating with dietitians on total parenteral nutrition (TPN) when necessary. In such cases, the impaired ability to effectively clear the potassium load may lead to life-threatening cardiac arrhythmias. Whenever feasible, oral administration is the primary preference. [PMC free article: PMC10837683] [PubMed: 25519949]3.Cavari Y, Pitfield AF, Kissoon N. When fluid overload is evident, children should receive 5 to 10 mg/kg boluses distributed over an extended time frame.Managing a patient's fluid varies according to their unique clinical condition. Hypotonic solutions are typically utilized when treating hypernatremia, whereas isotonic and hypertonic solutions are chosen to manage cases of hyponatremia. ESC Heart Fail. Diagnosing dehydration? Clinical examination should include an assessment of the patient's fluid status, including: pulse, blood pressure, capillary refill and jugular venous pressure presence of pulmonary or peripheral oedema presence of postural hypotension. Strategies for further research into the subject have also been proposed. However, in certain cases, patients may tolerate or necessitate alternative enteral methods, including the use of feeding tubes. Offer IV fluid therapy as part of a protocol (see the algorithms for IV fluid therapy): Assess patients' fluid and electrolyte needs following algorithm 1: assessment. Extension set: An extension set typically consists of 10 to 20 cm of IV tubing connected to the IV cannula. Clinical significance of bilateral leg edema and added value of monitoring weight gain during follow-up of patients with established heart failure. Hospitalized patients often suffer from conditions that hinder their capacity to regulate their hydration status. There is a clear need for guidance on IV fluid therapy for general areas of hospital practice, covering both the prescription and monitoring of IV fluid and electrolyte therapy, and the training and educational needs of all hospital staff involved in IV fluid management. Volume Overload Patients should be regularly monitored for peripheral edema, pulmonary edema, or hepatomegaly signs.[16] Healthcare providers should consider the underlying cardiac dysfunction or renal failure and adjust fluid administration volumes appropriately. Conversely, elevated blood pressure is typically associated with hypervolemia. [PubMed: 32491685]8.Porter SC, Fleisher GR, Kohane IS, Mandl KD. Examining the patient's records from recent outpatient visits before hospitalization can provide valuable information regarding the patient's typical baseline weight.[5] Heart rate : Healthcare providers should consider fluid administration when the heart rate exceeds 90 bpm. The maintenance need for water in parenteral fluid therapy, by Malcolm A. Disclosure: Mahesh Borhade declares no relevant financial relationships with ineligible companies.Fluid balance is a term used to describe the balance of input and output of fluids in the body, to allow metabolic processes to function properly and thereby maintaining optimal hydration ... This article provides an introduction to fluid management; the physiology that supports the rationale for prescribing IV fluids; the impact of vasodilatation and vasoconstriction; and the role of the pharmacist in managing patients. Patients receiving maintenance fluids are hemodynamically stable and cannot orally meet their daily fluid and electrolyte requirements.Oral intake is the most natural and preferred method for receiving fluids. Combination regimens that incorporate both IV and oral approaches have proven effective for patients who cannot enterally meet their total daily fluid requirements. Such solutions are suitable for children on maintenance fluids, for patients experiencing hypoglycemia and alcohol or fasting ketoacidosis, as well as for those with hyperkalemia but no hyperglycemia when administered with insulin. IV fluid management plans for patients on longer-term IV fluid therapy whose condition is stable may be reviewed less frequently. This set reduces micromovements at the IV insertion sites and protects against blood and body fluid exposure during IV tubing changes. The primary objective is to avert irreversible shock and over-resuscitation. StatPearls [Internet]. Blood Press. 2019 Jun;28(3):146-156. Many reasons underlie the ongoing debate, but most revolve around difficulties in interpretation of both trial evidence and clinical experience, including the following factors: Many accepted practices of IV fluid prescribing were developed for historical reasons rather than through clinical trials. Access free multiple choice questions on this topic. Enteral Tubes Enteral tubes come in various forms, each designed for specific clinical needs and patient conditions. Trials claiming to examine best early therapy for fluid resuscitation have actually evaluated therapy choices made after initial fluid resuscitation, with patients already in critical care or operating theatres. Backcheck valve: This valve prevents the reverse flow of fluid or medication within the IV. For more information, see the table on IV fluid prescription for routine maintenance over a 24-hour period. 2016 Nov;19(6):434-438. Errors in prescribing IV fluids and electrolytes are particularly likely in emergency departments, acute admission units, and general medical and surgical wards rather than in operating theatres and critical care units. J Pediatr. (Reduced urinary sodium excretion [less than 30 mmol/l] may indicate total body sodium depletion even if plasma sodium levels are normal. Hospitals should have an IV fluids lead, responsible for training, clinical governance, audit and review of IV fluid prescribing and patient outcomes. In addition to compensating for regular physiological losses, fluid replacement becomes necessary in cases of abnormal conditions such as vomiting, diarrhea, or extensive cutaneous burns.Due to an increased incidence of hyponatremia, hypotonic IV fluids are not suitable for maintenance in hospitalized patients who could have complex physiological derangements, decreased urinary output, less caloric expenditure, and elevated antidiuretic hormone (ADH) levels.[3] Isotonic IV maintenance fluids reduce the risk of hyponatremia and are a more appropriate choice. Inadequate intravascular volume can result in shock, ischemic stroke, myocardial infarction, renal and liver injury, organ failure, and even death. Both hypovolemia and fluid overload are associated with significant morbidity and mortality. 2012 Oct;8(10):589-601. The scope of the guideline does not cover the practical aspects of administration (as opposed to the prescription) of IV fluids. Sensible losses pertain to conventional forms of excretion, such as urination and defecation, whereas insensible losses pertain to less obvious fluid expenditure, including sweating and respiratory evaporation. Healthcare providers should assess the complete clinical scenario before proceeding with fluid replacement.The list provided below delineates observations that aid healthcare providers in discerning whether a patient is experiencing fluid depletion or volume overload.[4] Vital Signs Body weight : A patient's body weight is a highly sensitive indicator of changes in volume status. In addition, hypotension, tachycardia, an elevated respiratory rate, weight loss, oliguria, delayed capillary refill, and a NEWS score ≥5 indicate potential hypovolemia. Nursing. Making such choices requires clinical judgment based on the patient's initial fluid status and projections of their ongoing fluid needs. Fluid management is crucial in inpatient medical settings, where each patient presents unique and individual requirements. Therefore, a comprehensive interprofessional approach to fluid management is crucial to maximize patient outcomes and diminish morbidity and mortality.Review Questions1.Yung M, Keeley S. 2013 Nov;29(11):1225-8; quiz 1229-31. 2001 Jan;17(1):11-23, v. [PubMed: 19365211]11.Armstrong LE, Kavouras SA, Walsh NP, Roberts WO. Fluids are typically administered in a healthcare facility unless a specific situation necessitates community-based administration.The equipment generally required to administer fluids effectively is listed below. Curr Opin Clin Nutr Metab Care. Patients with hypokalemia may require potassium supplementation, while bicarbonate may be beneficial in cases of severe acidosis.Solutions containing dextrose have shown no evidence of harm or benefit for most patients. A slower refill rate may suggest volume depletion. Laboratory investigations should include current status and trends in: full blood count urea, creatinine and electrolytes. Objectives: Identify the indications for fluid therapy in various clinical settings and patient populations based on clinical evaluation and specific medical conditions.Implement evidence-based fluid resuscitation and maintenance therapy guidelines for acute and critical care patients, considering their unique physiological needs.Identify potential risk factors and contraindications related to fluid management in patients.Communicate effectively among the interprofessional healthcare team, including physicians, nurses, nutritionists, and pharmacists, to optimize fluid management strategies and improve patient outcomes. Crystalloid solutions include normal saline, half-normal saline, and lactated Ringer solution. They include commercial rehydration solutions, WHO rehydration solutions, breastmilk or formula, and commercially available sports drinks.In the pediatric population, it is crucial to consider a child's size when determining their rate of fluid maintenance. Physical Examination Findings Capillary refill: Under normal conditions, capillary refill typically occurs in under 2 seconds. Am Fam Physician.