

Managing Electrolyte Imbalances in Geriatric Patients with GI Disorders: Diagnostic Approaches, Treatment Strategies, and Clinical Outcomes

Abstract:

This Minireview article explores the critical role of electrolytes in geriatric gastric patients, emphasising their significance in managing gastrointestinal disorders. Elderly individuals are prone to electrolyte imbalances due to age-related physiological changes and the prevalence of gastric conditions. The review discusses the diagnostic methods, treatment strategies, and clinical outcomes associated with electrolyte disturbances in this population. Furthermore, it highlights the importance of interdisciplinary collaboration and personalised approaches in addressing electrolyte imbalances to improve patient outcomes.

Keywords: Geriatric patients, electrolytes, gastric disorders, diagnostic methods, treatment strategies, clinical outcomes, interdisciplinary collaboration, personalised approaches.

Introduction: An overview of managing electrolyte imbalances plays a crucial role in managing gastric disorders in the geriatric population, with a prevalence of up to 10% in elderly patients[1]. The elderly are particularly vulnerable to fluid and electrolyte disturbances due to age-related physiological changes, emphasising the importance of monitoring and maintaining optimal hydration levels to prevent negative outcomes[3][4]. Electrolyte disturbances, such as hyponatremia, are common in the elderly and can significantly impact morbidity and mortality, especially in the context of neurologic injuries. Elderly individuals face a heightened risk of electrolyte imbalances due to age-related physiological changes, particularly in kidney function and homeostatic capabilities. These imbalances can lead to a range of complications, including cognitive deficits, gait instability, falls, fractures, and even increased mortality[4]. The geriatric population's susceptibility to disturbances in water and electrolyte balance underscores the importance of closely monitoring and maintaining healthy hydration levels, especially in the presence of concurrent illnesses and therapies[5]. Gastrointestinal disturbances, such as sodium and water losses, are common in the elderly, further exacerbating the risk of electrolyte disorders. Moreover, the elderly are at a higher risk of developing gastrointestinal disorders like reflux esophagitis, malabsorption issues, and inflammatory bowel disease, emphasising the need for improved clinical care in this population. Understanding these dynamics is crucial for enhancing the management and prevention of electrolyte imbalances and gastrointestinal conditions in older patients.

Electrolyte Imbalance in Geriatric Gastric Patients: Electrolyte imbalances, particularly hyponatremia, are frequently observed in elderly patients undergoing gastrointestinal surgery[6]. Hyponatremia, characterized by low serum sodium levels below 135 mmol/L, can lead to a spectrum of symptoms ranging from lethargy to seizures, especially in the elderly population[7]. Studies emphasize the importance of early recognition and appropriate management of electrolyte disorders to prevent complications and reduce hospital readmissions. It can result from various causes such as excessive fluid intake, medication side effects, congestive heart failure, and the syndrome of inappropriate antidiuretic hormone secretion[8]. Electrolyte imbalance in geriatric gastric patients can indeed lead to a spectrum of symptoms, ranging from mild mental impairment to severe conditions like seizures. Research indicates that disturbances in water and electrolyte balance are common in older patients, with hyponatremia being, electrolyte imbalances, especially hypocalcaemia and hypokalaemia, are frequently observed in patients undergoing gastrointestinal surgery, emphasizing the importance of timely recognition and intervention to prevent complications[9]. Hypokalaemia and hypocalcaemia are also frequently observed in this patient

population[10][11]. Factors like comorbidities, drug use, and gender contribute to the risk of hypokalaemia in the elderly[12]. Electrolyte disturbances can lead to prolonged hospital stays, increased costs, and higher mortality rates. In surgical settings, using balanced electrolyte solutions like Hartmann's solution can prevent metabolic acidosis and improve organ perfusion compared to saline-based fluids in elderly patients. Hartmann's solution refers to the utilization of Hartmann wavefront sensors in various scientific applications. In the context of fluid resuscitation post-cardiac surgery, a study compared the safety and efficacy of using Hartmann's solution as a predominant resuscitation fluid over HAS, showing that Hartmann's solution can safely replace HAS, leading to potential cost-effectiveness and shorter PICU stays [13]. As we recognizing and managing electrolyte imbalances in geriatric gastric patients, especially during surgery, is crucial for better outcomes and reduced complications. Gastric disorders commonly seen in geriatric patients can lead to electrolyte imbalances, contributing to complications such as dehydration, cardiac arrhythmias, and cognitive impairment[14].

Diagnostic Methods and Monitoring:

Various methods are employed to diagnose electrolyte imbalances in geriatric gastric patients, crucial for managing gastric disorders in the elderly. Blood tests, urine tests, and imaging studies play key roles in monitoring electrolyte levels. Blood tests, as discussed in [15], are essential for detecting hyponatremia, a common issue in the elderly. Additionally, urine tests, highlighted in [16], can provide valuable insights into electrolyte imbalances. Imaging studies, although not directly mentioned in the contexts, can aid in assessing underlying conditions contributing to electrolyte disturbances. Regular monitoring of electrolyte levels is vital for timely intervention and effective management of gastric disorders in the elderly population, as emphasized in [17].

Treatment Strategies:

This section evaluates current treatment options for managing electrolyte imbalances in geriatric gastric patients, including dietary modifications, pharmacological interventions, and intravenous electrolyte replacement therapy. It discusses the effectiveness and safety of different treatment modalities in this population. Electrolyte imbalances in geriatric patients can lead to increased morbidity and mortality due to age-related physiological changes [18] [19]. These imbalances are crucial to address in various conditions, including COVID-19 and neurologic injuries, as they can exacerbate health issues and impact outcomes [20][21]. Treatment options for managing electrolyte imbalances in the elderly encompass dietary modifications, pharmacological interventions, and intravenous electrolyte replacement therapy, emphasizing the importance of monitoring and maintaining healthy hydration levels in this population [22]. Prompt correction of electrolyte disturbances is vital to prevent complications and improve patient outcomes, especially in geriatric individuals prone to fluid and electrolyte imbalances. Identifying and managing these imbalances promptly is essential to prevent syndromes, frailty, and associated health risks in the elderly.

Dietary modifications in geriatric patients:

Dietary modifications play a crucial role in improving the nutritional status of geriatric patients in various care settings shown in Figure No. 01.

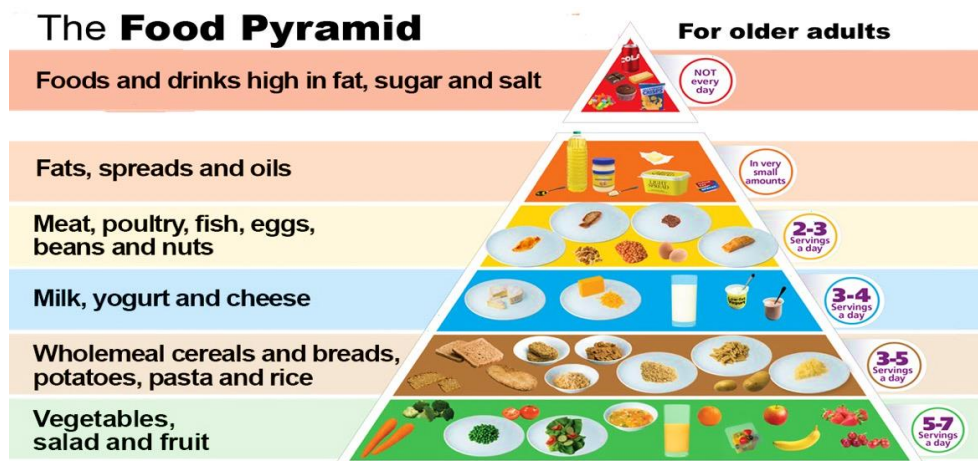


Fig No:01 .Geriatric Dietary modifications

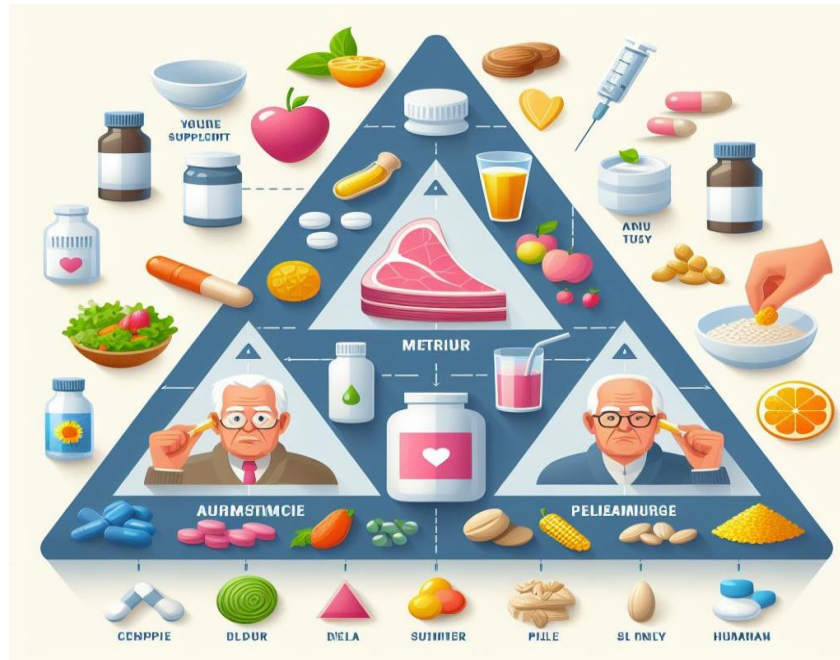


Fig No:02 .Geriatric Dietary modifications

Studies have shown that implementing modified diet regimens can significantly increase dietary intake and improve the nutritional status of elderly patients, such as those undergoing hemodialysis [23]. Additionally, texture-modified diets have been highlighted as essential for nursing home residents with swallowing or chewing difficulties shown in Figure No. 02., with the availability of appealing texture-modified diets being crucial for adequate nutrition [24] [25]. Furthermore, research indicates that diet modifications can lead to beneficial changes in nutrient intake, body functions, and metabolic indicators in chronically mentally ill patients residing in nursing homes [26].

Pharmacological interventions in geriatric patients:

Pharmacological interventions in geriatric patients have shown significant benefits in optimizing drug management[27][28]. Studies have highlighted the effectiveness of interventions in reducing potentially inappropriate medications and the number of drugs used per person, ultimately decreasing the incidence of PIMs and 30-day readmission rates[29]. Additionally, pharmacist-led interventions have successfully reduced hypnotic drug use in geriatric inpatients without compromising sleep quality, emphasizing the importance of deprescribing strategies in this population[30][31]. These interventions involve various components such as education of healthcare personnel, standardized discontinuation regimens, patient education, and transitional care support, contributing to improved outcomes and safer medication practices in elderly individuals.

Table No:01.Dosage Recommendations for Laxatives and Cathartics	
Agents that Cause Softening of Faces in 1–3 Days	Recommended Dose
Bulk-forming agents/osmotic laxatives	
Methylcellulose	4–6 g/day
Polycarbophil	4–6 g/day
Psyllium	Varies with product

Polyethylene glycol 3350	17 g/dose
Emollients	50–360 mg/day
Docusate sodium	50–360 mg/day
Docusate calcium	100–300 mg/day
Docusate potassium	4–6 g/day
Lactulose	4–6 g/day
Sorbitol	Varies with product
Methylcellulose	17 g/dose
Polycarbophil	50–360 mg/day
Psyllium	50–360 mg/day
Polyethylene glycol 3350	100–300 mg/day
Emollients	4–6 g/day
Docusate sodium	4–6 g/day
Docusate calcium	Varies with product
Docusate potassium	17 g/dose
Lactulose	15–30 mL orally
Sorbitol	30–50 g/day orally
Agents that Result in Soft or Semifluid Stool in 6–12 Hours	
Bisacodyl (oral)	5–15 mg orally
Senna	Dose varies with formulation
Magnesium sulfate (low dose)	<10 g orally
Agents that Cause Watery Evacuation in 1–6 Hours	
Magnesium citrate	18 g 300 mL water
Magnesium hydroxide	2.4–4.8 g orally
Magnesium sulfate (high dose)	10–30 g orally
Sodium phosphates	Varies with salt used
Bisacodyl	10 mg rectally
Polyethylene glycol–electrolyte preparations	4 L

Oral Rehydration Solutions:

Available ORS Products	Forms of sugar	Carbohydrate, g	Sodium, mEq/L	Chloride, mEq/L	Potassium, mEq/L	Base, mEq/L	Osmolarity, mOsm/L
Ceralyte70	Rice starch	40	70	60	20	30	<220
WHO/UNICEF ORS "Reduced-Osmolarity Formula"	Glucose	25	45	35	20	30	250
Rehydralyte	Glucose	25	75	65	20	30	310
Enfalyte	Rice starch	30	50	40	25	30	200
PediaLyte®	Glucose	25	45	35	20	30	250

Fig No :03. Dosage Recommendations for Geriatric Patients.

Ref:(Annals of Long-Term Care: Clinical Care and Aging. 2016;24(2):34-38. Received March 26, 2015; accepted September 14, 2015.

Fig No:04.The present guidelines, the definition “the oesophagus with Barrett’s mucosa (a columnar epithelium that extends continuously from the stomach to the oesophagus regardless of the presence of intestinal metaplasia[32].

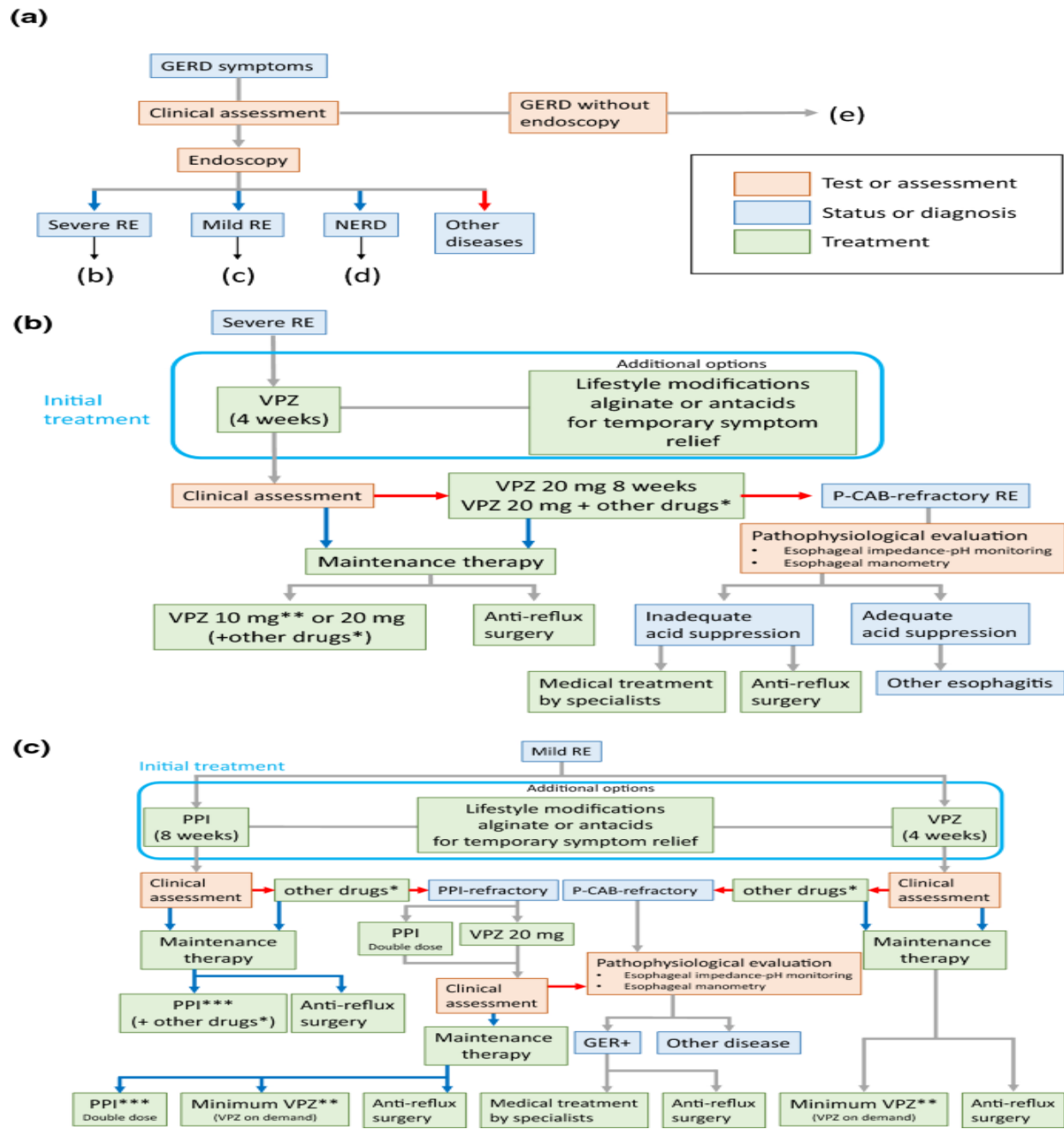


Fig No:04. Algorithm for the diagnosis and treatment of gastroesophageal reflux disease

Algorithm for the diagnosis and treatment of gastroesophageal reflux disease (GERD). a Diagnosis of GERD with endoscopy. b Treatment strategy for severe reflux esophagitis (RE). c Treatment strategy for mild RE. d Treatment strategy for non-erosive reflux disease (NERD). e. Diagnosis of GERD without endoscopy. Red arrows: judged to be negative or unsuccessful treatment. Blue arrows: judged to be a positive or successful treatment. *Prokinetics or Japanese herbal medicine. **Minimal dose of PPI used in cases with good control during 10 mg of vonoprazan. ***Minimal doses of PPI or on-demand therapy may be used[32].

S.No	Classes of medicines that increase the severity of reflux	Medicines that may cause constipation	Antibiotics to cause Diarrhea
01	Nonsteroidal anti-inflammatory agents (NSAIDs)	Antihypertensives	Penicillin, including ampicillin and amoxicillin
02	Nitrates	Anticholinergics	Clindamycin
03	Theophylline	Cholestyramine	Cephalosporins
04	Calcium channel blockers	Iron	Macrolides, such as clarithromycin
05	Oral antibiotics	Antacids containing mostly aluminum	Fluoroquinolones, such as ciprofloxacin and levofloxacin
06	Birth control pills	Narcotics/pain medicines	Cephalosporins, such as cefdinir and cefpodoxime
Table No :02. Drugs Cause Gastric Problems to Geriatric Patients			

Proton pump inhibitors (PPI) are commonly used in geriatric patients for gastric conditions like gastroesophageal reflux disease and peptic ulcers [33]. However, inappropriate prescription of PPI is prevalent among older inpatients, leading to potential adverse drug interactions, especially with drugs like clopidogrel and citalopram [34]. Additionally, elderly individuals are at a higher risk of adverse drug reactions due to polypharmacy, emphasizing the need for careful consideration of drug-drug interactions in this population [35] [36]. While PPIs are effective for gastric protection during NSAID treatment, their long-term use in the elderly has been associated with issues like bacterial overgrowth, infections, hip fractures, nutritional deficiencies, and mortality risks [37].

Clinical Outcomes and Prognosis:

Electrolyte imbalances in geriatric gastric patients can have significant implications on prognosis and mortality rates. Studies highlight that hyponatremia is a common disorder in older patients, leading to cognitive deficits, falls, fractures, and increased mortality rates [38]. Additionally, patients undergoing percutaneous endoscopic gastrostomy (PEG) for neurologic dysphagia or head/neck cancer often present with electrolyte alterations, particularly hyponatremia, which is associated with shorter survival times, reflecting severe systemic metabolic distress [39]. Furthermore, community-acquired hypokalemia (CAH) is prevalent in the elderly, with factors like loop diuretics, hydrochlorothiazides, and female gender posing as independent risk factors, leading to longer hospital stays, increased costs, and higher mortality rates in this population [40][41]. Proper management and monitoring of electrolyte imbalances are crucial in improving outcomes and reducing mortality in geriatric gastric patients.

Future Directions and Research Implications:

Future research in geriatric gastric patients should focus on the impact of electrolyte imbalances on clinical outcomes, especially in conditions like hyponatremia and refeeding syndrome. Interdisciplinary collaboration is crucial to developing personalised approaches for managing electrolyte disturbances in this vulnerable population. Studies should investigate the association between electrolyte alterations and mortality rates, as highlighted in various papers[42][43][44]. Additionally, exploring the prevalence of electrolyte abnormalities in geriatric patients undergoing percutaneous endoscopic gastrostomy (PEG) and their impact on survival can provide valuable insights[45]. Research should also address the challenges posed by polymorbidity and polypharmacy in pharmacotherapy, which complicate the maintenance of water and mineral balance in older individuals[46]. Understanding these aspects can enhance the quality of care and outcomes for geriatric patients with gastric issues.

Discussion: The mini-view underscores the prevalence of electrolyte imbalances in geriatric gastric patients and their impact on clinical outcomes, emphasizing the need for proactive management strategies. Diagnostic methods such as blood tests, urine tests, and imaging studies play a crucial role in identifying electrolyte disturbances early. Treatment options include dietary modifications, pharmacological interventions, and intravenous electrolyte replacement therapy, tailored to individual patient needs.

Moreover, the review discusses the implications of electrolyte imbalances on prognosis and mortality rates, highlighting the importance of proper management and monitoring in improving patient outcomes.

Results: This mini-review consolidates findings on electrolyte management in geriatric patients with gastric issues, emphasizing diagnostic techniques, treatment modalities, and resultant clinical progressions. It illuminates gaps in existing research and advocates for future investigations to delve into tailored interventions and interdisciplinary teamwork for addressing electrolyte imbalances in elderly individuals with gastric conditions.

Conclusion: In conclusion, managing electrolyte imbalances in geriatric patients with gastric disorders is a complex but essential aspect of healthcare that significantly impacts patient outcomes. Future research should focus on refining these management strategies, exploring the long-term effects of various interventions, and enhancing interdisciplinary care models to further improve the quality of care and outcomes for geriatric patients with gastric disorders. By addressing electrolyte imbalances proactively and comprehensively, healthcare providers can significantly enhance the well-being and prognosis of this vulnerable population.

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