

# Perceived Knowledge And Actual Practices Of Nurses Regarding Hypophosphatemia And Refeeding Syndrome In The Critical Care Units: A Cross-Sectional Study

Mona Shower PhD, Ahmed Quzmar MSC, Sarah Abdullah

Technical Institution Of Nursing, Mansoura, Egypt, Head Of Nursing Education And Training Development, King's College Hospital, London- Jeddah, Saudi Arabia

Clinical Educator At King's College Hospital, London- Jeddah, Saudi Arabia

Tissue Viability Nurse At King's College Hospital, London- Jeddah, Saudi Arabia

---

## Abstract:

**Purpose:** The present study aimed to assess the perceived knowledge and actual practices of nurses regarding hypophosphatemia (HP) and refeeding syndrome (RFS) in the critical care units of a private tertiary hospital in Jeddah, Saudi Arabia

**Background:** RFS is a medical condition that can be severe, yet often neglected, in patients who are rapidly re-fed after a prolonged period of undernourishment. The condition is caused by abnormal shifts in electrolytes and fluids, leading to dysfunction in multiple organs. The onset of symptoms typically occurs within 2-5 days of refeeding and can range from mild to life-threatening, depending on the severity of the patient's malnutrition and comorbidities. Diagnosis and estimating the incidence of RFS are challenging due to the lack of a standardized definition and the non-specificity of symptoms.

**Methods:** This study recruited 117 critical care nurses from a tertiary private hospital. The survey included measures on nurses' perceived knowledge and actual practice of nurses regarding HP and RFS using an adopted questionnaire.

**Results:** The findings of the study show that most of the nurses disagree on the role and knowledge about re-feeding syndrome (Mean = 1.63; SD = 0.15). Nurses also reported that they seldom practice on the role and knowledge about re-feeding syndrome (Mean = 3.39; SD = 0.50). This study revealed that nurses lack clarity regarding their own role related to their patients' nutritional status. Significant gaps in the perception of knowledge regarding HP and RFS were also evident. Moreover, the findings imply that the relationship between the perceived knowledge and actual practice of the nurses is significant as supported by a Pearson correlation value of 0.2626 and a p-value of 0.0042. However, nurses' perceived knowledge and actual practice regarding refeeding syndrome does not differ at all to their demographics showing that all p-values were greater than the significant level of 0.05.

**Conclusion:** The results of this study indicate that there is a lack of clarity among nurses regarding their responsibilities concerning their patients' nutritional status. In addition, there were significant discrepancies in their perceived knowledge of identifying and managing hypophosphatemia and refeeding syndrome. The study also suggests that there is a strong correlation between nurses' perceived knowledge and their actual practice. However, there were no significant differences in nurses' perceived knowledge and actual practice of refeeding syndrome based on their demographic characteristics. It is crucial for nurses to have awareness of this condition to recognize patients at risk, prevent its occurrence, and improve management.

**Keywords:** Hypophosphatemia, refeeding syndrome, nurses' role and knowledge, nurses' actual practice, undernourishment, life-threatening condition

---

Date of Submission: 08-03-2026

Date of Acceptance: 18-03-2026

---

## I. Introduction

Inpatients frequently suffer from malnutrition, a condition that often goes unnoticed (Vest et al., 2018; Janssen et al., 2019). Studies have found that between 20% to 50% of individuals are at risk of malnutrition or already malnourished upon hospital admission, but only 7% receive an official diagnosis (Lanctin et al., 2019).

Malnutrition can arise from various factors such as advanced age, low socioeconomic status, inadequate organizational support, chronic systemic or psychiatric diseases, polypharmacy, poor dietary intake, reduced nutrient absorption, and excessive nutrient losses (Barker et al., 2011; Ponzo et al., 2021, Soriano Guillén et al., 2024)

Treating malnourished inpatients can pose a challenge due to the risk of metabolic impairment after

initiating nutrition therapy (Reber et al., 2019).

The negative effects of refeeding were initially documented in studies conducted on prisoners who had been starved for five to six months during World War II (Schnitker et al., 1951; Ponzo et al., 2021). These studies revealed that individuals who had undergone prolonged fasting were susceptible to heart and/or respiratory failure, peripheral edema, neurological symptoms, and even death when reintroduced to excessive or even adequate caloric intake (Keys et al., 1950; Ponzo et al., 2021).

In the 1980s, the medical community coined the term 'refeeding syndrome' (RFS) after observing severe hypophosphatemia, electrolyte/metabolic imbalances, and associated cardiovascular and pulmonary symptoms that resulted in the deaths of two chronically malnourished patients receiving aggressive dextrose-based parenteral nutrition (Weinsier & Krumdieck, 1981; Ponzo et al., 2021).

Since then, RFS has been identified as a rare yet severe and potentially fatal complication that can occur when individuals who have been fasting or consuming very few calories over an extended period of time are re-fed, whether orally, enterally, or parenterally (Skipper, 2012; Ponzo et al., 2021).

In critical care settings, a comprehensive approach to patient care is crucial for promoting wellness and well-being through effective nursing interventions that can significantly influence the adaptation of critically ill patients. However, the complex environment of critical care units can conceal some common aspects from nurses' awareness, necessitating greater attention and awareness.

Electrolyte imbalances can occur suddenly and without a clear cause, making it crucial for critical care nurses to understand the potential consequences of malnutrition on their patients. One such consequence is the development of RFS, which can result in metabolic changes that manifest as respiratory failure. RFS most commonly occurs within the first 72 hours of nutrition therapy and is prevalent among those who have been malnourished or in a state of fasting (Stocker et al., 2021). Despite its significance, studies indicate that healthcare professionals may lack awareness of RFS and the need for monitoring and screening (Janssen et al., 2019).

Furthermore, the management of various intricate procedures, including the delivery of enteral feeding, is a crucial responsibility of nurses in the critical care unit. This forms an essential part of the care package designed to enhance patient outcomes. However, a failure to address the decline in patients' health status promptly can result from inadequate communication and knowledge (Liaw et al., 2011; Ben-Tovim & Theila, 2021).

### **Significance of the Study:**

The prevention of RFS, which can be fatal, requires a thorough understanding of the condition. It is critical to identify patients at risk and take appropriate measures to avoid RFS and the complications that follow (Bahashwan et al., 2023). RFS has been acknowledged for some time as a mechanism that can result in serious complications during nutrition intervention. However, there is a lack of high-quality scientific evidence related to the clinical syndrome. This is mainly because most of the available reports are based on retrospective, observational data and use varying definitions of the syndrome.

### **Aim:**

The present study aimed to assess the perceived knowledge and actual practices of nurses regarding hypophosphatemia (HP) and refeeding syndrome (RFS) in the critical care units of a private tertiary hospital in Jeddah, Saudi Arabia.

### **Research Questions:**

The following research questions regarding the perceived knowledge and actual practices of nurses regarding HP and RFS in the critical care units were answered in the current study:

1. What is the demographic profile of respondents?
2. What is the perceived knowledge and actual practices of nurses regarding HP and RFS in the critical care units?
3. Is there a significant relationship between the perceived knowledge and actual practices of nurses regarding HP and RFS in the critical care units?
4. Is there a difference in the knowledge and actual practices of nurses regarding HP and RFS in the critical care units when grouped according to their demographic profile?

## **II. Subjects And Methods**

### **Study design:**

A descriptive correlational research design was utilized for the current study. Descriptive cross-sectional design to examine the knowledge and actual practices of critical care nurses regarding HP and RFS at a private tertiary hospital in Jeddah, Saudi Arabia.

### **Settings:**

This study was carried out at a private tertiary hospital in Jeddah, Saudi Arabia.

**Sample:**

The subjects of this study included all nursing categories; working in the study setting included all nurses working in the critical care units of private tertiary hospitals. A total of 133,129 nurses agreed to participate in the research; 12 were excluded from participating in the pilot study.

The total number to participate was 117 nurses distributed as 25 nurses were drawn from the emergency room (ER), 71 from the intensive care unit (ICU), and 21 nurses from the coronary care unit (CCU) of a private tertiary hospital.

**Research Scale/Instrument:**

The study utilized an adopted standardized questionnaire developed by **Ben-Tovim & Theilla (2021)** that was selected in accordance with the research purpose. The current questionnaire was divided into three sections.

1. **The first section** included a few questions about participants' sociodemographic data such as gender, age, years of experience, educational level, nationality, and critical care unit of assignment.

2. **The second section** included 15 questions/items about nurses' perceived role and knowledge regarding RFS cardiopulmonary manifestation, occurrence, risk factors, laboratory test indicators, and associated electrolyte imbalance. The questions were answerable with agree and disagree, and evaluated according to participants' responses. The reliability and validity of the instruments gave attributes of the study and reduced the bias level. Test retest reliability and internal validity were measured by the correlation coefficient with a Cronbach alpha of 0.76 for the nurses' nutritional knowledge and early diagnosis of HP and RFS (**Ben-Tovim & Theilla, 2021**).

3. **The third section** included 10 questions related to the nurses' actual practice in the administration and monitoring of nutritional care, which was answerable by a 5-point Likert scale ranging from 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree. The reliability was tested using a correlation coefficient with a Cronbach alpha of 0.78, which was calculated for the nurses' adherence to global nutritional guidelines (**Ben-Tovim & Theilla, 2021**).

**Pilot study:**

Ten staff nurses representing 10 % of the study sample who underwent random selection for participation in a pilot study before starting the collection of data to evaluate the feasibility, applicability, and clarity of the tool is, and to allocate the time required for its completion. Exclusion of the 12 participants from the pilot study from the current study was done to ensure stability.

**Ethical consideration:**

The researcher applied for approval from the IRB and the ethical committee to collect the necessary data. Each participant was given a letter explaining the study's purpose, including the risks and benefits of participation, and further ensured that participants agreed to answer the survey voluntarily and were informed that they could withdraw at any time. In addition, the researcher assured the participants of confidentiality as their identified data would be kept inside a closed cabinet, and no one would see them except the researcher. The participants also signed a written consent form indicating both their agreement to participate in the study and their completion of the questionnaires

**Statistical Design:**

The data gathered were analyzed using the Statistical Package for the Social Sciences (SPSS). Descriptive as well as inferential statistics were applied in order to thoroughly investigate the results obtained from this analysis. This study utilized frequency and percentage data to analyze the sociodemographic profile of the nurses, such as gender, age, years of experience, educational level, nationality, and critical care unit of assignment. The weighted mean with standard deviation (SD) was also applied for further statistical analysis in order to gain insight regarding their role and knowledge, including their actual practice towards HP and RFS assessment and management. Additionally, the relationship between the perceived knowledge and actual practice of nurses in the assessment and management of HP and RFS was analyzed to assess a potential link using the Pearson correlation coefficient. Finally, the study examined how the sociodemographic profile of the nurses influences their perceived knowledge and actual practice in the assessment and management of HP and RFS using t-Test and analysis of variance (ANOVA).

**Table (1)** Table 1 show that the majority of the respondents are female, corresponding to 85.05% of the total number of respondents and 17.95% are male. In terms of age, the respondents are dominated by those who are above 30 years old, corresponding to 59.83%. On the other hand, the least is between 20-25 years old, corresponding to only 1 %of the nurses. Majority of the respondents have bachelor's degree in nursing with a total percentage of 93.16% and only 6.84% have master's degree. In terms of experience, 36.75% have 6-10 years of experience while the least have less than a year of experience. More than half of the nurses (60.68%) were

assigned in ICU while 17.95% were assigned in CCU. **Table (2)** Table 2 illustrates the perception of nurses regarding their role and knowledge about refeeding syndrome. The statement with highest mean responses based on rank is statement number 14. The mean response is 1.88, which is verbally interpreted as disagree. This implies the nurses generally disagree that patients with metastatic cancer are at risk of developing refeeding syndrome. On the other hand, the statement with the lowest mean response is statement number 5. The mean response is 1.27, which is interpreted as agree. This means that the respondents generally agree that phosphate levels are not important to monitor before commencing feeding. The composite mean is 1.63. Overall, the nurses disagree on the role and knowledge about re-feeding syndrome. In terms of SD, the highest SD of 0.52 was obtained by statements 11 and 8, implying that the respondents' opinion really varied on these statements. Meanwhile, consistency of responses is evident in statement number 14, having the lowest SD of 0.33. **Table (3)** demonstrate the actual practices of nurses about re-feeding syndrome. The statement with highest mean responses based on rank is statement number 5. The mean response is 4.56, which is verbally interpreted as strongly agree. This implies the nurses generally strongly agree that nurses monitor glucose level continuously. On the other hand, the statement with the lowest mean response is statement number 9. The mean response is 1.62, which is interpreted as disagree. This means that the respondents generally disagree that there is awareness of the refeeding syndrome. The composite mean is 3.39. Overall, the nurses seldom practice on the role and knowledge about re-feeding syndrome. In terms of SD, the highest SD of 1.20 was obtained by statement 8, implying that the respondents' opinion really varied about the patient's weight being assessed prior to feeding. Meanwhile, consistency of responses is evident in statement number 5, having the lowest SD of 0.59. **Table (4)** show the relationship between perceived knowledge and actual practice about refeeding syndrome. The p-value of the relationship is 0.0042, which is less than 0.05, therefore the null hypothesis was rejected, implying that the relationship between the perceived knowledge and actual practice of the nurses is significant. The positive value of the pearson correlation (0.2626) implies a direct relationship. The higher the perceived knowledge, the more frequent actual practice of the nurses and conversely.

**Table 1: Sociodemographic profile of the nurses N= 117**

Demographic	Frequency	Percentage
Gender	Male 21	17.95
	Female 96	82.05
Age	Between 20-25 years old: 1	0.85
	Between 26-30 years old :46	39.32
	More than 30 years old :70	59.83
Length of experience	Less than 1 year :6	3.42
	1-5 years :39	33.33
	6-10 years: 43	36.75
	More than10 years: 31	26.50
Educational level	Bachelor's in Nursing :109	93.16
	Master's in Nursing: 8	6.84
Critical care unit of assignment	ICU:71	60.68
	CCU:21	17.95
	ER:25	21.37

**Table 2: Nurses' perceived role and knowledge about re-feeding syndrome**

Statements	Mean	SD	Verbal interpretation
The dietician and not the nursing staff is solely responsible for dietary care and follow-up.	1.40	0.49	Agree
Daily monitoring of electrolyte levels is the responsibility of the nurse.	1.67	0.47	Disagree
The nurse's role is to inform the physician of any abnormality in the patient's electrolyte level.	1.85	0.36	Disagree
Electrolyte levels should be monitored prior to feeding.	1.86	0.35	Disagree
Phosphate levels are not important to monitor before commencing feeding.	1.27	0.45	Agree
Hypophosphatemia is a rare condition in ICU patients.	1.39	0.49	Agree
Generally, the patient should be fed immediately upon admission to the ward according to resting energy expenditure measurements	1.51	0.50	Disagree
There is a connection between phosphate levels and respiratory weaning.	1.74	0.44	Disagree
Phosphate levels are associated with patient mortality.	1.77	0.42	Disagree
Phosphate levels are linked to the number of hospitalization days	1.72	0.45	Disagree
Patients with low phosphate levels are at reduced risk of developing refeeding syndrome.	1.56	0.50	Disagree
Patients with a low BMI are at risk of developing refeeding syndrome.	1.85	0.35	Disagree
Patients who receive a significant amount of IV fluid for a prolonged period are at risk of developing the refeeding syndrome.	1.71	0.46	Disagree

Patients with metastatic cancer are at risk of developing refeeding syndrome	1.88	0.33	Disagree
Patients who have developed refeeding syndrome will show normal blood potassium levels.	1.32	0.47	Agree
Composite Mean	1.63	0.15	Disagree

**Table 3: Nurses’ actual practices about re-feeding syndrome**

Statements	Mean	SD	Verbal interpretation
Do the nurses monitor the patient’s nutritional status?	3.87	1.03	Agree
Is the dietitian solely responsible for nutritional care?	2.71	1.17	Neutral
Do patients receive full nutrition therapy on admission to the ICU?	3.46	1.00	Neutral
Do patients with hypophosphatemia receive full nutrition therapy?	3.66	0.91	Agree
Are blood glucose levels monitored continuously?	4.56	0.59	Strongly Agree
Are blood electrolyte levels checked before feeding the patient?	3.88	0.91	Agree
Are blood electrolyte levels monitored daily?	4.06	0.91	Agree
Is the patient’s weight assessed prior to feeding?	3.54	1.20	Agree
Is there an awareness of the Refeeding Syndrome?	1.62	0.69	Disagree
Is nutritional information discussed amongst staff members?	2.53	1.31	Neutral
Composite Mean	3.39	0.50	Seldom

**Table 4: Relationship between perceived knowledge and actual practice about re-feeding syndrome**

Pearson Correlation value	0.2626
p-value	0.0042
Significant	Significant

### III. Discussion

The present study focused on assessing the perceived knowledge and actual practices of nurses regarding HP and RFS in the critical care units. The findings of the study show that most of the nurses disagree on the role and knowledge about re-feeding syndrome. Nurses also reported that they seldom practice on the role and knowledge about re-feeding syndrome. This study revealed that nurses lack clarity regarding their own role related to their patients’ nutritional status.

Significant gaps in the perception of knowledge regarding the identification and management of hypophosphatemia and refeeding syndrome were also evident. Moreover, the findings imply that the relationship between the perceived knowledge and actual practice of the nurses is significant. However, nurses’ perceived knowledge and actual practice regarding refeeding syndrome do not differ at all to their demographics. Nutrition is an interdisciplinary process (Tappenden et al., 2013; Ben-Tovim & Theilla, 2021) that falls under one of the 13 domains in nursing practice (Herdman, 2012). In this regard, DiMaria-Ghalili et al. (2014) as cited by Ben-Tovim & Theilla (2021) recommend that nurses should integrate nutrition throughout their professional careers and establish clearer interactions with registered dietitians and other nutrition professionals (DiMaria-Ghalili et al., 2014; BenTovim & Theilla, 2021).

Furthermore, Ben-Tovim & Theilla (2021) reported that there is still a lack of clarity among nurses regarding their role as members of a multidisciplinary team responsible for nutrition in the critical care unit. Hence, it was found that the majority of nurses (91.1%) did not consider it their responsibility to provide nutritional care and follow-up for patients in the critical care unit. Instead, they believed this task should be left solely to the dietitian, who was only present for 12 hours a week. Unfortunately, this resulted in a gap in ongoing care, which may have contributed to the high prevalence of significant hospital-acquired malnutrition (HP) in patients receiving nutrition care (according to unpublished data from a recent survey). Although 93% of nurses agreed that they should inform physicians of abnormal electrolyte results, only 55% strongly agreed that they actually do so. Thus, it is clear that a more defined set of roles is necessary to ensure optimal patient care in the critical care unit.

In hospitals where specialized multidisciplinary teams composed of physicians, pharmacists, nurses, and dietitians are available, patient outcomes are much better (National Institute for Health and Care Excellence, 2020). However, the availability of such teams is quite limited, which often compels clinicians to rely on their critical judgment at the time of commencing nutritional support. This can lead to increased risks for patients as RFS is a severe condition that can lead to significant morbidity and mortality. Therefore, healthcare providers must exercise diligence in evaluating RFS risk factors before commencing nutritional support (Aubry et al., 2018; McKnight et al., 2019; Reber et al., 2019)

Effective monitoring and follow-up of complex tasks, such as nutritional care, require appropriate knowledge. Ben-Tovim & Theilla's (2021) study revealed significant knowledge gaps among healthcare professionals regarding the crucial aspects of HP and RFS management. Notably, up to 75% of the surveyed population did not recognize the importance of monitoring phosphate levels prior to commencing nutritional care. Additionally, a staggering 69% of the participants considered HP to be a rare condition in critical care units. This

notion is alarming given that HP has been linked to severe complications such as prolonged mechanical ventilation, extended critical care unit stay, and higher mortality rates (Alsumrain et al., 2010, Zhao et al., 2016; Ben-Tovim & Theilla, 2021).

In previous research, Coşkun and colleagues found that over half of critical care patients (52.14%) suffered from RS, which was associated with a higher mortality rate and a longer stay in the critical care unit (Coşkun et al., 2014; Ben-Tovim & Theilla, 2021). Interestingly, most healthcare providers were unaware of potential risk factors for RFS, such as patients receiving dextrose-containing fluids or those with metastatic cancer. This lack of knowledge was reflected in their clinical practice, as patients were started on full nutrition upon admission to the critical care unit, regardless of the presence of HP. These findings highlight the urgent need for improved education and awareness among healthcare providers regarding the development and prevention of RFS in critical care settings.

The existing recommendations suggest a gradual introduction of nutrition for patients who are susceptible to RFS, with a restriction on feeding after the diagnosis of the condition (Berger et al., 2019; McClave et al., 2016). A restricted caloric intake has been found to decrease complications and mortality rate in critically ill patients at risk of RFS in a randomized controlled trial (Doig et al., 2015; Ben-Tovim & Theilla, 2021)

#### IV. Conclusion

The results of this study indicate that there is a lack of clarity among nurses regarding their responsibilities regarding their patients' nutritional status. In addition, there were significant discrepancies in their perceived knowledge of identifying and managing hypophosphatemia and refeeding syndrome. The study also suggests that there is a strong correlation between nurses' perceived knowledge and their actual practice. However, there were no significant differences in nurses' perceived knowledge and actual practice of refeeding syndrome based on their demographic characteristics.

It is crucial for nurses to have awareness of this condition to recognize patients at risk, prevent its occurrence, and improve management. The present study offers novel insights into the current knowledge and practices of nurses regarding HP and RFS, taking into account the latest evidence. Despite the high prevalence of RFS and its potential to cause severe complications in certain categories of hospitalized patients, physicians often fail to diagnose and address the condition. Therefore, nurses must possess adequate knowledge about RFS, as this can help prevent overfeeding and other adverse outcomes in at-risk patients. Such preventive measures can, in turn, reduce hospital stays and mitigate the associated health costs

#### V. Recommendations

Based on the current study findings, it can be recommended that,

- The role of nursing staff as an integral part of a multidisciplinary team in nutritional care needs to be clarified.
- Educational programs to improve the knowledge of the nursing staff regarding the assessment and management of HP and RFS need to be implemented. Furthermore, a nurse-guided protocol, based on current nutrition guidelines, should be introduced to optimize nutrition care.
- Curriculum integration for undergraduate nursing is imperative. Additionally, conducting the same study in multiple settings with a large number of participants, perhaps in governmental hospitals, will be beneficial to support the findings of the current study.
- Furthermore, a need to implement best practice recommendations regarding the administration of nutrition care in the critical care units is necessary. In this regard, previous studies have shown that the introduction of nurse-guided protocol may improve patient outcomes as well as provide the nursing staff with a sense of autonomy and empowerment

#### References

- [1]. Aubry, E., Friedli, N., Schuetz, P., & Stanga, Z. (2018). Refeeding Syndrome In The Frail Elderly Population: Prevention, Diagnosis And Management. *Clinical And Experimental Gastroenterology*, 11, 255–264. <https://doi.org/10.2147/CEG.S136429>
- [2]. Bahashwan, S. M., Sindy, A. A., Azzeh, F., Alkholy, S. O., Abusudah, W. F., Bukhari, H. M., & Ghafouri, K. (2023). Refeeding Syndrome Awareness Among Physicians Of King Abdullah Medical City In Makkah, Saudi Arabia. *Healthcare*, 11(6), 794. <https://doi.org/10.3390/Healthcare11060794>
- [3]. Barker, L. A., Gout, B. S., & Crowe, T. C. (2011). Hospital Malnutrition: Prevalence, Identification And Impact On Patients And The Healthcare System. *International Journal Of Environmental Research And Public Health*, 8(2), 514–527. <https://doi.org/10.3390/Ijerp8020514>
- [4]. Ben Tovim, H., & Theilla, M. (2021). Role And Knowledge Of Critical Care Nurses In The Assessment And Management Of Hypophosphataemia And Refeeding Syndrome: A Descriptive Exploratory Study. *Intensive & Critical Care Nursing*, 67, 103097. <https://doi.org/10.1016/J.iccn.2021.103097>
- [5]. Coşkun, R., Gündoğan, K., Baldane, S., Güven, M., & Sungur, M. (2014). Refeeding Hypophosphatemia: A Potentially Fatal Danger In The Intensive Care Unit. *Turkish Journal Of Medical Sciences*, 44(3), 369–374. <https://doi.org/10.3906/Sag-1211-49>

- [6]. Da Silva, J. S., Seres, D. S., Sabino, K., Adams, S. C., Berdahl, G. J., City, S. W., Cober, M. P., Evans, D. C., Greaves, J. R., Gura, K. M., Michalski, A., Plogsted, S., Sacks, G. S., Tucker, A. M., Worthington, P., Walker, R. N., & Ayers, P. (2020). ASPEN Consensus Recommendations For Refeeding Syndrome. *Nutrition In Clinical Practice*, 35(2), 178–195. <https://doi.org/10.1002/Ncp.10474>
- [7]. Friedli, N., Odermatt, J., Reber, E., Schuetz, P., & Stanga, Z. (2020). Refeeding Syndrome: Update And Clinical Advice For Prevention, Diagnosis And Treatment. *Current Opinion In Gastroenterology*, 36(2), 136–140. <https://doi.org/10.1097/MOG.0000000000000605>
- [8]. Friedli, N., Stanga, Z., Culkun, A., Crook, M., Laviano, A., Sobotka, L., Kressig, R. W., Kondrup, J., Mueller, B., & Schuetz, P. (2018). Management And Prevention Of Refeeding Syndrome In Medical Inpatients: An Evidence-Based And Consensus-Supported Algorithm. *Nutrition*, 47, 13–20. <https://doi.org/10.1016/J.Nut.2017.09.007>
- [9]. Friedli, N., Stanga, Z., Sobotka, L., Culkun, A., Kondrup, J., Laviano, A., ... & Schuetz, P. (2017). Revisiting The Refeeding Syndrome: Results Of A Systematic Review. *Nutrition*, 35, 151–160. <https://doi.org/10.1016/J.Nut.2016.05.016>
- [10]. Hala Abdelrahman, A., & Shalaby, G. S. (2019). Critical Care Nurses' And Physicians' Perception About Re-Feeding Syndrome. *American Journal Of Nursing Research*, 7(2), 179–184. <https://doi.org/10.12691/Ajn>
- [11]. Hall, A. (2005). Defining Nursing Knowledge. *Nursing Times*, 101(48), 34–37.
- [12]. Herdman, T. H. (2012). *Nursing Diagnoses: Definitions And Classification*. NANDA International.
- [13]. Janssen, G., Pourhassan, M., Lenzen-Großimlinghaus, R., Jäger, M., Schäfer, R., Spamer, C., Cuvelier, I., Volkert, D., & Wirth, R. (2019). The Refeeding Syndrome Revisited: You Can Only Diagnose What You Know. *European Journal Of Clinical Nutrition*, 73(11), 1458–1463. <https://doi.org/10.1038/S41430-019-0441-X>
- [14]. Jaafar, S. A., & Al Jubouri, M. B. (2020). Nurses Knowledge Based On Evidence Based Practice Toward Eye Care For Intensive Care Units Patients. *Indian Journal Of Forensic Medicine & Toxicology*. <https://doi.org/10.37506/Ijfmt.V14i3.10573>
- [15]. Kaderbay, A., Atallah, I., Fontaine, E., Chobert Bakouline, M., Schmitt, S., Mitariu, P., & Righini, C. A. (2018). Malnutrition And Refeeding Syndrome Prevention In Head And Neck Cancer Patients: From Theory To Clinical Application. *European Archives Of Oto-Rhino-Laryngology*, 275, 1049–1058. <https://doi.org/10.1007/S00405-018-4935-2>
- [16]. Kesmodel, U. S. (2018). Cross-Sectional Studies: What Are They Good For? *Acta Obstetricia Et Gynecologica Scandinavica*, 97(4), 388–393. <https://doi.org/10.1111/Aogs.13331>
- [17]. Keys, A., Brožek, J., Henschel, A., Mickelsen, O., & Taylor, H. L. (1950). *The Biology Of Human Starvation*. University Of Minnesota Press.
- [18]. Khan, L. U., Ahmed, J., Khan, S., & Macfie, J. (2011). Refeeding Syndrome: A Literature Review. *Gastroenterology Research And Practice*, 2011, Article 410971. <https://doi.org/10.1155/2011/410971>
- [19]. Liaw, S. Y., Scherpbier, A., Klainin Yobas, P., & Rethans, J. J. (2011). A Review Of Educational Strategies To Improve Nurses' Roles In Recognizing And Responding To Deteriorating Patients. *International Nursing Review*, 58(3), 296–303. <https://doi.org/10.1111/J.1466-7657.2011.00915.X>
- [20]. Lauwers, C., Langouche, L., Wouters, P. J., Wilmer, A., Van Den Berghe, G., Casaer, M. P., & Gunst, J. (2025). Early Phosphate Changes As Potential Indicator Of Unreadiness For Artificial Feeding: A Secondary Analysis Of The Epanic RCT. *Critical Care*, 29, 48. <https://doi.org/10.1186/S13054-025-05273-2>
- [21]. McClave, S. A., Taylor, B. E., Martindale, R. G., Warren, M. M., Johnson, D. R., Braunschweig, C., McCarthy, M. S., Davanos, E., Rice, T. W., Cresci, G. A., Gervasio, J. M., Sacks, G. S., Roberts, P. R., & Compher, C. (2016). Guidelines For The Provision And Assessment Of Nutrition Support Therapy In The Adult Critically Ill Patient. *Journal Of Parenteral And Enteral Nutrition*, 40(2), 159–211. <https://doi.org/10.1177/0148607115621863>
- [22]. Mcknight, C. L., Newberry, C., Sarav, M., Martindale, R., Hurt, R., & Daley, B. (2019). Refeeding Syndrome In The Critically Ill: A Literature Review And Clinician's Guide. *Current Gastroenterology Reports*, 21, 58. <https://doi.org/10.1007/S11894-019-0724-3>
- [23]. Mehanna, H. M., Moledina, J., & Travis, J. (2008). Refeeding Syndrome: What It Is, And How To Prevent And Treat It. *BMJ*, 336(7659), 1495–1498. <https://doi.org/10.1136/Bmj.A301>
- [24]. National Institute For Health And Care Excellence. (2020). *Nutrition Support For Adults: Oral Nutrition Support, Enteral Tube Feeding And Parenteral Nutrition*. <https://www.nice.org.uk/guidance/cg32>
- [25]. Neube, C. M. (2019). *Intensive Care Nurses' Knowledge Of Evidence Based Guidelines Regarding Endotracheal Suctioning*. University Of The Witwatersrand.
- [26]. Ponzio, V., Pellegri, M., Cioffi, I., Scaglione, L., & Bo, S. (2021). The Refeeding Syndrome: A Neglected But Potentially Serious Condition For Inpatients. *Internal And Emergency Medicine*, 16, 49–60. <https://doi.org/10.1007/S11739-020-02525-7>
- [27]. Reber, E., Gomes, F., Bally, L., Schuetz, P., & Stanga, Z. (2019). Nutritional Management Of Medical Inpatients. *Journal Of Clinical Medicine*, 8(8), 1130. <https://doi.org/10.3390/Jcm8081130>
- [28]. Sajeewani, N. (2020). Knowledge And Practices Of Sri Lankan Critical Care Nurses On Enteral Nutritional Care. *Australian Critical Care*, 33, S40. <https://doi.org/10.1016/J.Aucc.2020.04.128>
- [29]. Schnitker, M. A., Mattman, P. E., & Bliss, T. L. (1951). A Clinical Study Of Malnutrition In Japanese Prisoners Of War. *Annals Of Internal Medicine*, 35(1), 69–96. <https://doi.org/10.7326/0003-4819-35-1-69>
- [30]. Skipper, A. (2012). Refeeding Syndrome Or Refeeding Hypophosphatemia: A Systematic Review Of Cases. *Nutrition In Clinical Practice*, 27(1), 34–40. <https://doi.org/10.1177/0884533611427916>
- [31]. Stocker Pérsico, R., & Franzosi, O. S. (2021). Patients With Enteral Nutrition At Risk Of Refeeding Syndrome Show Electrolyte Abnormalities At Admission In The Emergency Department. *Nutrición Hospitalaria*. <https://doi.org/10.20960/Nh.03500>
- [32]. Stratton, S. J. (2021). Population Research: Convenience Sampling Strategies. *Prehospital And Disaster Medicine*, 36(4), 373–374. <https://doi.org/10.1017/S1049023X21000649>
- [33]. Soriano Guillén, M., Shabaka, A., Vázquez Raso, I., Sanz De Pedro, M. P., & Fernández Juárez, G. M. (2024). Assessment Of Differences In Management And Outcomes Of Severe Hypophosphatemia Secondary To Refeeding Syndrome. *Nephrology Dialysis Transplantation*, 39(Supplement\_1), Gfae069 1221 3060. <https://doi.org/10.1093/Ndt/Gfae069.122>
- [34]. Vest, M. T., Pappas, M. A., Shaper, M., McGraw, P., Capizzi, A., & Jurkovic, C. (2018). Characteristics And Outcomes Of Adult Inpatients With Malnutrition. *Journal Of Parenteral And Enteral Nutrition*, 42(6), 1009–1016. <https://doi.org/10.1002/Jpen.1042>
- [35]. Weinsier, R. L., & Krumdieck, C. L. (1981). Death Resulting From Overzealous Total Parenteral Nutrition: The Refeeding Syndrome Revisited. *American Journal Of Clinical Nutrition*, 34(3), 393–399. <https://doi.org/10.1093/Ajcn/34.3.393>
- [36]. Windpessl, M. (2018). Recognize Malnutrition But Avoid Refeeding Syndrome. *The American Journal Of Medicine*, 131(6), E277. <https://doi.org/10.1016/J.Ajmed.2017.12.032>
- [37]. Zeki, S., Culkun, A., Gabe, S. M., & Nightingale, J. M. (2011). Refeeding Hypophosphatemia Is More Common In Enteral Than Parenteral Feeding In Adult Inpatients. *Clinical Nutrition*, 30(3), 365–368. <https://doi.org/10.1016/J.Clnu.2010>