

Role of pharmacists in providing nutritional support team (NST) in makkah hospitals

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Abstract:

Total parenteral nutrition TPN preparation is an essential component of patient care in the clinical setting. Clinical pharmacists have a crucial role in the management of specialized nutritional support program and in the improvement of quality. However, the importance of their role in hospitals. Our aim is to investigate the role of clinical pharmacists in TPN preparation in Makkah hospitals, in addition to their involvement in nutritional support team at hospitals. Data were collected from seven hospitals in Makkah. Only pharmacists implicated in the TPN process have been eligible to fulfill the questioner. Descriptive statistics have been used to describe the clinical site, pharmacists and TPN process characteristics. All questioner papers have been signed from the concerned pharmacist and stamped from the hospital. Our preliminary results showed that the number of TPN pharmacists is limited in each hospital. Their role is to perform technical tasks mainly with a minimal role in patient education process. Most of TPN pharmacists have received a training sessions to be well-prepared for working in this field. A large number of pharmacists reclaims that other health care providers don't help them providing direct patient care. Some of TPN pharmacists play an important role in monitoring the TPN administration process while others have not been implicated in this task. All of them would recommend the presence of nutritional support team (NST) in their hospitals although NST is not established in all hospitals included in this study. Our results have been compared to results from clinical studies done in other countries, Nevertheless, an emerging role for clinical pharmacists has been noticed through skills enhancement and removing barriers to pharmaceutical care practice.

Keywords: Role of pharmacist, TPN, Makkah hospitals

المخلص:

يعد إعداد TPN للتغذية الوريدية الكاملة عنصراً أساسياً في رعاية المرضى في البيئة السريرية. يلعب الصيادلة السريريون دوراً حاسماً في إدارة برنامج الدعم الغذائي المتخصص وفي تحسين الجودة. إلا أن أهمية دورهم في المستشفيات. هدفنا هو دراسة دور الصيادلة السريريين في إعداد TPN في مستشفيات مكة المكرمة، بالإضافة إلى مشاركتهم في فريق الدعم الغذائي في المستشفيات. تم جمع البيانات من سبعة مستشفيات في مكة المكرمة. فقط الصيادلة المتورطون في عملية TPN هم المؤهلون للإجابة على السائل. تم استخدام الإحصائيات الوصفية لوصف الموقع السريري والصيادلة وخصائص عملية TPN. جميع أوراق الاستفسار موقعة من الصيدلي المختص ومختومة من المستشفى. أظهرت نتائجنا الأولية أن عدد صيادلة TPN محدود في كل مستشفى. يتمثل دورهم في أداء المهام الفنية بشكل أساسي مع الحد الأدنى من الدور في عملية تثقيف المريض. تلقى معظم صيادلة TPN دورات تدريبية ليكونوا مستعدين جيداً للعمل في هذا المجال. يدعي عدد كبير من الصيادلة أن مقدمي الرعاية الصحية الآخرين لا يساعدهم في تقديم الرعاية المباشرة للمرضى. يلعب بعض صيادلة TPN دوراً مهماً في مراقبة عملية إدارة TPN بينما لم يتورط الآخرون في هذه المهمة. يوصي جميعهم بوجود فريق الدعم الغذائي (NST) في مستشفياتهم على الرغم من عدم إنشاء فريق الدعم الغذائي (NST) في جميع المستشفيات المشمولة في هذه الدراسة. تمت مقارنة نتائجنا بنتائج الدراسات السريرية التي أجريت في بلدان أخرى، ومع ذلك، فقد لوحظ دور ناشئ للصيادلة السريريين من خلال تعزيز المهارات وإزالة العوائق أمام ممارسة الرعاية الصيدلانية.

الكلمات المفتاحية: دور الصيدلي، TPN، مستشفيات مكة المكرمة

Introduction:

Patients who are unable to accept oral or enteral feeding owing to a defective or inaccessible gastrointestinal (GI) tract are candidates for parenteral nutrition (PN) therapy, which involves the intravenous delivery of formulations that are nutritionally sufficient and balanced. This therapy is administered to patients. Over the course of its history, PN has developed into a significant main and adjunctive therapy in a wide range of clinical diseases and disease states. It is utilised in the treatment of critically sick hospitalised patients as well as in the long-term healthcare context for some patients who are at home (Boullata, Guenter, & Mirtallo, 2013). For instance, PN formulations can be used as a life-sustaining alternative for premature newborns and critically sick hospitalised patients. Additionally, they can be used for patients who have irreversible loss of the gastrointestinal tract, such as those who have fistulas or short bowel syndrome among other conditions. When all of the patient's daily dietary requirements are met solely by the administration of parenteral nutrition (PN) formulations, the treatment is referred to as total parenteral nutrition (TPN). Regarding the composition of the formulations, PN formulations can either be of a standard composition or they can be customised to meet the specific requirements of the patient. In spite of the fact that standard PN formulations have been progressively supplied by industry in certain countries, PN formulations are still created in-house by pharmacy personnel inside hospital pharmacies in many nations in order to meet the requirements of patients (August, 2002).

The PN formulations are complex admixtures that are made up of numerous components. These components include macronutrients (such as amino acids, dextrose, and intravenous fat emulsions [IVFEs]) as well as micronutrients (such as electrolytes, vitamins, and trace elements). Because of the intricacy of their composition and the fact that they are administered directly into the bloodstream, these formulations need to be sterile and ensure that they contain components that are stable and compatible in order to guarantee the safety of patients who are undergoing PN treatment. When patients get an intravenous infusion that is incompatible, unstable, or contaminated, they run the risk of experiencing injury, which may include major morbidity and even death (Giancarelli, & Davanos, 2015). As a result, PN formulations are required to be compounded using stringent aseptic processes in accordance with established pharmaceutical compounding protocols. Additionally, PN treatment is a high-risk feeding technique that can be associated with various consequences, despite the fact that it can save the lives of a significant number of patients. The electrolyte imbalance that occurs at the beginning phases of PN therapy is often the most prevalent acute complication that is associated with PN management. There is a possibility that line problems, such as line infection and occlusion, pulmonary embolism, and metabolic complications, such as glucose intolerance, cholestatic liver disease, and micronutrient shortages or toxicity, might emerge throughout the course of long-term PN treatment. The refeeding syndrome is another possible hazard of PN treatment. This syndrome occurs when a patient begins to eat after a period of protracted deprivation (Iredell, et al., 2022).

Consequently, this can lead to a significant biochemical disruption, which may include a precipitous drop in phosphate levels, as well as following symptoms and indications of deterioration that may ultimately end in mortality if they are not recognised and handled appropriately. The provision of nutrition support to patients by the intravenous delivery of nutrients is a costly method of providing nutrition support. This is in addition to the possible issues that may arise (Katoue, & Al-Taweel, 2016). In order to contribute to the administration of nutrition support therapy to patients, chemists possess a unique constellation of abilities, including clinical knowledge and skills, which puts them in an excellent position to do so. In point of fact, the traditional compounding and distribution of pharmaceuticals has given way to the current delivery of direct patient care within multidisciplinary health care teams. This shift in the professional duties of chemists has occurred over the course of the past several decades. Pharmaceutical care, sometimes known as PC, is a practice philosophy in which the chemist is responsible for providing drug therapy to patients in order to accomplish certain objectives that improve the patients' quality of life. The favourable influence that PC has on patient care and the expenses of health care is supported by a body of research that has accumulated over time (Maisonneuve et al., 2004).

In order for chemists to deliver patient care services that are adequate, they need to work together with other medical experts and the patient to develop, implement, and monitor a therapy plan that will maximise the patient's clinical results. For this reason, the successful implementation of PC practice would necessitate a strong collaboration between chemists and the other members of the health care team in order to maximise the successful outcomes of patients' therapeutic interventions. In a similar vein, PN treatment is best administered to patients as a multidisciplinary service, in which the chemist works in conjunction with other medical specialists to develop the most effective nutrition care plan for the patient (Mirtallo, Hawksworth, & Payne, 2009). The nutrition support team, also known as the NST, is an interdisciplinary team that is typically made up of physicians, dietitians, chemists, and nurses who have received specialised training in nutrition support. The NST is tasked with the duty of managing continuous nutrition treatment in accordance with protocols that have been meticulously created. It

has been demonstrated that the provision of patient-centered pharmacy services by chemists to patients who are getting PN treatment significantly improves the clinical results of such patients. As a result, PN treatment provides an ideal opportunity for the pharmacist to participate as an active member of a multidisciplinary health care team in the field of providing patients with nutritional and medical therapy that is both safe and effective (Pedersen, Schneider, & Scheckelhoff, 2011).

Patient care in a clinical context requires the preparation of total parenteral nutrition (TPN), which is a key component of patient care. When it comes to the management of specialised nutritional support programmes and the enhancement of quality, clinical chemists play an extremely important role. On the other hand, Saudi Arabia has never conducted any research considering the significance of their participation.

Research Objective:

In addition to their participation in the nutritional support team at hospitals, the purpose of this study is to evaluate the role that clinical chemists play in the preparation of TPN in hospitals located in Makkah.

Literature review

Development of nutrition support in clinical pharmacy

In terms of pharmacy nutrition assistance, the United States of America has accomplished the majority of the developmental stages. Through the use of central venous access, Dudrick and colleagues from the Hospital of the University of Pennsylvania were able to successfully nourish beagle puppies across the course of their development into fully grown dogs in the year 1968. Almost immediately after that, the treatment was initially delivered to newborns who were suffering from crippling ailments or gastrointestinal malformations, and thereafter it was given to adults.

Because Stanley Serlick was able to create clean, stable, and suitable mixes of nutrients that could be given intravenously, he is considered to be the pioneer in the field of pharmaceutical nutrition support (Ragab, Al-Hindi, & Alrayees, 2016). By the early 1970s, commercial PN products became accessible, and across the United States of America, physicians began employing the therapy in the management of patients who required PN administration. As a consequence of this, there was an increasing demand for the establishment of a sophisticated system for the ordering, preparation, and administration of PN treatment, with a heightened focus on the development of methods to prevent issues associated to PN metabolism and catheters. Since that early period, the multidisciplinary National Support Teams (NSTs) have evolved as the preferred approach for the safe administration of PN treatment, and chemists have begun to enhance their knowledge and competence in nutrition support. Their responsibilities have been growing beyond the creation of sterile, stable, and suitable PN admixtures to include the clinical treatment of PN patients, as well as research efforts linked to PN and the enhancement of safety (Pedersen, Schneider, & Scheckelhoff, 2011).

The American Society for Parenteral and Enteral Nutrition (ASPEN) was founded in 1978 with the purpose of maximising the nutritional support that patients receive while they are in the hospital and while they are recovering from their illness. ASPEN is an interdisciplinary society that includes physicians, nurses, dietitians, pharmacists, and nonclinical researchers. The subsequent twenty years saw a number of developments in the field of parenteral nutrition (PN) therapy (Seres, et al., 2006). These developments included the introduction of home parenteral nutrition (HPN) programmes, the enhancement of the quality of the manufacturing of macronutrients such as amino acids and intravenous fluid elements (IVFE), the development of disposable administration devices, and the introduction of automated compounding machines, which improved the safety and precision of PN admixture compound (Seres, et al., 2006).

Before that momentous accomplishment, the traditional approach to compounding these multicomponent admixtures consisted of manually employing gravity-driven transfers for large volume additives like amino acids, dextrose, lipids, and sterile water, and using syringes to add small volume additives like electrolytes, trace minerals, multivitamins, and drugs. This was the method that was used in the past (Worthington, et al., 2017). It used to be that the manual approach was laborious and needed several manipulations of infusion containers, sets, syringes, and needles. This had the potential to result in poor precision throughout the compounding process as well as probable contamination of the final admixture. The development of automated compounding technology for the compounding of PN admixtures, with the assistance of fluid pump technology and software that controls the compounder pump, has resulted in the possible improvement of compounding accuracy as well as the safety of PN. Additionally, it significantly cut down on the amount of time needed to construct PN formulations and

simplified the process of customising their composition to meet the requirements of each particular patient (Yang, et al., 2013).

In addition, there has been an increase in clinical research into the appropriate use of PN in a variety of clinical diseases and the management of problems that are associated with PN. This is being done in an effort to produce the best possible outcomes for PN. In 1987, the American Society of Pharmacists (ASPEN) issued criteria for nutrition support pharmacists (NSPs), which represented the evolving role of pharmacists in nutrition assistance. As a "benchmark representing a range of performance of competent care that should be provided to assure safe and efficacious nutrition care," these guidelines were created by the International Society for Nutrition and Dietetics (ASPEN). A year later, the Board of Pharmaceutical Specialties (BPSs) acknowledged NSPs as specialists. With the development of Nutrition Care Standards by the Joint Commission on Accreditation of Health Care Organisations (JCAHO), the efforts of the American Society of Pharmacists in the Pharmaceutical Industry (ASPE), the American Society of Health-System Pharmacists (ASHPs), and other organisations came to fruition. 1995 marked the beginning of the surveying process for these standards, which demanded the establishment of an interdisciplinary nutrition care procedure throughout the organisation. ASPEN, in collaboration with the American Society of Health-System Pharmacists (ASHP), established a task group with the purpose of developing safe standards for the administration of PN. These guidelines were initially published in 1998 and then amended in 2004. These clinical guidelines comprise suggestions that have been reached by agreement in order to promote safe procedures for the ordering, labelling, compounding, administration, and quality control of physical nurse practitioners (August, 2002).

Roles of NSPs

Nutrition support pharmacy has emerged as a specialised field within clinical pharmacy practice, particularly in industrialised nations, notably in North America and Europe. The NSPs possess the necessary training and expertise to offer a range of advantageous services pertaining to PN treatment. The scope of practice for these individuals may vary depending on their work environment. It can encompass a range of responsibilities such as providing direct care to patients, consulting with other healthcare professionals, overseeing the preparation and distribution of parenteral nutrition formulations, educating patients and carers, as well as students, trainees, and colleagues, and contributing to research and quality improvement efforts related to nutrition support. In addition, they possess administrative capabilities such as overseeing nutrition support services within their institutions. This includes tasks such as creating, documenting, implementing, and periodically evaluating organisational policies, procedures, and protocols related to nutrition support. They are also responsible for selecting and assessing appropriate and cost-effective nutrition support formulas (Katoue, & Al-Taweel, 2016).

NSTs in Saudi hospitals

To provide appropriate nutritional assistance, a care team comprised of professionals from a variety of fields is required. According to the findings of this study, the vast majority of the participants believed that NSTs played a significant role in ensuring the precision and effectiveness of EN and PN prescriptions. Among patients who are receiving nutritional assistance, the presence of NSTs contributes to an improvement in the quality of treatment that is provided. NSTs were shown to have a strong correlation with decreased metabolic complications, mortality, and improper utilisation of PN, according to a recent systematic analysis. Additionally, according to this research, NSTs were found to have a comparatively lower risk of catheter-related infections. Nevertheless, the deployment of NST in hospitals is becoming less common as a consequence of healthcare organisations' efforts to reduce or save money on their budgets. Only sixty percent of hospitals in the United Kingdom offer nutritional support through a multidisciplinary Nutritional Support Team (NST). The recent study found that about half of the people who participated in the survey had a formal NST that included medical professionals, nutritionists, chemists, and nurses. It is common practice for NSTs to have meetings on a weekly basis in order to discuss their operations, including individual patients, reported data, and publications. In the current study, it was shown that there was a significant amount of variation in the number of NST meetings (Ragab, Al-Hindi, & Alrayees, 2016).

Despite the fact that NSTs are very cost-effective, putting them into practice can be difficult. Within the scope of this study, the most significant obstacles to the implementation of NSTs included a dearth of physicians who were interested in the practice, skilled chemists, and incentives provided by hospital administrations. In the same vein, DeLegge et al. revealed that there are similar obstacles connected with the beginning of NSTs. These obstacles need to be addressed by the methods that future hospitals in Saudi Arabia will employ in order to successfully deploy NST.

The degree of confidence among professionals who provide supportive nutrition All of the people who took part in the study reported a much better degree of confidence in their EN practice compared to their PN practice. It was also different for each of the many healthcare professions. According to the findings of the current research,

the characteristics that contribute to an increased degree of confidence in practice include nutritional certification and a greater number of years of experience. A significant amount of importance should be placed on educating healthcare professionals about nutritional support. To demonstrate that they are competent to work in the field of nutrition, all nutritional support physicians are expected to meet a set of minimal credentials, as stipulated by the standards of practice established by the American Society of Nutritional Physicians (ASPN). The following are some of the qualifications that are required: board certification in a primary specialty; training, experience, or certification in nutritional support; participation in institutional nutritional support activities; current clinical responsibility for patients who require nutritional support therapy; and active membership in a nutritional support professional society. The techniques of nutritional assistance for chemists differ depending on the role, the education level, and the environment in which they work. There are some minimal requirements that must be met by all chemists who are involved in providing nutritional assistance (Ragab, Al-Hindi, & Alrayees, 2016).

Methods

- Data were collected from seven hospitals in Makkah (four governmental and three private hospitals).
- Only pharmacists implicated in the TPN process have been eligible to fulfill the questioner.
- Descriptive statistics have been used to describe the clinical site, pharmacists and TPN process characteristics.
- All questioner papers have been signed from the concerned pharmacist and stamped from the hospital

Data collection focused on three aspects:

- Role of Clinical pharmacist in different steps of TPN procedure
- Interaction between clinical pharmacist and patient
- Clinical pharmacist competencies

In each aspects the following points were covered:

Role of Clinical pharmacist in different steps of TPN procedure

- A. Formulary selection
- B. Decision making
- C. TPN compounding
- D. Regimen design

Interaction between clinical pharmacist and patient

- A. Patient education and counseling
- B. Patient monitoring
- C. Health care providers cooperation

Clinical pharmacist competencies

- A. Undergraduate training in TPN
- B. Continuous learning and workshops in TPN

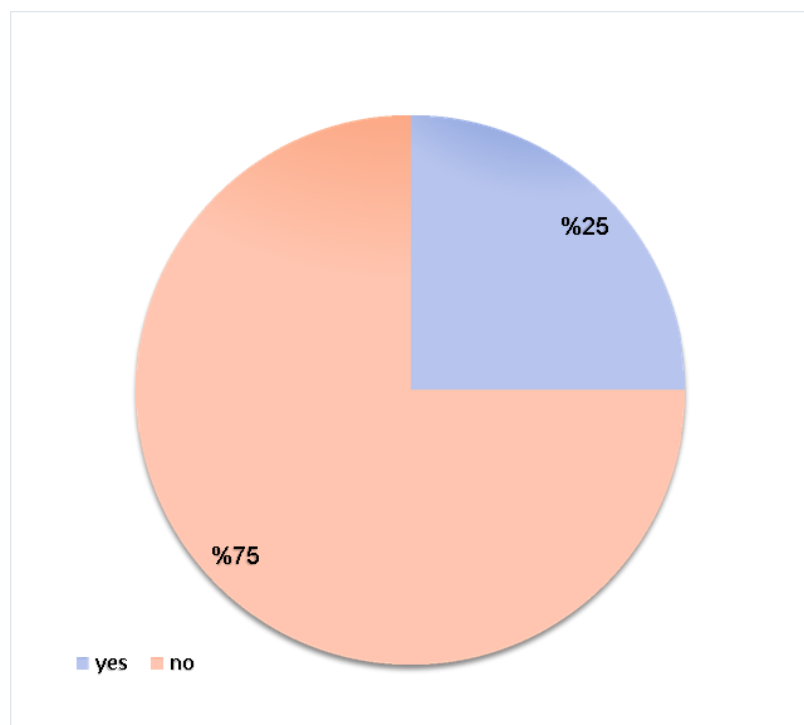
Results

Table 1.: General information about hospitals included in the study

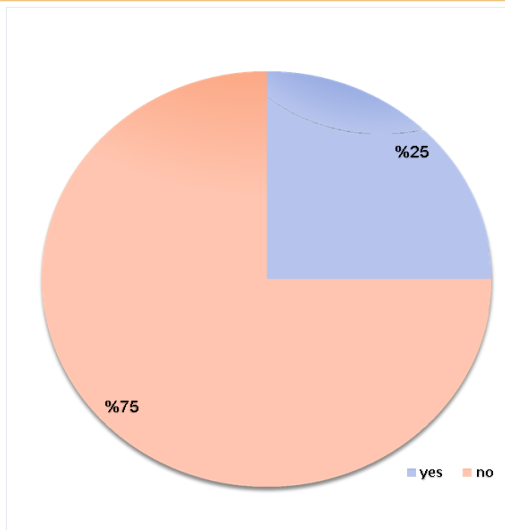
	Government/ Private	Number of pharma cist	Number of technicians	Number of beds	Number of TPN preparations /day
H1	Private	20	5	217	-
H2	Government	65	80	600	15
H3	Private	25	10	60	2
H4	Government	40	15	280	25-10
H5	Government	9	3	280	25
H6	Private	19	15	500	4-13
H7	Government	45	25	350	35

1. Role of Clinical pharmacist in different steps of TPN procedure

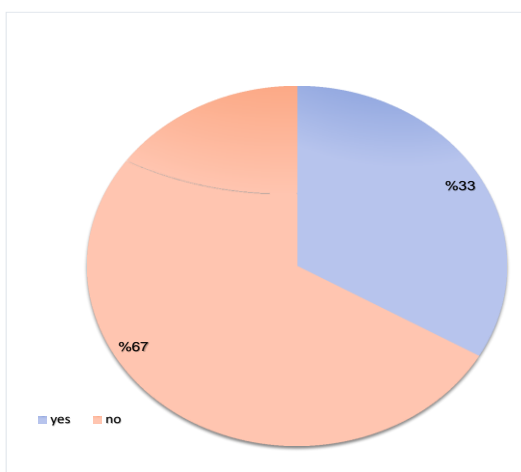
- Formulary selection for TPN products (Figure 1)



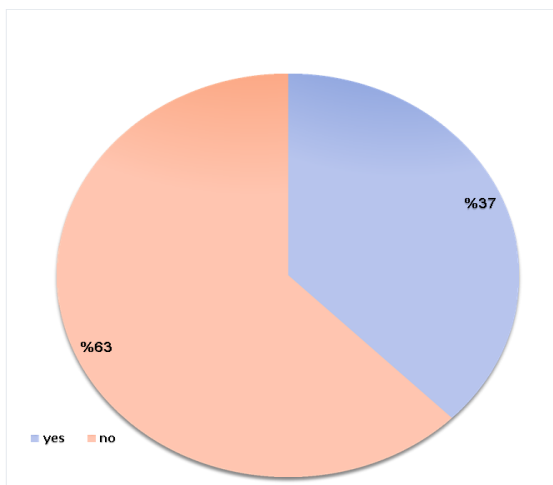
- Decision making process for TPN administration (Figure 2)



- TPN compounding (Figure 3)

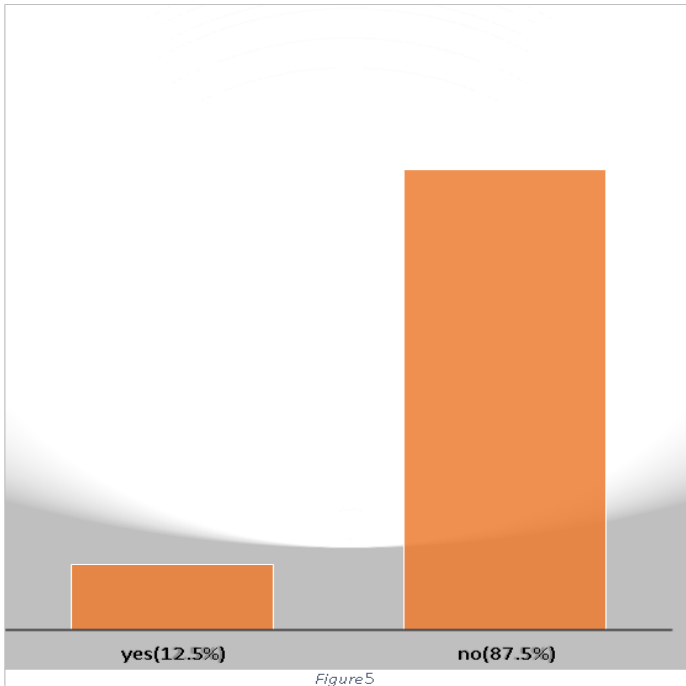


- Participation in designing the regimen taken in TPN (Figure 4)

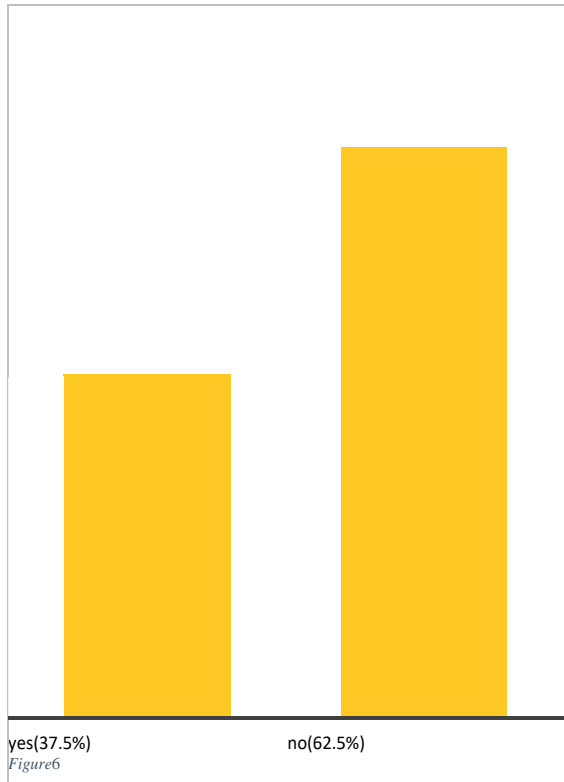


2. Interaction between clinical pharmacist and patient

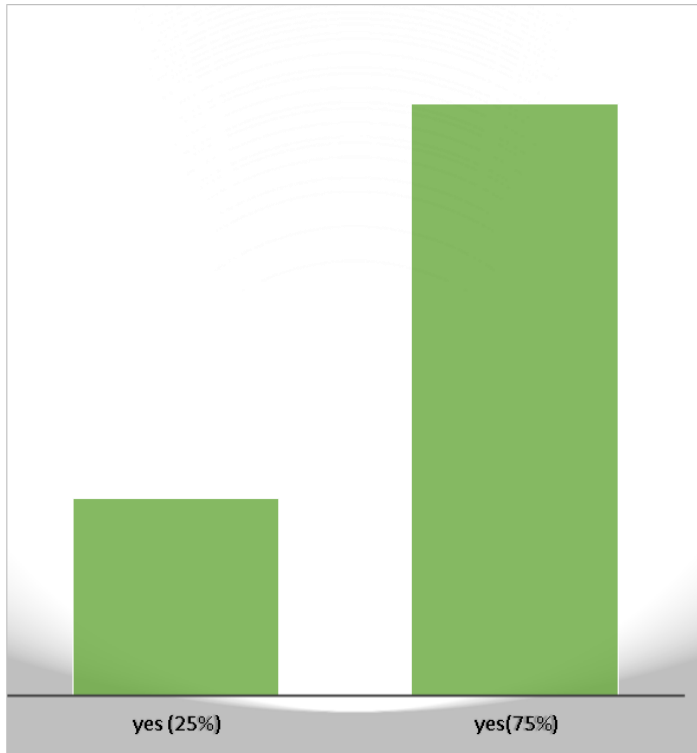
- Percentage of hospital where the pharmacist do patient education and counseling for patient receiving TPN (Figure 5)



- Percentage of hospital where the pharmacist monitor the TPN administration process (Figure 6)



- Percentage of hospitals where health care providers help the pharmacist to interact with patients (Figure 7)



3. Clinical pharmacists background and lifelong learning about TPN preparation

- Percentage of pharmacists who received an undergraduate training in TPN preparation (Figure 8)

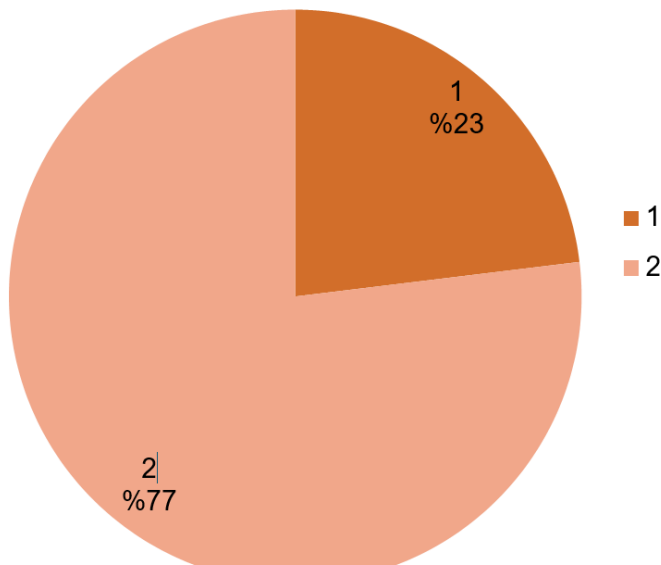
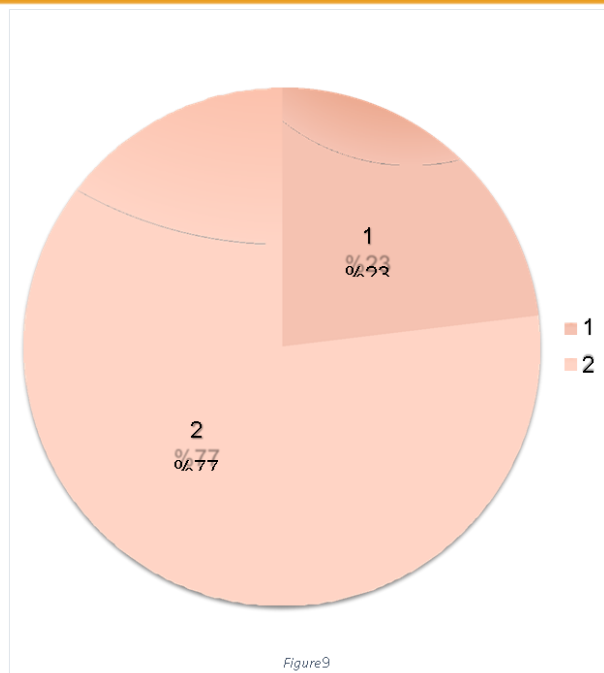


Figure8

- Percentage of pharmacists who received workshops or training after graduation in TPN preparation (Figure 9)



4. Comparison with other hospitals in Arab countries

In a clinical investigation that was carried out in Kuwait, data were gathered through the use of face-to-face semi-structured interviews with senior TPN chemists working at all of the hospitals that offer TPN preparation services.

Results in this study showed that:

Although they had a modest role in delivering direct patient care, chemists were primarily responsible for doing technical duties such as TPN compounding.

Depending on the practice setting, chemists reported both favourable and bad experiences with regard to their interactions with physicians.

There was not a single hospital that had a reliable NST. On the other hand, chemists have indicated that they would like to work inside NSTs because of the potential advantages of improved communication and information sharing among practitioners, as well as the enhancement of providing better service.

It was believed by pharmacists that there were various obstacles in the way of delivering pharmaceutical treatment. These obstacles included a lack of trustworthy sources of information connected to TPN, the absence of a standard operating procedure for TPN across hospitals, an inadequate number of staff members, time limits, and poor communication amongst TPN pharmacists.

Conclusion

Within the TPN process in Makkah hospitals, the job of clinical chemists is restricted to the production procedure of the TPN. The function of clinical pharmacists remains unchanged when compared to that of pharmacists in other Arab nations. However, TPN clinical pharmacists' function is further evolved in Europe. On the other hand, the development of clinical chemists' abilities and the elimination of obstacles to the practice of pharmaceutical care have highlighted the emergence of a new role for these professionals.

Patients in a variety of nations have been receiving PN-related services from chemists, who have been actively engaged in this endeavour. The majority of the evidence that has been documented regarding the role that chemists play in providing PN support has been primarily gathered from developed countries; however, it is also being investigated in some developing countries. The provision of clinical services by chemists for the management of patients receiving PN support has been linked to the provision of adequate nutrition care and medical therapy, as well as an improvement in the nutritional status and clinical outcomes of patients, the prevention and resolution of complications associated with PN support, and a reduction in the costs of health care related to PN support. It is expected that increased participation of chemists in the delivery of direct care services to these patients would lead to improved patient outcomes as well as an improvement in the quality of physical nurse practitioner services. A sufficient amount of educational preparation and clinical training on nutrition support is required for chemists in order for them to satisfy the needs of that profession. It is anticipated that the empowering of chemists to play a more prominent leadership position in this aspect of pharmacy practice would result in an improvement in the quality of care that is delivered to patients who are undergoing PN therapy, as well as an enhancement of PN services.

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