

Nutrition nurses' status, practices, and routines: an online cross-sectional survey

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ABSTRACT

Objectives: Nutrition is an integral component of care in the intensive care unit. However, no international comparison has been published about the status and practices of nutrition nurses, their legal titles, gained certificates, and routine duties. To describe the working conditions, educational background, nutrition-related practices, challenges, and future development needs of nutrition nurses in Türkiye, the European countries, and the USA.

Methods: A cross-sectional design was used. A thirty-three-item online cross-sectional survey was sent to nutrition support nurses in collaboration with national nutrition societies. The data were collected between November 2020 and August 2021. One-way ANOVA and chi-squared test were used to compare the three countries.

Results: Eighty-one nurses completed the survey: 44 (54.4%) from Türkiye, 27 (33.3%) from the European countries, and 10 (12.3%) from the USA. All nurses in Türkiye reported having a clinical nutrition support team, while 88.8% in the European countries and 80% of nurses in the USA had this team ($p=0.040$). Significant differences were found in terms of nurses' age, length of service, estimated number of ambulant nutritional consultations per week, and time spent on nutritional practices during work ($p<0.001$). The type of first-line test for nasogastric tube placement was X-ray confirmation (70%) in the US, whereas it is auscultation (77.2%) in Türkiye and pH-testing of gastric aspirate (81.4%) in the European countries ($p<0.001$). The most frequently reported professional challenge among nurses in Türkiye (66%) and the European countries (22.5%) was having no legal job title.

Conclusion: These findings reflect the broader picture of nutrition nurses' status and point out the need to develop standardized strategies for education and evidence-based nutrition practices. This study has revealed important differences in the roles and responsibilities of nutrition nurses. The study guides the future development needs of nutrition nurses, highlighting the standardized guidelines and protocols for nutrition practices and calling for comprehensive training programs.

Keywords: Evidence-based practice, knowledge, nursing, nutrition, practices

INTRODUCTION

After an appropriate nutritional assessment, artificial nutritional support (ANS) in the form of enteral (EN) and/or parenteral nutrition (PN), is frequently used in intensive care units, hospitals, nursing homes, and home care settings.^{1,2} Nutrition support is often offered to patients through a multidisciplinary nutrition support team (NST).

In most cases, the core membership of an NST consists of the following NST members: a clinician, a nurse, a dietitian, and a pharmacist.^{3,4} In this team, nurses, as "nutrition nurses (NN)", undertake important responsibilities and duties in providing effective and comprehensive services to patients in need of nutritional support, in accordance with established workplace policies, goals, rules, and regulations. The responsibilities of an NN vary

depending on the practitioner's educational background, position, and practice environment. The scope of practice encompasses but is not limited to direct patient care, including intravenous access, educating patients and caregivers, and participating in research activities.

NN focus on three major areas: clinical practice, academia/research, and entrepreneurship/industry, along with a special emphasis on geriatrics, obesity, surgical specialties, wound-ostomy care, pediatric or neonatal care, solid organ transplantation, oncology, palliative care, ICU, and infection control.^{2,5,6} Since NN collaborate with other disciplines across the continuum of care, they play a pivotal role in providing formal and informal training to the interdisciplinary healthcare team.^{2,7} The main responsibilities of nutrition support nurses include participating in the assessment of nutrition status and nutritional requirements, in the development and monitoring of a specialized nutrition care plan, assisting in the placement of enteral or parenteral feeding access, and in the prevention/management of enteral and/or parenteral access devices and complications. An important aspect of the role is serving as a patient advocate while also providing training and education to patients, caregivers, and various healthcare workers.³⁻⁵

In the absence of skilled and experienced healthcare staff during ANS, serious and sometimes life-threatening complications may occur, such as aspiration pneumonia, misplacement of nasogastric (NG) tubes, local gastrostomy problems, total parenteral nutrition (TPN)-related catheter sepsis, metabolic and mechanical complications.^{3,8} Studies demonstrate that having an NST creates added value in patients on ANS.^{4,5} Another important issue is having clear policies, communication, responsibilities, and agreements between each member of the NST. In this

way, a specialized, coordinated, and successful nutrition support service may be provided to patients. However, in many countries, there is still a lack of regulation and formal high-quality education for advanced practice in the NN.^{2,8}

In addition, in most countries, NN do not have a protected title, there are significant differences between the scope of practice and application of standards, and certification programs, and even many institutions around the world could not establish a well-organized NST.^{7,9} At this point, some national and international nutrition societies are trying to develop standards of practice for NN to improve the quality of care and practice.¹⁰⁻¹³ Looking at the literature, a few studies have investigated the knowledge level and competencies of NN and no studies or international comparisons have been published about their current status and practice, legal title, places of employment, certificates obtained, routine duties, e.g.¹⁴⁻¹⁸ Therefore, the current survey aimed to describe the background, role, and scope of practice of NN in Türkiye, the European countries and the USA.

MATERIAL AND METHODS

Study Design

The study utilized a cross-sectional design and collected data through a web-based questionnaire. Because it was not feasible to conduct a community-based national or international sample survey during the COVID-19 period, the research team decided to collect the data online.

Study Sample

Nurses from Türkiye, Belgium, England, the Netherlands, and the USA, who were working fully or partially in the field of (artificial) nutrition, were invited to complete the survey using a convenience sampling method. The study sample consisted of nurses (n=81) who were actively working in clinics and volunteered to participate in the study.

Data Collection

The data collection form was developed based on the literature searches^{2,4-7} and consisted of five sections and a total of 33 questions:

- Section I: Socio-demographic characteristics (e.g. age, gender, country of residence)
- Section II: Educational and scientific activities (e.g. educational level, degrees, certificates, legal title, membership in national and international nutrition societies, participation in congresses, e.g.)
- Section III: Working conditions (current medical discipline, duration of professional experience, membership in an NST, e.g.)

Main Points

- This cross-sectional survey is the first to demonstrate the different educational backgrounds, employment, and scope of practice among nutrition nurses in various countries including Türkiye, Belgium, England, the Netherlands, and the United States of America (USA).
- This study highlights that there is a wide range of differences in nutrition practices in different parts of the world.
- The present study calls for collaboration among international nutrition societies with nursing professionals, hospital managers, universities, and ministries of health to improve high-quality education and certification programs, credentialing boards, legal title protection, and enhance recognition of nutrition nurses.

- Section IV: Nutrition standards of clinical practice (e.g. nutrition screening, nutrition assessment, naso-intestinal tube insertion, preparation of necessary equipment for nutrition support, nutrition care plan, EN and PN access care, and education/training activities during patient visits with the NST, follow-up of patients' EN, and PN at home)
- Section V: Challenges related to working conditions and nutritional practices.

The data collection was set up with the assistance of two experienced NNs and two academics in the field of nutrition. An invitation letter containing a brief introduction of the background, objectives, procedures, voluntary nature of participation, declarations of anonymity and confidentiality, instructions for filling in the questionnaire and contact details of the researchers were provided to the participants to obtain informed consent. Two online survey links for nurses (https://docs.google.com/forms/d/e/1FAIpQLSfvRSsOpBWfoqrEaurMi3B-gpKV5VmJpkeBLQI-Gst1f0ns4g/viewform?usp=sf_link) and international nurses (https://docs.google.com/forms/d/e/1FAIpQLSeiljoUhTyZKvmoSGQq95suylrre1H7KajCo b00pEqKNVlyaq/viewform?usp=sf_link) were generated using Google Forms, and the invitation links were sent to nurses via e-mail and/or WhatsApp Messenger Groups. By clicking on the URL link, participants were directed to the cover letter, and the question "Do you agree to participate in this survey?" was asked at the bottom of the first page. Participants were directed to the next page of the survey only if they answered 'yes'. Question styles on the survey included single-choice, multiple-choice, and Likert scales. The survey could be completed on a computer, tablet, or cell phone. Nurses were requested to complete survey questions before clicking through to the next section. 'Go back' option was available on all pages, allowing participants to revisit and change a response if needed. The survey was available for 8 weeks, from November 2020 to August 2021, to allow nurses enough time to complete it. The authors did not use additional strategies to encourage survey completion, including financial incentives, alternating survey mailings, and postcard reminders. Multiple survey entries were prevented by unique web links. Nurses completed the survey at their convenience, and the survey took a minimum of 20 minutes to complete. The survey data were stored in a database on a password-protected computer as an encrypted file.

Ethical Considerations

The Ethics Committee of Hacettepe University Non-Interventional Clinical Research Ethics Board (Number: 2020/16-34) approved study protocol and informed consent procedures before the formal survey. Participants had to answer a yes-no question to confirm their

willingness to participate voluntarily. After confirming the question, the participant was directed to complete the self-report questionnaire. Anonymous responses were enabled in the Google form for security reasons settings, ensuring that respondents' IP addresses, locations, and contact information were not recorded.

Data Analysis

The data analyses were conducted using SPSS version 25.0. The normal distribution of data was checked with the Shapiro-Wilk test. Descriptive statistics were reported as "mean \pm standard deviation" for variables with normal distribution and as "median (min; max)" for variables with non-normal distribution. Frequencies and percentages were used to provide information about nutrition nurses and their practices by country. ANOVA was used to assess the significance of differences between groups based on mean values. The chi-square test or Fisher's exact test (when the chi-square test assumptions do not hold due to low expected cell counts) was used to compare the three study groups, where appropriate. Levene's test was used to assess the homogeneity of the variances. When an overall significance was observed, pairwise post-hoc tests were performed using Tukey's test. The statistical significance level was set at $p < 0.005$ (two-tailed).

RESULTS

Sample Characteristics

Data on the individual and working characteristics of the participants are given in Table 1. A total of 81 participants completed the survey. The mean age of the participants was 39.0(SD=6.38) in Türkiye, 46.61(SD=7.36) in the European countries, and 56.36 (SD=13.67) years in the USA. Nurses in Türkiye were younger than nurses in the European countries and the USA ($p < 0.001$). Regarding the educational level, half of the nurses had a bachelor's degree in Türkiye (50%) compared to 48.1% in the European countries and 20% in the USA. Only two nurses in the USA had a Ph.D. degree. 44.1% of nurses in the European countries, and 80% in the USA reported having at least a certificate or diploma in nutrition. The mean length of service was 5.52(SD=7.38) years in Türkiye, while it was 9.48(SD=5.97) years in the European countries, and 19(SD=17.06) years in the USA ($p < 0.001$). Almost half of the nurses in Türkiye (47.7%) reported having a protected nurse title (nutrition nurse) compared to those in the European countries (77.7%) and the USA (80%) ($p = 0.003$). All nurses in Türkiye reported having a clinical nutrition support team, compared with 88.8% in the European countries, and 80% in the USA nurses had this team ($p = 0.040$). Only two Turkish nurses mentioned having a speech therapist in their NST. In the USA, this was 87.5%. Regarding the presence of a steering committee, 90.9% of Turkish nurses reported having this team compared to

| Table 1. Characteristics on nutrition nurses (n=81) | | | | |
|---|-------------------------------|---|--------------------------|---------|
| | Türkiye n (%) n= 44 (54.3) | European Countries n (%) n=27 (33.3) | USA n (%) n=10 (12.3) | P value |
| Age (in years) Mean (SD) | 39.00±(6.38) (25-54) | 46.61±(7.36) (31-56) | 56.36±(13.67) (33-71) | <0.001 |
| 20-30 | 4 (9.1) | 0 (0.0) | 0 (0.0) | <0.000 |
| 31-40 | 22 (50.0) | 7(25.0) | 2 (20.0) | |
| 41-50 | 16 (36.3) | 10 (35.7) | 2 (20.0) | |
| >50 | 2 (4.6) | 10 (35.7) | 6 (60.0) | |
| Gender | | | | |
| Female | 43 (97.7) | 26 (96.2) | 9 (90.0) | 0.466 |
| Male | 1 (2.3) | 1 (3.8) | 1 (10.0) | |
| Educational level | | | | |
| Associate degree | 5 (11.3) | 5 (18.5) | 0 (0.0) | - |
| Bachelor's degree | 22 (50.0) | 13 (48.1) | 2 (20.0) | |
| Master degree | 15 (34.1) | 8 (29.6) | 3 (30.0) | |
| Doctorate degree | 2 (4.5) | 0 | 0 | |
| Master degree with nutritional certificate | 0 | 1 (3.8) | 3 (30.0) | |
| Doctoral degree with nutritional certificate | 0 | 0 | 2 (20.0) | |
| Nutrition certificate and awarding institute (without master and doctoral degree) | | | | |
| Yes | 20 (45.5) | 12 (44.4) | 8 (80.0) | 0.144 |
| Source/organization/institution provided these certificate(s)* | | | | |
| Health Ministry | 6 (30.0) | - | - | - |
| Educational Institution | 0 (0.0) | 7 (58.3) | 3 (37.5) | |
| Education and Training Hospital | 3 (15.0) | - | - | |
| University Hospital | 5 (25.0) | - | - | |
| National Nutrition Society | 5 (25.0) | 4 (33.3) | 4 (50.0) | |
| International Nutrition Society | 1 (5.0) | 1 (8.33) | 1 (12.5) | |
| Title within the specialist nutrition nursing field | | | | |
| Nutrition Nurse | 38 (86.5) | 7 (25.0) | 0 (0.0) | |
| Nutrition Nurse Specialist | 6 (13.5) | 7 (25.0) | 2 (20.0) | |
| Clinical Nutrition Nurse Specialist | - | 8(29.6) | 3 (30.0) | |
| Consultant Nutrition Nurse | - | 1 (3.8) | 3 (30.0) | |
| Clinical nurse specialist (nutrition support focus) | - | 4 (14.8) | 2 (20.0) | |
| Duration of professional experience (mean; SD; min-max) | 5.52 (7.38) (1-18) | 9.48 (5.97) (1-21) | 19.00 (17.06) (1-45) | <0.001 |
| Is the title approved by a regulatory authority? | | | | |
| Yes | 32 (72.7) | 13 (48.1) | 7 (70.0) | 0.051 |
| Is Nutrition Nurse (NN) a protected title in your country? | | | | |
| Yes | 21 (47.7) | 21 (77.7) | 8 (80.0) | 0.003 |
| Abbreviation: ICU, Intensive Care Unit; NST, Nutrition Support Team * Multiple choice. | | | | |

| Table 1. Continued | | | | |
|---|---------------------------------------|---|----------------------------------|------------------|
| | Türkiye n (%) n= 44 (54.3) | European Countries n (%) n=27 (33.3) | USA n (%) n=10 (12.3) | P value |
| Current medical discipline* | | | | |
| ICU | 22 (50.6) | 10 (37.1) | 6 (60.0) | - |
| Surgery | 14 (32.2) | 14(51.8) | 2 (20.0) | |
| Internal Medicine | 15 (34.5) | 14 (51.8) | 5 (50.0) | |
| Pediatrics | 6 (13.8) | 1(3.71) | 5 (50.0) | |
| Reanimation Unite | 6 (13.8) | 5(18.5) | 5 (50.0) | |
| Geriatrics | 10 (23.0) | 6 (22.2) | 2 (20.0) | |
| Oncology | 5 (11.5) | 9 (33.3) | 2 (20.0) | |
| All specialist | 5 (11.5) | 2 (7.40) | 2 (20.0) | |
| Enrollment in the nutrition field * | | | | |
| Job advertisement in the hospital | 11 (25.3) | 14 (51.8) | 1 (10.0) | - |
| Job advertisement from another hospital | 1 (2.3) | 4 (14.8) | 1 (10.0) | |
| On a proposal by a physician | 7 (16.1) | 4 (14.8) | 2 (20.0) | |
| On a proposal by a hospital management | 10 (23.0) | 2 (7.40) | 3 (30.0) | |
| On a proposal by another colleague | 19 (43.7) | 3 (11.1) | 3 (30.0) | |
| Presence of a nutrition team | | | | |
| Yes | 44 (100.0) | 24 (88.8) | 8 (80.0) | 0.040 |
| NST members | | | | |
| Physician | 44 (100.0) | 24 (100.0) | 4 (50.0) | - |
| Nurse | 44 (100.0) | 24 (100.0) | 8 (100) | |
| Dietician | 43 (97.7) | 24 (100.0) | 7 (87.5) | |
| Pharmacist | 42 (95.5) | 24 (100.0) | 8(100) | |
| Speech therapist | 2 (4.5) | 17 (70.8) | 7 (87.5) | |
| Presence of a steering committee | | | | |
| Yes | 40 (90.9) | 23 (85.1) | 6(60.0) | <0.005 |
| Steering committee members | | | | |
| Physician | 40 (90.9) | 23 (100.0) | 6 (100.0) | - |
| Nurse | 39 (88.6) | 23 (100.0) | 6 (100.0) | |
| Dietician | 39 (88.6) | 23 (100.0) | 6 (100.0) | |
| Pharmacist | 35 (79.5) | 18 (78.2) | 6 (100.0) | |
| Nursing director | 12 (27.3) | 7 (30.5) | 0 (0.0) | |
| Medical director | 11 (25.0) | 5 (21.7) | 2 (33.3) | |
| Other person from the hospital management | 17 (38.6) | 15 (65.2) | 1 (16.6) | |
| Head nurse(s) | 10 (22.7) | 12 (52.1) | 0 (0.0) | |
| Kitchen staff member | 5 (11.4) | 14 (60.8) | 0 (0.0) | |
| Speech therapist | 2 (4.5) | 13 (56.5) | 0 (0.0) | |
| Abbreviation: ICU, Intensive Care Unit; NST, Nutrition Support Team * Multiple choice. | | | | |

the nurses in the European countries (60%) ($p<0.005$).

Educational and Scientific Activities

Educational and scientific activities related to nutrition are presented in Table 2. Membership in an international nutrition society was higher in the European countries (22.2%) than in Türkiye (4.5%). On the other hand, Turkish nurses had higher participation in intramural training/courses compared to the European countries and the USA, 81.8%, 59.2%, and 40%, respectively. Nurses in Türkiye (58.3%), the European countries (25%), and the USA (40%) acknowledged that in-service education programs/courses were not conducted on an occasional basis. All nurses in the US reported conducting clinical research compared to nurses in Türkiye and the European countries (60%, and 70.3%, respectively) ($p=0.031$). Although not shown in the table, several resources were mentioned to gain nutrition knowledge. Nurses in Türkiye used the internet, scientific databases, protocols, etc. (61.4%), while nurses in the USA and the European countries relied more on

national nutrition guidelines (75.7%) and their colleagues (75.7%). Overall, most nurses rated their knowledge as good, while 30% of nurses in the USA rated their practice skills as excellent.

Nutritional Practices

Table 3 summarizes the nutritional practices of NN. Turkish nurses were more involved in nutritional assessment than their counterparts in the European countries, and the USA (81.8%, 74%, and 60%), respectively. Peripheral venous catheters for peripheral TPN were less used in Türkiye (65.9%) compared to the European countries (88.8%) and the USA (90%) ($p<0.001$). Nurses in Türkiye (59.1%) were less involved in placing NG tubes compared to nurses in the European countries (88.8%), and the USA (100%) ($p<0.001$). Most nurses in the USA (90%) and the European countries (88.8%) were involved in the follow-up of patients on HEN or HPN, whereas only 45.5% of nurses in Türkiye were involved ($p<0.001$).

Table 2. Education and scientific activities of nutrition nurses (n=81)

| | Türkiye (n=44) n (%) | European Countries (n=27) n (%) | USA (n=10) n (%) | P value |
|---|-------------------------|------------------------------------|---------------------|--------------|
| Membership of an international nutrition society? | | | | |
| Yes | 2 (4.5) | 6 (22.2) | 1 (10.0) | 0.235 |
| Participation in any in-service education programs/courses | | | | |
| Yes | 36 (81.8) | 16 (59.2) | 4 (40.0) | 0.020 |
| Frequency of education programs/courses | | | | |
| At least once a year | 7 (19.4) | 4 (25.0) | 0 (0.0) | - |
| More than once a year | 8 (22.3) | 8 (50.0) | 0 (0.0) | |
| Not specified (on an occasional basis) | 21 (58.3) | 4 (25.0) | 4 (40.0) | |
| Participation in any extramural scientific or educational nutritional program? | | | | |
| Yes | 35 (79.5) | 20 (74.1) | 6 (60.0) | 0.727 |
| Conducting clinical study | | | | |
| Yes | 24 (60.0) | 19 (70.3) | 10 (100.0) | 0.030 |
| Perceived nutritional knowledge | | | | |
| Excellent | 4 (9.1) | 3 (11.1) | 3 (30.0) | 0.197 |
| Good | 26 (59.1) | 19 (70.3) | 6 (60.0) | |
| Moderate | 10 (22.7) | 5 (18.6) | 1 (10.0) | |
| Low | 4 (9.1) | 0 (0.0) | 0 (0.0) | |
| Perceived nutritional practice skills | | | | |
| Excellent | 6 (13.6) | 7 (25.9) | 3 (30.0) | 0.396 |
| Good | 31 (70.5) | 18 (66.6) | 7 (70.0) | |
| Moderate | 3 (6.8) | 2 (7.5) | 0 (0.0) | |
| Low | 4 (9.1) | 0 (0.0) | 0 (0.0) | |

| Table 3. Nutritional practices of nutrition nurses (n=81) | | | | |
|---|---------------------------------|--|-----------------------------|-------------------------------|
| Participate or train (in) following nutritional standards of clinical practice | Türkiye (n=44) n (%) | European Countries (n=27) n (%) | USA (n=10) n (%) | P value Difference |
| | Yes | Yes | Yes | |
| Nutrition screening | 36 (81.8) | 20 (74.0) | 6 (60.0) | 0.603 |
| Nutrition assessment | 39 (88.6) | 18 (66.6) | 7 (70.0) | 0.040 |
| Nasogastric tube insertion | 26 (59.1) | 24 (88.8) | 10 (100.0) | 0.007 |
| Naso-intestinal tube insertion | 7 (15.9) | 18 (66.6) | 5 (50.0) | <0.001 |
| Peripheric venous catheter insertion | 29 (65.9) | 24 (88.8) | 9 (90.0) | <0.001 |
| Preparation of necessary equipment for nutrition support | 36 (81.8) | 25 (92.5) | 10 (100.0) | 0.187 |
| Nutrition care plan and follow-up (artificial nutrition) | 36 (81.8) | 22 (81.5) | 10 (100.0) | 0.277 |
| Enteral access care or teaching (patients, caregivers, other health-care professionals) | 39 (88.6) | 26 (96.2) | 10 (100.0) | 0.313 |
| Parenteral access care or educational activities (patients, caregivers, other health-care professionals during patient visits with the NST) | 38 (86.4) | 20 (74.0) | 10 (100.0) | 0.167 |
| Participating in patient visits with the NST | 39 (88.6) | 27 (100.0) | 10 (100.0) | 0.106 |
| Follow-up of patients with HEN or HPN | 20 (45.5) | 24 (88.8) | 9 (90.0) | <0.001 |
| Data collection and recording related to nutrition | 37 (84.1) | 25 (92.5) | 9 (90.0) | 0.396 |
| Conducting clinical research | 24 (54.5) | 19 (70.3) | 10 (100.0) | 0.031 |
| Method of external NGT length insertion* | | | | |
| NEX (for adults) | 36 (81.8) | 18 (66.6) | 4 (40.0) | <0.001 |
| NEX + 10 (for adults) | 10 (22.7) | 18 (66.6) | 3 (30.0) | |
| NEMU (for children) | 6 (13.6) | 1 (3.7) | 5 (50.0) | |
| First line method for confirming correct nasogastric tube position | | | | |
| X-ray | 3 (6.8) | 3 (11.1) | 7 (70.0) | <0.001 |
| pH testing of gastric secretion | 2 (4.5) | 22 (81.4) | 3 (30.0) | |
| Auscultation | 34 (77.2) | 0 (0.0) | 0 (0.0) | |
| Aspiration and visual inspection of gastric fluid | 5 (11.3) | 2 (7.4) | 0 (0.0) | |
| Alternative methods for confirming nasogastric tube position* | | | | |
| X-ray | 15 (34.1) | 27 (100.0) | 5 (70.0) | <0.001 |
| pH testing of gastric secretion | 2 (4.5) | 11 (40.7) | 3 (30.0) | |
| Auscultation | 23 (52.2) | 1 (3.7) | 5 (50.0) | |
| Aspiration and visual inspection of gastric fluid | 25 (56.8) | 4 (14.8) | 3 (30.0) | |
| Abbreviation: ANS, Artificial Nutrition Support; HEN, Home Enteral Nutrition; HPN, Home Parenteral Nutrition; NEMU; Nose-ear-mid-umbilicus; NEX, Nose-ear-xiphoid; NGT, Nasogastric tube; NST: Nutrition Support Team | | | | |
| * Multiple choice. | | | | |

| Table 3. Continued | | | | |
|---|-------------------------|------------------------------------|---------------------|-----------------------|
| Participate or train (in) following nutritional standards of clinical practice | Türkiye (n=44) n (%) | European Countries (n=27) n (%) | USA (n=10) n (%) | P value Difference |
| | Yes | Yes | Yes | |
| Number of inpatients with ANS per week | | | | |
| No | 3 (6.8) | 3 (11.1) | 0 (0.0) | 0.224 |
| 1-10 | 5 (11.4) | 3 (11.1) | 3 (30.0) | |
| 11-20 | 10 (22.7) | 9 (33.3) | 3 (30.0) | |
| 21-30 | 12 (27.3) | 5 (18.5) | 1 (10.0) | |
| 31-40 | 5 (11.4) | 1 (3.8) | 1 (10.0) | |
| >41 | 3 (6.8) | 0 (0.0) | 2 (20.0) | |
| Number of outpatients with HEN in the previous year | | | | |
| No | 22 (50.0) | 4 (14.8) | 2 (20.0) | 0.230 |
| 1-25 | 8 (18.2) | 8 (29.6) | 1 (10.0) | |
| 26-50 | 2 (4.5) | 5 (18.5) | 1 (10.0) | |
| 51-100 | 5 (11.4) | 4 (14.8) | 3 (30.0) | |
| >101 | 7 (15.9) | 5 (18.5) | 3 (30.0) | |
| Number of outpatients with HPN in the previous year | | | | |
| No | 29 (65.9) | 7 (25.9) | 2 (20.0) | 0.288 |
| 1-25 | 10 (22.7) | 8 (29.6) | 3 (30.0) | |
| 26-50 | 1 (2.3) | 3 (11.1) | 3 (30.0) | |
| 51-100 | 2 (4.5) | 4 (14.8) | 1 (10.0) | |
| >101 | 2 (4.5) | 5 (18.5) | 1 (10.0) | |
| Number of ambulant nutritional consultations (per week) | | | | |
| No | 25 (56.8) | 4 (14.8) | 3 (30.0) | <0.001 |
| 1-5 | 12 (27.3) | 11 (40.7) | 2 (20.0) | |
| 6-10 | 5 (11.4) | 10 (37.0) | 2 (20.0) | |
| >11 | 1 (2.3) | 2 (7.5) | 3 (30.0) | |
| Type of patients receiving nutrition support | | | | |
| Adults | 31 (70.5) | 21 (77.7) | 5 (50.0) | 0.160 |
| Pediatrics | 5 (11.4) | 0 (0.0) | 2 (20.0) | |
| Both adults and pediatrics | 8 (18.2) | 6 (22.2) | 3 (30.0) | |
| Specific time for nutrition activities | | | | |
| ≤ 25% | 10 (22.7) | 0 (0.0) | 0 (0.0) | 0.002 |
| > 25% ≤ 50% | 11 (25.0) | 2 (7.5) | 2 (20.0) | |
| > 50% ≤ 75% | 4 (9.1) | 2 (7.5) | 3 (60.0) | |
| > 75% | 19 (43.2) | 23 (85.2) | 5 (50.0) | |
| Abbreviation: ANS, Artificial Nutrition Support; HEN, Home Enteral Nutrition; HPN, Home Parenteral Nutrition; NEMU; Nose-ear-mid-umbilicus; NEX, Nose-ear-xiphoid; NGT, Nasogastric tube; NST: Nutrition Support Team | | | | |
| * Multiple choice. | | | | |

As for the control of the NG tube location, the NEX (nose-ear-xiphoid) method was the most preferred technique in Türkiye (81.8%) for adults compared to EC and the USA (66.6%, 40%, respectively) ($p<0.001$). As for the NEX+10 method, just 22.7% of Turkish nurses utilized compared to the European Countries and the USA (66.6%, and 30%, respectively) ($p<0.001$). NEMU (nose-ear-mid-umbilicus) method used for children was practiced in 13.6% in Türkiye, 3.7% in the European Countries, and 50% in the USA ($p<0.001$).

As for the USA external measurement of internal NG tube length, nurses in the US primarily used radiographic confirmation (70%) as a first-line test to confirm the correct tip position of nasogastric (NG) tubes, whereas in Türkiye, auscultation (77.2%) and pH testing of gastric aspirate (81.4%) were more common ($p<0.001$). When considering alternative methods to confirm tube position, 100% of nurses in the European countries utilized radiography,

whereas only 70% of nurses in the USA and 34.1% in Türkiye used this method ($p<0.001$). Regarding the number of outpatients per week, nurses in Türkiye (56.8%) reported never seeing outpatients ($p<0.001$). 85.2% of nurses in the European countries, the USA nurses (50%), and 43.2% of those in Türkiye have specified that spend more than 75% of their time at work on nutrition ($p=0.002$).

Nutrition-related Challenges

Nutrition nurses deal with several challenges concerning their general practice or job. Relevant items are presented in Table 4 and Figure 1. There is no legal title and/or job protection for nurses in Türkiye (66%) and a quarter of nurses in the European countries.

DISCUSSION

This online cross-sectional survey is the first to demonstrate the different educational backgrounds, employment, and scope of practice among NN. The mean age and seniority of nurses in the European countries and the USA were higher than in Türkiye. Only a few nurses in the USA graduated from a nutrition-related master's program and had a Ph.D. degree. The ASPEN membership database showed that 28% of the members were nurse practitioners and 38% of those had a master's degree. The same report stated that the number of nurses with a doctoral degree has increased over the years.¹⁹ Considering the educational activities of NN, intramural activities were irregular, and the participation rate was similar in all the countries. Turkish nurses reported frequent use of the Internet to gather information related to nutrition, while nurses in other countries mostly rely on national nutritional guidelines and their colleagues. Additionally, membership in (inter)national nutrition societies was higher in both the USA and the European countries. In Türkiye, almost all nurses were entitled to "NN", while "NN specialists" only



Figure 1. Challenges of nutrition nurses

| Notification of local, legal, practical and/or organizational challenges as a nutrition nurse | Türkiye (n=44) n (%) | European Countries (n=27) n (%) | USA (n=10) n (%) |
|---|-------------------------|------------------------------------|---------------------|
| Have no legal title or legal job protection | 29 (65.9) | 6 (22.5) | 1 (10.0) |
| Have no other direct colleague who does the same job | 4 (9.1) | 2 (7.5) | 2 (20.0) |
| Lack of support from other health-care workers in the hospital or in my organization | 2 (4.5) | 0 (0.0) | 0 (0.0) |
| Inability to advance in career (from novice to expert) | 2 (4.5) | 0 (0.0) | 0 (0.0) |
| The possibility of losing job | 0 (0.0) | 5 (13.5) | 1 (10.0) |
| Have no formal job description as a nutrition nurse | 1 (2.3) | 1 (3.8) | 0 (0.0) |
| Being a nutrition nurse is not interesting and challenging enough | 0 (0.0) | 2 (7.5) | 0 (0.0) |
| The job time is not enough to do the job properly | 0 (0.0) | 5 (13.5) | 1 (10.0) |
| Lack of support from the hospital management | 1 (2.3) | 3 (11.1) | 0 (0.0) |

seemed to exist outside Türkiye. The ASPEN's nutrition support nurses section published core competencies for NN in 2008. However, the present study revealed that education and recognized titles included a variety of titles reported by nurses as practitioners and nutrition support clinicians. Previous reports also confirmed our findings that there is a variety of job titles reported by the nurses, such as nurse practitioner, and nutrition support clinician.¹⁹

This study revealed that there were important differences between NN practices, including the measurement of external NGT length insertion and confirming the correct position of the NGT. In the European countries and the USA, nurses frequently assist in the insertion of NG, naso-intestinal, PEG, and PEJ tubes, while nurses in Türkiye rarely perform these activities. The gastric route is accepted as the most appropriate choice for enteral nutrition support when there is no contraindication.²⁰

The placement of NG tubes by nurses or physicians to administer fluids, tube feedings, or drugs is common in daily clinical practice.²¹⁻²⁴ Correct placement and positioning are essential to prevent associated morbidity and mortality (e.g., aspiration pneumonia) within the proper placement. NG tube placement starts with a measurement of the expected internal length. The NEX approach (distance from the tip of the nose-earlobe-xiphoid process) remains the method most widely taught in nursing programs and used by practicing nurses for tube insertion in adults, but it may not be the safest approach as demonstrated in an integrative review.²⁵⁻²⁷

Incorrect NG tube placement in pediatric and adult patients has been integrated into reporting systems.²⁵⁻²⁹ The Pennsylvania Patient Safety Agency reported 166 NG tube misplacements between 2011 and 2016, including 10.2% in children.²⁹ The United Kingdom National Health Services and the U.S. Food and Drug Administration reported significant cases of incorrect placement of NG tubes. Most of these cases had a history of immediate treatment such as decompression and chest tube placement, with some cases resulting in cardiopulmonary arrest and death.³⁰⁻³⁴ Similar findings have been reported in the UK, which would equate to 5149 misplacements, 963 pneumothoraxes, and 218 deaths per year due to misplacement of NG tubes.³⁵⁻³⁷ To prevent these complications safe testing methods should be applied to confirm the correct tip position.

In line with this, nurses may consider checking the position of NG tubes after insertion, and during the nutrition support based on data-driven knowledge. An abdominal X-ray remains the gold standard, but X-ray interpretation must be performed by a competent person, and if there is any doubt about misinterpretation, the advice of a

radiologist should be sought.^{25,36,38-45} The NPSA reported 45 incidents of X-ray misinterpretation, 12 of which resulted in patient death. In their patient safety alert, they recommend that an X-ray should be used as a second-line test when no aspirate could be obtained, or pH indicator paper has failed to confirm the position of the nasogastric tube.³⁶ Looking at bedside methods for confirmation, pH-testing ($\text{pH} \leq 5$) on gastric aspirate excludes pulmonary placement and reduces the risk of esophageal placement to a minimum.^{36,46-50} Other methods, such as auscultation and visual evaluation of gastric aspirates, are considered unsafe.^{34,39,47,51-57} This survey demonstrated that nurses in Türkiye still rely on unsafe methods to check the position of an NG tube, such as auscultation and visual inspection of sucked aspirates without checking the pH. This highlights the need for re-education in nursing schools, care facilities, and home care. In general, it is clear that there is still some educational work to do to increase awareness about the safest methods of nasogastric tube insertion and/or tip confirmation.

Regarding the correct nasogastric tip location, most nurses in Türkiye (77.2%) still rely on auscultation, which has been proven to be unsafe.⁵⁸ For both adults and children, there is scientific evidence that the NEX is incorrect.⁵⁹ In children, the NEMU (distance from the nose to the ear to the mid-umbilicus) or an age-related height-based method should be used. Only nurses outside Türkiye use this method.

One of the most striking findings of our study is that NN in Türkiye, the European countries, and the USA reported important nutritional challenges. NN stated that they struggle with the same issues including the amount of time spent on nutrition and the lack of other colleagues doing the same job. On the other hand, nurses in the European countries and the USA mainly emphasized the absence of a legal regulation to protect their title or profession. These findings reveal the need for new legal initiatives for professional recognition and improved local policies to improve working conditions and time management. In summary, it is evident that there are still many hurdles that need to be overcome.

Limitations

Our study had several limitations that need to be addressed. The response rate and reasons for not participating in the study are not included in this study. The volunteered nurses may have internet access or be more motivated to respond to the survey. This may be a source of bias. It is important to note that relatively few nurses from the USA participated in the study. Another limitation is that only nurses from a few European countries responded. The timing of the survey also needs to be considered; it was conducted during the COVID-19 pandemic, and this

may have influenced both the participation rate and the generalizability of the findings.

CONCLUSIONS

Eighty-one nurses responded to this online survey. Only a minority had a postgraduate degree, which is an apparent contradiction given the fact that a master's degree is a prerequisite for advanced practice nurses. International nutrition societies with a nursing section, hospital managers, universities, and ministries of health need to collaborate to improve quality education and certification programs, credentialing boards, legal title protection, and recognition of NN. Moreover, this study underlines that a wide range of differences exists among nurses in different parts of the world.

To minimize these differences, NN should be encouraged to share knowledge, discuss uniform job profiles, be an active part of an (inter)national nutrition society, and integrate more evidence-based research into their clinical practice. Standardized guidelines and protocols should be established, and nutrition nurses should be encouraged to participate in comprehensive training programs and research activities to integrate evidence-based information into clinical practice.

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