

Original Article

Health insurance or subsidy, not related to GDP, is a universal advantage for effective management of hospital malnutrition

Stanislaw Klek MD, PhD¹, Michael Chourdakis MD, PhD², Dima Abdulqudos Abosaleh PhD³, Alejandra Amestoy PhD⁴, Hyun Wook Baik MD, PhD⁵, Gertrudis Baptista MD, PhD⁶, Rocco Barazzoni MD, PhD⁷, Ryoji Fukushima MD, PhD⁸, Josef Hartono MD, PhD⁹, Ranil Jayawardena MD¹⁰, Rafael Jimenez Garcia MD, PhD¹¹, Zeljko Krznaric MD, PhD¹², Ibolya Nyulasi PhD¹³, Gabriela Parallada PhD¹⁴, Eliza Mei Perez Francisco MD, PhD¹⁵, Marina Panisic-Sekeljic MD, PhD¹⁶, Mario Perman MD, PhD¹⁷, Arina Prins PhD¹⁸, Isabel Martinez del Rio Requejo MD, PhD¹⁹, Ravinder Reddy MD, PhD²⁰, Pierre Singer MD, PhD²¹, Marianna Sioson MD, PhD²², Andrew Ukleja MD, PhD²³, Carla Vartanian PhD²⁴, Nicolas Velasco Fuentes MD, PhD²⁵, Dan Linetzky Waitzberg MD, PhD²⁶, Steve Leonce Zoungrana MD, PhD²⁷, Aleksander Galas MD, PhD²⁸

¹Stanley Dudrick's Memorial Hospital, General Surgery Unit, Poland

²School of Medicine, Aristotle University of Thessaloniki, Greece

³Nutrition Services Department, King Faisal Specialist Hospital & Research Center, Riyadh, Kingdom of Saudi Arabia

⁴Maestría en Nutrición, Universidad Católica del Uruguay, Montevideo, Uruguay

⁵DMC BundangJesaeng Hospital, Seohyundong, Bundang, Gyeong Gi-Do, Seoul, Republic of Korea

⁶Universidad Central de Venezuela, Facultad de Medicina, Unidad Soporte Nutricional Hospital Universitario de Caracas

⁷Department of Medical, Surgical and Health Sciences, University of Trieste, Trieste, Italy

⁸Teikyo University School of Medicine, Tokyo, Japan

⁹Intensive Care Unit, Central Army Gatot Soebroto Hospital, Jakarta, Indonesia

¹⁰Diabetes Research Unit, Faculty of Medicine, University of Colombo, Sri Lanka

¹¹Universidad de las Ciencias Médicas de La Habana, Hospital Universitario Pediátrico Juan Manuel Márquez, La Habana, Cuba

¹²School of Medicine, University of Zagreb, Croatia

¹³Department of Nutrition and Dietetics and Department of Medicine, Monash University Central Clinical School, Prahran, Australia

¹⁴Universidad Católica del Uruguay Dámaso Antonio Larrañaga, Montevideo, Uruguay

¹⁵St. Luke's Medical Centre, BGC, Taguig, Manila, Philippines

¹⁶Medical Academy University Clinic for General Surgery Department for perioperative nutrition, Belgrade, Serbia

¹⁷Intensive Care Unit, Italian Hospital of Buenos Aires, Buenos Aires, Argentina

¹⁸Mary Medical Centre in Groenkloof, Pretoria, South Africa

¹⁹Hospital Lic. Adolfo LópezMateos ISSSTE, Nutrition and Metabolic Unit, México City

²⁰Care Hospitals Banjara Hills, Hyderabad, India

²¹Institute for Nutrition Research and Critical Care Department, Rabin Medical Center, Beilinson Hospital, Sackler School of Medicine, Tel Aviv University, Israel

²²Section of Nutrition, Department of Medicine, The Medical City Hospital, Pasig City, Manila, Philippines

²³Department of Gastroenterology at Cleveland Clinic Florida, Tampa, USA

²⁴Serhal Hospital, Head of Clinical Nutrition & Dietetics Department, Beirut, Lebanon

²⁵School of Medicine, Pontifical Catholic University of Chile, Santiago, Chile

²⁶Departamento de Gastroenterologia da Faculdade de Medicina da Universidade de São Paulo, Sao Paulo, Brazil

²⁷La Clinique de l'Amitié à Ouagadougou, Burkina Faso

²⁸ Jagiellonian University Medical College, Chair of Epidemiology and Preventive Medicine, Department of Epidemiology, Krakow, Poland

Background and Objectives: Protein-energy and micronutrient malnutrition are global public health problems which, when not prevented and severe, require medical management by clinicians with nutrition expertise, preferably as a collectively skilled team, especially when disease-related. The aim of the study was to analyze factors influencing the introduction and the use of enteral (EN) or parenteral (PN) nutrition. **Methods and Study Design:** An international survey was performed between January and December 2014 in twenty seven countries from all continents. Electronic questionnaires were distributed to 28 representatives of clinical nutrition (PEN) societies. The questionnaire comprised questions regarding country economy, reimbursement, education and the use EN and PN. Twenty-seven (96.4%) files were returned. **Results:** The prevalence of malnutrition was not related to Gross National Product (GPD, $p=0.186$). EN and PN were used in all countries surveyed (100%), but to different extents. Neither reimbursement of EN and PN use depended on GDP. The presence of reimbursement increased the use of EN and PN at hospitals ($p=0.035$), but not at home or chronic care facilities. The size of GDP did not affect the use of EN ($p=0.256$), but it mattered for PN ($p=0.019$). **Conclusions:** This is the first worldwide survey to explore the link between economy and the implementation of medical procedures in the field of nutrition. Results proved that reimbursement was a key factor for the effective treatment.

Key Words: health insurance, subsidy, malnutrition, hospital malnutrition, fight against malnutrition

INTRODUCTION

Disease-related malnutrition (DRM) represents indisputably a serious public health issue worldwide, as it increases morbidity, mortality, readmission rate, length of hospital stay and health-care costs.¹⁻³ It is quite prevalent – DRM is diagnosed in 7-16% of outpatients and in 20-60% patients at admission to hospital.⁴⁻⁸ Yet, the problem of malnutrition often passes unnoticed or belittled.⁵⁻⁷ The only effective intervention for malnutrition is the clinical nutrition. This medical intervention is present in most of countries, but its use varies a lot. Furthermore, as it is a relatively simple procedure, it is possible to analyze what influences its use.

It is well known that the implementation of a new medical procedure is a complex process. It requires a lot of effort, and it is an interplay among various activities, such as raising the awareness, education or research. The economy, however, seems to be crucial, as proven by the therapy for orphan diseases or anti-cancer treatment. The relations among those factors have, however, never been fully addressed, which is startling, as it could be the clue of successful launch of a new therapy.

As randomized, controlled, clinical trials would be unethical, thus impossible, there is no an easy way to prove that detection and treatment of malnutrition matters. Therefore, the fight against malnutrition, comprising the implementation of screening and treatment, was very often left to scientific societies. Both world-leading clinical nutrition societies, the American Society for Parenteral and Enteral Nutrition (ASPEN) and the European Society for Clinical Nutrition and Metabolism (ESPEN), as well as many national societies (PEN societies) have undertaken many activities to change the situation and to focus more attention on malnutrition and its consequences. Actions were dedicated not only to medical specialists such as physicians, dieticians, pharmacists and nurses, but also and more importantly to politicians, health authorities and media. Those activities increased awareness, improved screening, amplified the use of enteral (EN) and parenteral nutrition (PN), representing two types of clinical nutrition support (CN), hence, improved the situation. Results

differed, however, among countries. The question ‘what are the key elements of efficient FAM?’ emerged and remained unanswered. Moreover, with the deteriorating economic situation, the real use of EN and PN was thought to become less successful, as fewer resources were available. A shrinking economy was supposed to negatively influence the treatment of malnutrition through the absence or lowering of the refund for artificial nutrition, as well as the lack of resources needed for education and raising awareness.

Therefore, the purpose of the study was to answer that query by assessing the situation world-wide. Following aspects were analyzed: the economy of the country, the presence of the reimbursement for EN and PN, the quality of education for clinical nutrition and the real use of EN and PN at various short- and long term settings.

METHODS

An international survey with an electronic questionnaire was performed between January and December 2014. Questionnaires were distributed to representatives of twenty-eight national parenteral and enteral (PEN) societies. Participants were supposed to answer all questions, including the prevalence of malnutrition, using recent, already collected, data or new survey performed for the purpose of the study. Twenty-seven questionnaires were returned completely filled (response rate: 96.4%), and analyzed. The Ethics Committee of Stanley Dudrick’s Memorial Hospital approved the study (SKAW2/2013). The study was carried out following the international ethical recommendations stated in the Helsinki Declaration.

For the purpose of financial analysis all participating

Corresponding Author: Dr Stanislaw Klek, Stanley Dudrick’s Memorial Hospital, General Surgery Unit, 32-050 Skawina, 15 Tyniecka Street, Poland.

Tel/Fax: (0048) 12-444-65-26

Email: klek@poczta.onet.pl; st.klek@gmail.com

Manuscript received 25 August 2015. Initial review completed 21 September 2015. Revision accepted 19 November 2015.

doi: 10.6133/apjcn.122015.07

countries were categorized by their economic status according to the World Bank criteria for national income in four categories:⁹

- a. lower middle income countries: Burkina Faso, India, Sri Lanka, Indonesia, Philippines
- b. upper middle income countries: Cuba, Venezuela, Mexico, Republic of South Africa, Lebanon, Argentina, Brazil
- c. high income: Saudi Arabia, Chile, Uruguay, South Korea, Israel, Japan, Australia, United States of America (USA)
- d. Europe: Ukraine, Serbia, Turkey, Latvia, Poland, Russia, Croatia

Group d was formed artificially to include European countries and enable a world-wide analysis. The money spent in those countries on health care (<1,000 USD per capita/year) allowed fair comparison with countries from other continents. Following parameters were analyzed:

- Country population
- Number of hospitals
- Health care expenses as the % of gross domestic product (GDP)
- Prevalence of malnutrition
- Institution responsible for health care regulations
- Presence and type of insurance company (public/ private/ both)
- Use of EN and PN at various settings (hospitals, home, chronic care facilities)
- Presence of the reimbursement for EN and PN
- Presence and type of education in the field of EN and PN

The term 'hospital settings' referred to all in-patients, 'home' to all out-patients staying at home along/ with family/ other care-givers, but without any additional chronic care provided at his/her household level, chronic care and palliative care centers referred to all patients staying outside home, at long term care facilities, due to untreatable cancer or any chronic condition, other than cancer.

Statistical analysis

The statistical analysis was performed using the SPSS v.19 (SPSS Inc., Chicago, IL) software package. The chi-

square test was used if the expected frequency was less than 5 in less than 20% of cells, otherwise the F-Fisher's exact test was performed. A *p* value of <0.05 was accepted as being statistically significant.

RESULTS

Medical insurance companies (responsible for the reimbursement) operate in 26 countries (96.2%), except for Cuba. South Africa, Burkina Faso, Sri Lanka, Serbia and Ukraine there was no state-dependent company, only private ones. The latter did not operate at all in Poland, Cuba, Croatia and France at all in those countries health care expenses were covered by the state-funded and state-governed entity. In twenty countries both private and state insurance companies were present.

Ministry of Health was the institution responsible for creating the health care policy in 26 of 27 countries (96.3%), Australia with the policy created by federal and state authorities was the exception. Additionally, Federal Drug Administration (FDA) in USA and Accreditation Board in India participate in the process as well.

Generally speaking, enteral (EN) and parenteral nutrition (PN) were used in all countries (100%), but to different extent. EN and PN were available to all patients at hospital settings (100%), independently of reimbursement or economy. The EN and PN were not routinely used in chronic care facilities in Indonesia, Cuba, Latvia, Croatia, Ukraine, Sri Lanka and Mexico, at home in Russia, Latvia, Mexico, Sri Lanka, Burkina Faso and Indonesia, and at palliative cancer care centers in Latvia, Croatia, Serbia, Russia, Burkina Faso, Cuba, Indonesia, Argentina, Uruguay, Sri Lanka and Mexico. There was not any one, general denominator for all of these countries responsible for the utilization of EN or PN.

The analysis showed that income of the country did not affect the use of EN and PN, as presented in Table 1. The insignificant trend was observed only in case of home EN and PN (*p*=0.073)

Corresponding situation was observed in case of chronic and palliative care centers – there was a trend toward the dependency on the country income (*p*=0.334 and *p*=0.332, respectively).

The level of the country income did not influence the

Table 1. The GDP and the use of clinical nutrition

Description	Low income & lower middle income outside Europe		Upper middle income outside Europe		High income outside Europe		Europe		<i>p</i> ^F
	n	%	n	%	n	%	n	%	
Clinical nutrition used in general	5	100	7	100	8	100	7	100	---
Clinical nutrition used at hospitals	5	100	7	100	8	100	7	100	---
Clinical nutrition used at chronic care facilities	2	40.0	5	71.4	7	87.5	4	57.1	0.334
Clinical nutrition used at palliative cancer care	2	40.0	4	57.1	7	87.5	4	57.1	0.362
Clinical nutrition used at home	2	40.0	6	85.7	8	100	5	71.4	0.073
Clinical nutrition used at all of the aforementioned facilities	2	40.0	4	57.1	7	87.5	3	42.9	0.246

Table 2. The GDP and the reimbursement of EN and PN

Reimbursement	Low income & lower middle income outside Europe		Upper middle income outside Europe		High income outside Europe		Europe		p^F
	n	%	n	%	n	%	n	%	
	No	4	80.0	1	14.3	1	12.5	1	
Yes for PN, no for EN	0	0.0	0	0.0	1	12.5	2	28.6	
Yes for all types of CNS	1	20.0	6	85.7	6	75.0	4	57.1	

EN: enteral nutrition; PN: parenteral nutrition; CNS: clinical nutrition support.

Table 3. The reimbursement of different forms of clinical nutrition

Reimbursement	Low income & lower middle income outside Europe		Upper middle income outside Europe		High income outside Europe		Europe		p^F
	n	%	n	%	n	%	n	%	
	At hospital	1	20.0	6	85.7	7	87.5	6	
At chronic care									
No	5	100	4	66.7	3	37.5	5	71.4	
Partially	0	0.0	1	16.7	0	0.0	0	0.0	0.130
Yes	0	0.0	1	16.7	5	62.5	2	28.6	
At palliative care	0	0.0	1	16.7	5	62.5	2	28.6	0.119
At home									
No	5	100	5	71.4	3	37.5	4	57.1	0.072
Partially	0	0.0	2	28.6	1	12.5	0	0.0	
Yes	0	0.0	0	0.0	4	50.0	3	42.9	
At all of the above	0	0.0	0	0.0	4	50.0	2	28.6	0.073

Table 4. Type of nutrition reimbursed

Reimbursement for	Low income & lower middle income outside Europe		Upper middle income outside Europe		High income outside Europe		Europe		p^F
	n	%	n	%	n	%	n	%	
	Enteral nutrition – oral supplements	1	20.0	4	57.1	5	62.5	5	
Enteral nutrition – tube feeding	1	20.0	6	85.7	6	75.0	6	85.7	0.070
Parenteral nutrition	1	20.0	5	71.4	7	87.5	6	85.7	0.062
All types	1	20.0	4	57.1	5	62.5	5	71.4	0.429

reimbursement for EN and PN, as presented in Table 2 ($p=0.072$). The prevalence of malnutrition was not related to the country income ($p=0.186$).

An interesting correlation was observed in regards to the reimbursement. It influenced the use of EN and PN as far as the place of treatment was considered (it was important for the utilization of EN and PN at hospitals ($p=0.035$), and mattered less at other settings), which it did not influence the type of therapy - neither EN nor PN was depended on the reimbursement ($p<0.05$).

If the CNS was not provided by the unit thanks to public funding, it was paid or co-paid by the patient himself or his/ her family (Table 3 and 4).

The economy influenced, however, the usage of nutrition for patients with indications for that type of treatment. A significant group of patients did not receive PN if it was indicated ($p=0.019$). No such observation was made for EN ($p<0.05$), as presented in Table 5.

Training for clinical nutrition was present in all of the twenty seven countries participating in the study (100%). The most popular were local PEN societies' activities (21 countries [77.7%]), followed by postgraduate trainings

and ESPEN LLLs (20 countries [74.1%] and 13 [48.1%]). The pre-graduate activities were the least popular (12 countries, 44.4%) (Table 6).

Table 7 presents the relation between various types of training for clinical nutrition and the use of EN and PN. There was no correlation for any of the analyzed factors ($p>0.05$).

All participants of the survey were allowed to freely comment on the situation regarding clinical nutrition and fight against malnutrition. All of them emphasized the need for education and the increase of the awareness, mostly among decision-makers. Most of participants also pointed out the need for implementing EN and PN at chronic care facilities and at home settings. Detailed comments were presented below.

Nutritional issues, regarded as the most important for each country

Serbia

Differences between use of clinical nutrition among institutions depends on the awareness of the importance of parenteral and enteral nutrition and education of the staff

Table 5. The GDP and the presence of malnutrition

Country	Low income & lower middle income outside Europe	Upper middle income outside Europe	High income outside Europe	Europe	<i>p</i>
Prevalence of malnutrition at admission (%)					
Number of countries with the provided data	N=3	N=5	N=7	N=6	
Mean (SD)	48.3 (2.9)	29.5 (18.2)	35.7 (15.9)	30.6 (21.8)	
Median (Q1-Q3)	50.0 (45.0-nd)	35.0 (10.5-45.6)	40.0(35.0-45.0)	29.2 (15.0-46.3)	<i>p</i> ^{kw} =0.186
Min-max	45.0-50.0	8.5-50.0	1.0-49.0	0.0-65.0	
Proportion of patients with indications for enteral nutrition. Who receive treatment (%)					
Number of countries with the provided data	N=5	N=7	N=8	N=6	
Mean (SD)	21.8 (23.8)	56.9 (34.7)	53.6 (29.1)	42.5 (36.8)	
Median (Q1-Q3)	20.0 (2.0-42.5)	70.0 (15.0-90.0)	50.0 (28.8-82.5)	40.0 (5.0-76.3)	<i>p</i> ^{kw} =0.256
Min-max	1.0-60.0	3.0-90.0	15.0-99.0	5.0-95.0	
Proportion of patients with indications for parenteral nutrition. Who receive treatment (%)					
Number of countries with the provided data	N=5	N=7	N=8	N=6	
Mean (SD)	15.8 (24.9)*	51.6 (35.1)	69.4 (23.4)*	46.7 (39.3)	
Median (Q1-Q3)	5.0 (2.0-35.0)	50.0 (30.0-90.0)	75.0 (42.5-88.8)	47.5 (8.8-80.0)	* <i>p</i> ^{gh} =0.019
Min-max	1.0-60.0	1.0-100.0	40.0-100.0	5.0-95.0	

Table 6. GDP and different types of training

CNS training	Low income & lower middle income outside Europe		Upper middle income outside Europe		High income outside Europe		Poorer in Europe		<i>p</i> ^F
	n	%	n	%	n	%	n	%	
Undergraduate	3	60.0	3	42.9	5	62.5	1	14.3	0.278
Postgraduate	3	60.0	6	85.7	6	75.0	5	71.4	0.930
ESPEN LLL	2	40.0	2	28.6	4	50.0	5	71.4	0.471
Local PEN trainings	4	80.0	5	71.4	7	87.5	5	71.4	0.861
Other training	2	50.0	2	40.0	1	25.0	3	75.0	0.733

to implement parenteral and enteral nutrition at all. We should focus all efforts on reimbursement, both enteral and parenteral nutrition not only in hospitals but in all circumstances.

Russia

It is very important to include Clinical Nutrition in the medicine training in higher schools (pre- and postgraduate) and create a new clinical profession called "Specialist in clinical nutrition" in all hospitals. It is also important to include enteral and parenteral nutrition in general guidelines for medical treatment in every medical condition. We should also fight for the reimbursement of enteral formulas by the insurance company and develop a system for home care nutrition, palliative care and chronic care facilities.

Brazil

The development of Government funded home TPN program is the most important task.

Argentina

Education and the inclusion of the practice in minimum mandatory health care at national or province levels.

Australia

Major concern is the lack of HPN programs and funding for the service. Some understanding by the Federal government and some major investigations in intestinal fail-

ure and identifying options.

Turkey

The most important tasks are:

- Medical education:
 - Education in clinical nutrition should become a part of the curriculum for medical students, dietitians, nurses and pharmacists.
 - The training should also continue in the postgraduate level.
- All patients in hospitals, all individuals in nursing homes and those at risk living in community should be routinely screened for malnutrition and nutritional risk.
- Educational campaigns about malnutrition should be organized to raise awareness among the public.

South Korea

The most important tasks are:

- Educate medical doctors nutritional therapy
- Educate medical students nutritional therapy
- Education & enlightenment of public
- Encourage nutrition support team activity in hospitals & chronic care facilities
- To reimburse EN, PN formulas & devices and activity of NST

Sri Lanka

Private hospital has both EN and PN (including 3-in-1 packs) and patient have to bear the cost. But in the gov-

Table 7. Proportion of patients with indication for clinical nutrition who received the treatment related to different types of EN and PN training

	Absent	Present	
Undergraduate training			
Proportion of patients with indications for enteral nutrition, who receive treatment [%]			
Number of countries	15	11	
Mean (SD)	46.3 (30.0)	45.1 (37.3)	
Median (Q1-Q3)	55.0 (15.0-70.0)	40.0 (3.0-90.0)	
Min-max	5.0-95.0	1.0-99.0	$p^{mw}=0.795$
Proportion of patients with indications for parenteral nutrition, who receive treatment [%]			
Number of countries	15	11	
Mean (SD)	52.0 (32.1)	45.0 (39.5)	
Median (Q1-Q3)	50.0 (20.0-75.0)	40.0 (3.0-85.0)	
Min-max	5.0-100	1.0-100	$p^{mw}=0.516$
Postgraduate training			
Proportion of patients with indications for enteral nutrition, who receive treatment [%]			
Number of countries	7	19	
Mean (SD)	46.6 (39.6)	45.5 (30.8)	
Median (Q1-Q3)	60.0 (5.0-90.0)	50.0 (20.0-70.0)	
Min-max	1.0-95.0	3.0-99.0	$p^{mw}=0.977$
Proportion of patients with indications for parenteral nutrition, who receive treatment [%]			
Number of countries	7	19	
Mean (SD)	40.9 (34.0)	52.1 (35.6)	
Median (Q1-Q3)	40.0 (5.0-70.0)	50.0 (10.0-85.0)	
Min-max	1.0-90.0	1.0-100	$p^{mw}=0.418$
ESPEN LLL			
Proportion of patients with indications for enteral nutrition, who receive treatment [%]			
Number of countries	14	12	
Mean (SD)	47.8 (35.5)	43.5 (30.2)	
Median (Q1-Q3)	50.0 (12.5-90.0)	47.5 (16.3-67.5)	
Min-max	1.0-95.0	3.0-99.0	$p^{mw}=0.857$
Proportion of patients with indications for parenteral nutrition, who receive treatment [%]			
Number of countries	14	12	
Mean (SD)	44.6 (37.2)	54.3 (32.7)	
Median (Q1-Q3)	45.0 (5.0-82.5)	65.0 (22.5-82.5)	
Min-max	1.0-100	1.0-95.0	$p^{mw}=0.536$
Local PEN trainings			
Proportion of patients with indications for enteral nutrition, who receive treatment [%]			
Number of countries	6	20	
Mean (SD)	51.8 (41.1)	44.0 (30.6)	
Median (Q1-Q3)	60.0 (4.0-91.3)	45.0 (16.3-67.5)	
Min-max	1.0-95.0	3.0-99.0	$p^{mw}=0.714$
Proportion of patients with indications for parenteral nutrition, who receive treatment [%]			
Number of countries	6	20	
Mean (SD)	32.7 (33.2)	54.0 (34.6)	
Median (Q1-Q3)	25.0 (4.0-60.0)	60.0 (15.0-83.8)	
Min-max	1.0-90.0	1.0-100	$p^{mw}=0.190$

EN: enteral nutrition; PN: parenteral nutrition; CNS: clinical nutrition support.

ernment hospital (majority in the country), they do not use EN (commercial supplements) and PN when needed due to the cost. Blended products are used by government hospital staff. Nutritional training among doctors is vital to increase the awareness of the hospital malnutrition and other situations where nutrition support is important. Second, government should support commercial nutrition supplements for hospital patients. At the moment, only limited products have been included to hospital drug lists.

Cuba

To create trained personnel in the primary level to expand Home Enteral and Parenteral Nutrition

Chile

a. To establish the reimbursement of out-patients nutritional support.

- To increase number of physicians trained in clinical nutrition at public hospitals
- Re-educate medical personnel in clinical nutrition

United States of America

Change of the attitude: Nursing homes accept patients only with gastrostomy or jejunostomy, they do not approve nasogastric/enteral feeding tubes. Moreover, nursing homes very rarely admit patients with TPN.

India

Standard nutritional interventional based on current guidelines and are practiced in about 25% of the hospitals in India. The rest of the nutritional interventions are based on the advice of the clinician, whose familiarity with the standard guidelines is substandard. In other words, medical nutrition therapy is substandard in majority of the

hospitals in India

The following issues can improve nutritional services in India:

- a. Comprehensive nutrition care (of hospitalised patients and non-hospitalised individuals) should be included in the core-curriculum of undergraduate and postgraduate training programmes.
- b. Regular training programmes (workshops, case-study modules, lectures, seminars) on the art and science of medical nutrition therapy ought to be a regular agenda, which should be conducted by the local PEN and critical care societies.
- c. Junior medical and nutritional professionals should be encouraged to attend national and international conferences related to artificial nutrition support
- d. There is a dire need to start nutrition training programmes on regular and frequent basis in various parts of the country

Lebanon

The health care in Lebanon is very much advanced as its considered one of the best in the Middle East/ Arab Countries due to both high number and highly educated medical doctors and medical staff, however the problem relies on the fact that health care is not state covered for everyone in the country and the patient may still be required to pay part of his fees for enteral/parenteral nutrition sometimes even with private insurance or state covered social health care. As for the organization, a PEN society should be established that I started talks a few years back on and then it was on hold until today. Also more up to date and intensive training especially for the nurses/dieticians and of course aiming that the enteral nutrition section be covered 100% for everyone by the state no matter how long the patient requires it and what expensive products are involved.

Uruguay

There is a need for government-introduced regulations on enteral and parenteral nutrition as well as nutrition support teams.

Indonesia

The term of nutrition as supplement must be changed to be as treatment, and the government (health ministry) must be involved to understand and change the policy that giving nutrition is giving treatment so all the nutrition either enteral or parenteral must be reimbursed.

Indonesian society (Inaspen) have just support the ministry of health few years ago to make NST (Nutritional Support Team) or "TTG (Tim Terapi Gizi) as one of the accredited points for any hospital in Indonesia which want to be accredited as a good hospital must have the team.

PEN society in each country must involve actively with the government especially the ministry of health to change the perception that nutrition is not a supplement but some kind like a "drug" that every patient need it in different dose and composition for treatment the diseases so nutrition must be reimbursed.

Venezuela

Education of all medical professionals (Physician, Dieticians, Nurses, Pharmacist) and the heads of hospitals. Post graduate and under graduate courses are needed. PEN society should cooperate with other scientific societies (Gastro, UCI, Surgery, Paediatric, Oncology and others).

DISCUSSION

Reimbursement systems differ significantly worldwide, due to organisation and funding of health care.¹⁰ All countries are responsible to ensure the right to health and the obligation to grant access to essential medications or services, but it can be ensured by the provision of a range of particular medicines in public sector facilities that are procured by the state as either free of charge or with a modest co-payment, or utterly "out-of-pocket" in the private sector.¹⁰ In many countries the distinction between the public and private sectors is not always clear.¹⁰

The implementation of a new medical procedure is a complex process, and it is an interplay of various factors. The thorough analysis of this process is demanding, hence it is not surprising that such an analysis have never been performed.

As disease related malnutrition represents a critical public health concern as it increases complication rates, morbidity, mortality, hospital readmissions, the length of hospital stay and health care costs, it seemed to a perfect model for such an a survey.^{1,2} Recently published Croatian study showed that the total cost of adult malnutrition for selected diagnoses was 97.35 million EURO, accounting for 3.38% of the total Croatian national health care budget and the average cost per patient was estimated at 1640.48 EURO.¹¹ Another recent European survey showed that the implementation of CNS varied across Europe and seemed to be influenced by the political situation, local economy and the activity of local PEN society.¹² The latter differed as far as the their engagement in trainings, cooperation with authorities and raising the awareness, were considered. Moreover, randomized, clinical trials on malnutrition would be unethical, which leaves us incapable of proving its worth with evidence based medicine.

The following study address all the major ambiguities, such as the relation among the reimbursement, education or economy and the use of EN and PN. The GDP was used as a marker of country economic status.

The study showed that enteral (EN) and parenteral nutrition (PN) were used in all countries (100%) and its use was independent of the income of the country. EN and PN were available to all patients at hospital settings, but not available to everyone in chronic care facilities or at home. The relation between use of clinical nutrition at chronic care centers, palliative centers was statistically insignificant ($p=0.334$ and $p=0.332$, respectively).

The level of the country was proven not to be responsible for the reimbursement for EN and PN ($p=0.072$). The reimbursement mattered for the use of EN and PN at hospitals ($p=0.035$), and mattered less at other settings. Reimbursement was unimportant for any type of clinical nutrition ($p<0.05$). If the EN or PN was not provided by

the unit, it was paid or co-paid by the patient himself or his/ her family.

Training for clinical nutrition was present in all countries participating in the study but one. The most popular were local PEN societies training, postgraduate trainings, and ESPEN LLLs. Unfortunately, pre-graduate training was extremely scarce, which answers the question of limited awareness in health care professionals. This aspect was not related to the wealth of the country, such that the economy was not to blame. On the other hand, there was no correlation between various types of training for clinical nutrition and the use of EN and PN. It may suggest the high impact of health care professionals on the use of nutrition, is more important than government's actions. All participants of the study emphasized the need for the increase of education and raise the nutritional awareness.

To our knowledge this is the first survey on the educational and economic aspects of the implementation of a new therapeutic strategy. Authors are aware of the fact that the study can be biased to some extent due to relativity of data. Possibly one of study limitations may be a selective choice of responders from all over the world not fully representative of all national/local hospitals, and centres. On the other hand, there was no reason to doubt the credibility of participants, moreover, it is important to emphasize that there is no other method of collecting such circuitous information. Undoubtedly, the study offered a lot of new data, which provided a new insight into the treatment of malnutrition and the implementation of health care in general.

Conclusion

Results indicated that economic situation influences all aspects of the implementation of the new health service, including education and the treatment itself. The reimbursement seemed to be the key factor in that process.

ACKNOWLEDGEMENTS

SK and MCh coordinated the research, both were responsible for critical data analysis, evaluation of the outcome, and writing of the manuscript. AG was responsible for the statistics and data analysis. All other authors have made substantial contributions to the data collection and drafting of the manuscript.

AUTHOR DISCLOSURES

The authors hereby declare that the article is original, is not under consideration for publication anywhere else and has not been previously published. Authors declare no potential or actual personal, political or financial interest in the material, information or techniques described in the paper. The paper had no external sources of funding.

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