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Health technology assessment of hyperphosphatemia management among hemodialysis patients in Lebanon

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VALORIZATION

The present thesis explored the health technology assessment (HTA) of hyperphosphatemia management among hemodialysis patients, with a focus on the Lebanese setting. It reviewed the evidence behind the cost-effectiveness of phosphorus-lowering interventions in this patient population; explored the cost of hemodialysis in Lebanon and its drivers; assessed the clinical effectiveness of dedicated dietitians providing nutrition education; and evaluated its cost-effectiveness in comparison with the existing practices in Lebanon.

This thesis is directed towards clinicians, policy makers and researchers, and contributes to the efforts tackling the burden of hyperphosphatemia, and aiming to offer optimal care to hemodialysis patients. This research informs decision makers about the high financial burden of hemodialysis and hyperphosphatemia management among hemodialysis patients in Lebanon, and about the effectiveness of intensive nutrition education as a phosphorus-lowering intervention. In light of the insufficient evidence about the cost-effectiveness of interventions targeting hyperphosphatemia management, this dissertation suggests the intensive nutrition education as a cost-saving solution. Finally, this thesis informs researchers about numerous gaps related to the HTA of interventions targeting hyperphosphatemia in this patient population on the international level, and about the gaps related to HTA evidence-building, specifically in Lebanon.

This research could further be considered as an initial model of incorporating clinical and economic evidence in the assessment of health technologies in Lebanon, and a first step towards adopting a transparent value-based model of care within the national healthcare system.

Although this thesis has several clinical, economic, societal, public policy and research implications discussed below, it is worthy to acknowledge its limitations (discussed in ***Chapter 6***) and the need for further studies in order to fully understand the value of the proposed technology.

PROPOSED TECHNOLOGY AND IMPLEMENTATION ROADMAP

As insightfully declared by Pronovost et al. [1] “one of the greatest opportunities to improve patient outcomes will probably come not from discovering new treatments, but from more effective delivery of existing therapies”. The effective delivery of intensive nutrition education requires several key elements to be ensured: 1) expertise factor, i.e. adequate education and skills related to renal dietetics and nutrition education, requiring the translation of nutrition recommendations into core professional education programs to facilitate adoption, 2) time factor, i.e. adequate dietitian-to-patient ratio and sufficient dietitian-to-patient time, and 3) collaborative relationship with relevant organizations to support practicing dietitians in implementing renal nutrition guidelines, reduce practice variations and develop performance measures to assess compliance with the guidelines, all of which must be performed within a scientific and public policy supportive environment [2].

We propose to allocate dedicated dietitians to hemodialysis units, as a first step towards implementing renal nutrition evidence-based practice guidelines, improving patient outcomes, and possibly decreasing pertaining societal costs. We propose this health technology as an innovative and feasible model of renal nutrition care in Lebanon and other developing countries with similar healthcare systems. As recommended by evidence-based practice guidelines, renal dietitians, playing a pivotal role in the unit, should determine the nutrition diagnosis and intervention for hemodialysis patients. Within the proposed technology, every hemodialysis patient will have access to a qualified dietitian and receive intensive nutrition counseling and dietary management based on an individualized plan of care developed before or at the time of commencement of hemodialysis therapy, and modified as indicated.

Implementing this technology within hemodialysis units in Lebanon requires numerous considerations, extending from public health policy makers (system and organization), to third party payers, and to the renal nutrition and health care providers in Lebanon. We propose below a practical implementation roadmap entailing specific, concrete and actionable steps.

Governance considerations

- *Health systems arrangements*

There is no specific description of the required dietetic care for hemodialysis patients in the Lebanese Healthcare Organizations Accreditation Law. Clinical duties of the hospital dietitian are limited to provision of evidence that the dietitian responds to requests to assess patients, in addition to a documented review on a standardized form in patients' medical records, with no specifications for hemodialysis patients. The renal dialysis chapter of the accreditation law only requires evidence of regular consultation and coordination with other health professionals (e.g. dietitians), without further specifications of the dietitian-to-patient ratio or time. The roles and responsibilities of dietitians are thus not set nor organized by law. Accordingly, almost all hemodialysis patients in Lebanon receive only one yearly routine dietetic consultation; in addition to dietetic counseling delivered following nephrologists' consult requests.

→ *Proposed action*

Including an article in the Lebanese Healthcare Organizations Accreditation Law, specifying a minimal dietitian-to-hemodialysis patient ratio and time, as elaborated below. The article is also expected to clarify the roles and responsibilities of the dedicated dietitian. The latter could initially follow Academy of Nutrition and Dietetics (AND) and National Kidney Foundation (NKF)'s Standards of Practice (SOP) and Standards of Professional Performance (SOPP) for dietitians in nephrology nutrition [3], until country-specific standards are established (further details are provided below).

Organizational considerations

- *Institutional arrangement*

Currently, hospital dietitians lack institutional support, including time allocation, to deliver effective care to hemodialysis patients. 85% of Lebanese hospital dietitians spend less than ten hours at the hemodialysis unit. They can only find limited time for hemodialysis patients' consults within their other clinical, administrative and food service duties [4,5]. This limited time greatly falls below what is recommended by international guidelines [3,6–8].

→ *Proposed action*

Organizations must ensure adequate dietitian caseload (dietitian-to-patient time and ratio). This could be done through recruiting dietitians solely dedicated to hemodialysis patients, or establishing specific measurements within the hospitals' dietetic department to ensure the delivery of dietetic services compatible with the below-specified caseload. As initial implementation steps, we propose a dietitian-to-patient ratio of approximately 1:100 hemodialysis patients (not exceeding 1:150) [3]. In dialysis facilities where the dietitian will have broader responsibilities (e.g. quality improvement, development and monitoring of protocols for patient care, research), the caseload ratio should be adjusted downward. The proposed dietitian-to-patient contact time includes an initial consultation of 60-90 minutes, a follow-up within 1 month of 30-45 minutes, and regular nutritional updates of 45-60 minutes, as needed [8]. We propose this initial dietitian staffing, until the optimal dietitian-to-patient ratio of 1:70 [9] and dietitian-to-patient contact time of approximately 2 hours per month [6] could be achieved.

- *Financial arrangement*

The presence of a dedicated dietitian incurs additional costs to dialysis providers in Lebanon (hospitals); resistance of the latter bodies towards implementing this technology is expected.

→ *Proposed action*

On average, the cost of the intensive nutrition education is around $1 per patient per session, assuming an optimal dietitian-to-patient ratio of 1:70. This cost is expected to further decrease on the long-run, due to the omission of the cost of the initial training of the dietitians, representing approximately 10% of the cost of the intervention. The monthly budget implications of making a dedicated dietitian available for the patient would be on average $12.5 (approximately $40,000 for the 3,300 patients currently treated by hemodialysis in Lebanon). As found in our economic evaluation, the monthly difference in the decrease in healthcare costs between the proposed intervention and the existing practice during the post-implementation phase was $151 per patient. This amount would offset more than 10 times the cost of the nutrition intervention. As the third party payers are expected to benefit from the cost savings resulting from the implementation of this technology, the cost of the intensive

nutrition education could be added to the bundled payment to the hospitals by third party payers. The latter will be in charge of reimbursing the dietitians. This reimbursement system would be similar to the mechanism adopted in the USA [10].

Provider considerations

- *Delivery arrangement 1:*

Lebanese hospital dietitians' knowledge of renal nutrition guidelines is poor, and specialized education, training or certification in renal dietetics do not exist in Lebanon [4,11].

→ *Proposed action:*

Dietitians must be provided with sufficient specialized education enabling them to deliver effective, comprehensive and individualized care using cognitive/behavioral strategies and culturally specific educational tools, along with easy-to-apply skills [12–14]. A possible roadmap to developing renal dietetic specialization in Lebanon consists of 1) integrating an intensive evidence-based renal dietetics course within the nutrition bachelor program or post-baccalaureate dietetic internship, 2) establishing a health practice accreditation system that periodically audits the knowledge and practice of dietitians working with renal patients, and 3) establishing a system of obligatory continuing education to maintain license to practice in this field [11]. Until renal dietetic specialization is ensured within the didactic or internship programs in Lebanon, providing intensive trainings to practicing dietitians intended to be allocated to hemodialysis units could be proposed, similarly to what was successfully done in the Nutrition Education for Management of Osteodystrophy (NEMO) trial [15]. Dietitians allocated to hemodialysis units would refer to international tools to assess their current skill levels and to identify areas for additional professional development in this practice area, such as the Academy of Nutrition and Dietetics (AND) and the National Kidney Foundation (NKF)'s SOP and SOPP [3], until country/regional-specific tools are elaborated.

- *Delivery arrangement 2:*

Country-specific practice-guidelines for renal dietetics do not exist in Lebanon.

→ *Proposed action*

International evidence-based practice-guidelines on renal nutrition [6,7,16,17] would be applied, until country/regional-specific standards and guidelines are established.

- *Multidisciplinary care arrangement*

Disparity in the nutrition-related perceptions and recommendations between members of nephrology care team do exist [18]. Other members of the nephrology team were shown to have limited knowledge and skills related to some aspects of the nutritional management of hemodialysis patients

[19], and overlap in patient delivered messages might be a potential source of confusion for the patient [20].

→ *Proposed action*

Dietitians are uniquely qualified to provide effective, tailored, and safe nutrition care to renal patients [21,22]. Recognizing the role of the dietitians at the hemodialysis unit, involving them in the multidisciplinary patient care, standardizing practices amongst renal care professionals, actively discouraging and correcting alienation between staff members, promoting teamwork, respect for work product among staff members, and effective communication and coordination of care between all healthcare providers [9,20,23] are best practices in the hemodialysis units, that should be implemented for optimal patient outcomes. Until shortages in qualified dedicated dietitians are bridged, task shifting, i.e. delegation of some nutrition-related tasks, where appropriate, to less specialized health workers in nutrition (e.g. nurses) could be adopted as a temporary solution.

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