

**THE QUALITY OF CLINICAL DIAGNOSIS AND PROCEDURE
CODING AND RISK FACTORS FOR MALNUTRITION AMONG
HOSPITALIZED GERIATRICS IN HOSPITAL UNIVERSITI SAINS
MALAYSIA**

by

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**Thesis submitted in fulfilment of the requirements
for the degree of
Master of Science**

August 2015

STATEMENT of ORIGINALITY

The work contained in this dissertation has not been previously submitted for a degree at any other tertiary education institution. To the best of my knowledge and belief, the dissertation contain no material previously published or written by another person, except where due references is made.

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Date : 20th August 2015

ACKNOWLEDGEMENT

I would like to express my sincere gratitude for guidance and support which have helped me go thru the challenging process in completing my Master's degree. And my appreciation goes to:

Associate Professor Dr. Sakinah Harith, my principal supervisor for her motivation, enthusiasm and immense knowledge for my research study. I am also grateful for her time and patience in assisting me with most valuable comments and advice.

Dr Rosminah Mohammed, my associate supervisor, who has provided me with golden opportunity to enhance my knowledge regarding the casemix system and all the requisite elements. I would also appreciate for her constructive feedback on my research study and thesis writing.

The research assistant, Nor Syuhaida Haris who helped me throughout data collection process.

All the administrators and staffs from the Hospital Universiti Sains Malaysia (HUSM), who allowing and supporting me to recruit participants in the wards.

Puan Zaini Mohd Nor, Head of Medical Record Department (MRD) of HUSM and all clinical coders, who readily shared their knowledge and expertise in clinical coding and being so generous to allowing me to access the coded data from

the available system in MRD and helping me to retrieve all the medical records needed.

All geriatric participants, who consent to participate in the study. They had given meaningful contribution to the body of knowledge of the area under study. Without them, this study would not possible.

My colleagues especially, Tan Sze Lin, Juliana Shamsudin, Ngoh Hui Jiun, and Dr. Chen Seong Ting who supported me both academically and spiritually by giving inspiration and encouragement.

Finally yet importantly, my beloved husband, Faiz Abdul Rahman who supplied me with physically, emotionally and spiritually strength to overcome failure and stress during this challenging journey. My mother, Puan Norlila Ali for her never ending supports and helps. And my precious sons; Ahmad Fakhry Naufal and Faheem Lutfi, your birth has lightening my journey to be a colourful moment forever.

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LIST OF ABBREVIATIONS

ASPEN	American Society for Parenteral and Enteral Nutrition
BAPEN	British Association for Parenteral and Enteral Nutrition
BMI	Body Mass Index
BT	Blood transfusion
CC	Calf Circumference
CC	Comorbidity and Complication
CMG	Casemix Major Group
CMS	Centers for Medicare and Medicaid Services
DRG	Diagnosis Related Group
ESPEN	European Society for Clinical Nutrition and Metabolism
GIM	Global Indicator Malnutrition
GNRI	Geriatric Nutritional Risk Index
HUSM	Hospital Universiti Sains Malaysia
ICD-10	International Classification of Diseases-10
ICD-9-CM	International Classification of Diseases-9-Clinical Modification
IDNT	International Dietetics and Nutrition Terminology
MCC	Major Comorbidity and Complication
MLR	Multiple Logistic Regression
MNA	Mini Nutritional Assessment
MNA-SF	Mini Nutritional Assessment Short Form
MRD	Medical Record Department
MRST-H	Malnutrition Screening Tool for Hospital
MUAC	Mid Upper Arm Circumference
MUST	Malnutrition Universal Screening Tool
MY-DRG	Malaysia Diagnosis Related Group
NRS	Nutritional Risk Screening
NSI	Nutrition Screening Initiative
ONS	Oral nutritional support

LIST OF ABBREVIATIONS

PPV	Positive Predictive Value
ROC	Receiver operating characteristics
SD	Standard deviation
SGA	Subjective Global Assessment
SLR	Simple Logistic Regression
SSF	Subscapular Skinfold
TLC	Total Lymphocytes Count
WHO	World Health Organization

LIST OF SYMBOLS

kg	Kilogramme
kgm ⁻²	Kilogramme per meter squared
cm	Centimetres
mm	Millimetre
<i>n</i>	Total number of individual
%	Percentage
<i>p</i>	<i>p</i> -value
g/L	Gram per liter
<i>b</i>	Regression coefficient
CI	Confident Interval
χ^2	Chi-square value

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ABSTRACT

Malnutrition is highly prevalent among hospitalized geriatrics. Unfortunately, the identification, notification and clinical coding of malnutrition have been reported to be inadequate. In order to place malnutrition in the focus of the healthcare system, it is mandatory to assess the current practice and the quality coding for malnutrition to improve the overall quality in healthcare services. Therefore, the objectives of this study were; (1) to determine factors associated with malnutrition among hospitalized geriatrics (2) to study the impacts of malnutrition on clinical outcomes (3) to explore the completeness documentation of nutritional information and (4) to identify the causes of coding issue for malnutrition. A cross-sectional study was conducted among hospitalized geriatrics aged 60 years and above in Hospital USM. A total 130 participants were recruited in this study consists of 49 (37.7%) men and 81 (62.3%) women. The nutritional assessments conducted were anthropometric measurement and biochemical assessment coupled with standard nutritional screening and assessment tools. A systematic reviewed on the medical records for nutritional information and clinical coding was conducted once participant was discharged. Data were analysed using SPSS version 20. Results revealed that 35.4% of participants were malnourished according to standard reference Subjective Global Assessment (SGA). Multivariate analysis demonstrated that malnutrition were significantly associated with low BMI ($p<0.001$) and albumin ($p<0.05$), loss of appetite ($p<0.001$)

and surgical procedure ($p<0.05$). Malnourished geriatrics were found to have significantly longer hospital stay, higher complication and readmission rate compared to well-nourished geriatrics ($p<0.05$). The documentation of weight was 48.5%, height; 27.7%, weight loss; 3.1%, dietary intake; 43%, loss of appetite; 11.5% and digestion problem; 32.3%. Only 50% of malnourished were intervened. None of the participants had been diagnosed and coded with malnutrition. The causes of coding issue for malnutrition were; lack of awareness among healthcare professional (50.0%) and incomplete medical documentation (50%) at the ward level. In addition, two causes were occurred for diagnosis and procedure coding; uncoded (52.2%), miscoding diagnosis (39.1%), missing diagnosis code (8.7%), missing procedure codes (26.7%), and unavailable codes for dietary counselling and oral nutritional supplementation (73.3%). In conclusion, the quality of clinical coding of malnutrition is mooted to be improve. Structured assessment and standard documentation of malnutrition will allow optimization of this information to be used in improving patient care management and quality of healthcare services.

**KUALITI KOD KLINIKAL DIAGNOSIS DAN PROSEDUR SERTA
FAKTOR RISIKO MALPEMAKANAN DALAM KALANGAN PESAKIT
GERIATRIK DI HOSPITAL UNIVERSITI SAINS MALAYSIA**

ABSTRAK

Umumnya, kajian lepas mendapati prevalens malpemakanan dalam kalangan pesakit geriatrik adalah tinggi. Namun begitu, kes ini kurang diberi perhatian dan lazimnya, dokumentasi berkaitan maklumat pemakanan juga didapati kurang lengkap. Penilaian terhadap pengurusan klinikal serta kualiti kod malpemakanan adalah penting supaya malpemakanan dapat diletakkan sebagai salah satu fokus utama dalam pengurusan kesihatan serta meningkatkan kualiti servis yang diberikan. Oleh itu, objektif kajian adalah (1) menentukan faktor risiko malpemakanan (2) mengkaji impak malpemakanan terhadap kemajuan klinikal (3) menilai dokumentasi rekod maklumat pemakanan dan (4) mengenalpasti punca isu-isu yang melibatkan kod malpemakanan dalam kalangan pesakit geriatrik. Satu kajian keratan rentas telah dijalankan terhadap 130 responden yang terdiri daripada pesakit geriatrik (60 tahun ke atas) yang dimasukkan ke wad Hospital USM. Kumpulan ini terdiri daripada 49 (37.7%) lelaki dan 81 (62.3%) perempuan. Penilaian pemakanan yang telah dilaksanakan adalah seperti pengukuran antropometri, data biokimia beserta kajiselidik yang piawai. Rekod perubatan dan data berkaitan kod klinikal disemak dan direkodkan setelah pesakit keluar dari hospital. Data kajian dianalisa menggunakan SPSS versi 20. Hasil kajian mendapati 35.4% prevalens malpemakanan berdasarkan piawai penilaian *Subjective Global Assessment (SGA)*. Analisa *multivariate* menunjukkan faktor yang signifikan dengan malpemakanan adalah kurang BMI ($p < 0.001$) dan albumin

($p < 0.05$), hilang selera makan ($p < 0.001$) dan prosedur surgikal ($p < 0.05$). Hasil penilaian dokumentasi maklumat pemakanan mendapati rekod berat; 48.5%, tinggi; 27.7%, hilang berat badan; 3.1%, corak pengambilan makanan; 43%, kurang selera makan; 11.5% dan masalah penghadaman; 32.3%. Hanya 50% pesakit yang mengalami malpemakanan mendapat rawatan. Tiada subjek yang mempunyai rekod diagnosis dan kod malpemakanan. Punca berlakunya isu-isu berkaitan kod malpemakanan adalah kurang kesedaran dalam kalangan profesional kesihatan (50%) dan maklumat klinikal yang tidak lengkap (50%). Selain itu, terdapat lima punca yang telah dikenalpasti berlaku dalam konteks diagnosis dan prosedur iaitu; diagnosis malpemakanan yang tidak dikod (52.2%), pemilihan kod yang tidak tepat (39.1%), kod diagnosis yang tidak lengkap (8.7%), kod prosedur yang tidak lengkap (26.7%), dan tiada kod prosedur untuk kaunseling pemakanan dan pemberian suplemen (73.3%). Kesimpulannya, kualiti kod diagnosis dan prosedur malpemakanan perlu ditingkatkan. Penilaian pemakanan yang berstruktur beserta dokumentasi yang standard adalah penting supaya maklumat berkaitan malpemakanan dapat diaplikasikan dalam pelbagai tujuan untuk meningkatkan lagi mutu penjagaan kesihatan dan servis yang diberikan.

CHAPTER 1

INTRODUCTION

1.1 Background

Over the past three decades, the issue of malnutrition in the clinical setting has been constantly highlighted. Thus, experts in clinical nutrition have further continued their studies and have brought to light the risk factors of malnutrition, which facilitate in identifying individual at risk or has already malnourished. Moreover, studies also have discovered that malnutrition has a great influence on clinical outcomes. Most often, it is associated with poor clinical progress.

On top of this issue, hospitalized geriatrics have frequently received attention by numerous researchers pertaining to malnutrition. The nature of global trends that have seen an increment in the geriatric population, subsequently has increased the rates of hospitalization among this group (Agarwal *et al.*, 2013). Thus, it is expected that this vigilant population is more susceptible to develop malnutrition in clinical setting. Moreover, hospitalized geriatrics have been recognized to face high risk of malnutrition associated with biological progress of ageing and clinical factors (Kagansky *et al.*, 2005; Feldblum *et al.*, 2007; Volkert *et al.*, 2010). In fact, a series of worldwide prevalence of malnutrition among hospitalized geriatrics had been reported to be 20% to 60%, regardless of the background setting and the methodology applied

(Perrson *et al.*, 2002; Kagansky *et al.*, 2005; Kuzuya *et al.*, 2005; Stratton *et al.*, 2006; Coelho *et al.*, 2006; Cereda *et al.*, 2008; Vanderwee *et al.*, 2010; Volkert *et al.*, 2010; Holyday *et al.*, 2012). Nevertheless, studies in Malaysia had demonstrated that the prevalence ranged between 10.5% and 55% (Suzana *et al.*, 2002a, Sakinah *et al.*, 2010; 2012).

Risk factors of malnutrition among the geriatric population have been reported in numerous studies. Increasing age (Correia & Campos, 2003; Vanderwee *et al.*, 2010), accompanied by impairments of basic physiological functions, are the primary factors that influence nutritional intake among geriatrics (Feldblum *et al.*, 2007; Poulsen *et al.*, 2006, Suominen *et al.*, 2005). In addition, psychological factors such as depression and dementia (Suominen *et al.*, 2005; Feldblum *et al.*, 2007; Meijers *et al.*, 2008; Vanderwee *et al.*, 2010) and socioeconomic factors (Suzana *et al.*, 2002b; Pirlich *et al.*, 2005; Sakinah *et al.*, 2012) have been found to be significantly associated with high prevalence of malnutrition. Moreover, the presence of acute or chronic diseases (Meijers *et al.*, 2008; Mudge *et al.*, 2011), hospitalization factors (Pirlich *et al.*, 2006; Vanderwee *et al.*, 2010; Marco *et al.*, 2011), including polypharmacy (Pirlich *et al.*, 2006; Poulsen *et al.*, 2006) and clinical procedures (Raja *et al.*, 2004; Vanderwee *et al.*, 2010), possess great influence on the nutritional status among geriatrics. A part from that, studies in Malaysia also have identified factors such as marital status, inability to prepare food, smoking (Suzana *et al.*, 2002b), feeding difficulties (Sakinah *et al.*, 2012), weight loss, economy dependency (Suzana *et al.*, 2002b; Sakinah *et al.*, 2012) and muscle wasting (Sakinah *et al.*, 2012) were significantly associated with malnutrition among geriatrics. Hence, the complexity factors from the ageing perspective and clinical

aspects have potential to increase the risk of malnutrition among hospitalized geriatrics.

In addition, several implications of malnutrition have been listed to negatively affect the clinical outcomes. Malnourished patients have been found to have longer hospital stays compared to those who are well nourished (Stratton *et al.*, 2006; Vanderwee *et al.*, 2010). Furthermore, they have high risk to develop complications (Braunschweig *et al.*, 2000; Sullivan *et al.*, 2002), frequent readmissions (Thomas *et al.*, 2002; Visvanathan *et al.*, 2004) and high mortality rates (Kagansky *et al.*, 2005; Stratton *et al.*, 2006). Moreover, increased in healthcare expenditure has been commonly observed in managing malnourished patients as a consequence from the aforementioned events (Raja *et al.*, 2004; Marco *et al.*, 2010; Lim *et al.*, 2011).

Despite the well reported high prevalence and negative implications, it is astonishing to report that identification and interventions of malnutrition by healthcare professional have remained poor (Correia and Campos, 2003; Volkert *et al.*, 2010; Holyday *et al.*, 2012). Consequently, a large numbers of malnourished patients did not receive appropriate intervention to correct or to improve their nutritional status as part of clinical services (Bavelaar *et al.*, 2008, Volkert *et al.*, 2010). Moreover, lack of awareness among healthcare providers increases the nutritional deterioration associated with hospitalization, which is already known to potentially lead to poor clinical outcomes (Correia and Campos, 2003; Volkert *et al.*, 2010; Holyday *et al.*, 2012).

However, the higher prevalence found unfortunately was not synchronized with the documentation of nutritional information and diagnoses in the medical records. This scenario has been proven by numerous studies, conducted worldwide (Kelly *et al.*, 2000; Waitzberg *et al.*, 2001; Correia and Campos, 2003; Ockenga *et al.*, 2005; Lazarus and Hamlyn, 2006; Bavelaar *et al.*, 2008; Volkert *et al.*, 2010; Holyday *et al.*, 2012). Moreover, the diagnosis made for malnutrition was extremely low despite its high occurrences (Raja *et al.*, 2004; Lazarus and Hamlyn, 2006; Marco *et al.*, 2011). This situation have a potential to affect the clinical coding process at the end episode of care. Hence, underreported malnutrition will hamper the integrity of hospital data, primarily regarding the actual occurrence of malnutrition in a clinical setting.

In 2007, Centers for Medicare and Medicaid Services (CMS) had proposed to include complication and comorbidity to the available Diagnosis Related Group (DRG). This revision was purposely conducted in conjunction to implement the changes that occurred with the rates for hospital inpatient services for operating costs and capital-related costs. Malnutrition has been recognized and listed as one of the diagnoses of major complications and comorbidity, as proposed by CMS. With the inclusion of complication and comorbidity, it consequently describes the level of severity of a disease (Steinbusch *et al.*, 2007). In fact, malnutrition possesses characteristic of essential diagnosis to be coded as it involves health care cost and requires professional skill (Raja *et al.*, 2004; Steinbusch *et al.*, 2007). It also has been proven that coding malnutrition resulted in DRG changes, in which this condition has been shown to increase hospital reimbursement (Raja *et al.*, 2004; Ockenga *et al.*, 2005; Marco *et al.*, 2011).

At present, Hospital Universiti Sains Malaysia (USM) is in the second year of implementing the Casemix system. This is a patient classification system that grouped patients into similar clinical characteristics and resource used in their treatment. The first level of the classification known as Casemix Major Groups (CMGs). The CMGs are presented in the an alphabetic order (A to Z) which is correspond to body systems most equivalent to chapters in ICD-10. The end product of the classification known as Case Base Groups (CBGs) which is generated from the MY-DRG Grouper™. Casemix system is a recognized management tool which is useful to improve the overall health care delivery system. The decision to implementing this system is strongly supported by essential elements, such as medical documentation and clinical coding. The quality of these elements will further assist organizations of the hospital to further enhance the quality and efficiency in health care services provided by Hospital USM.

Coded data possess valuable information, which is commonly used for secondary purposes. For instance, coded diagnoses and procedures are essential elements in evaluating the prevalence of disease, the effectiveness of service provided, the allocation of resource and the purpose of reimbursement, particularly in the Casemix system and policy development (Ockenga *et al.*, 2005; Marco *et al.*, 2011). However, the prevalence of coded malnutrition has been found lower than the expected cases (Raja *et al.*, 2004; Ockenga *et al.*, 2005; Marco *et al.*, 2010). Observation of the quality of clinical coding and its requisites are critically important. This critical issue should not be neglected. Failure to identify malnourished individual and inadequate nutritional information provided at ward level would further influence the coding process at the end episode of care. Hence, the use of coded malnutrition for the purpose

of secondary use may diminish in the absent of actual occurrence to represent the current situation.

On top of the aforementioned issues, all elements involved in clinical coding are essential to be investigated in order to ensure that all of requisite data are of good quality. Hence, the continuum of the clinical coding process will be smoothly performed. Despite medical documentation, clinical coders also play a major determinant in quality of coding. Since they are not clinicians, interpreting the complex cases may end up in ambiguity if the documentation provided by physician is inadequate or unclear (Snow *et al.*, 2012). These ultimately affect the evaluation of hospital performances in term of services provided, budget planning and potential reimbursement. Therefore, a practical mechanism along the way to improve clinical coding of malnutrition is needed to present a clear understanding on how each of the related components plays a vital role. Nonetheless, any identified issues on malnutrition coding must be adequately addressed and announced in order to improve the quality of coded data.

1.2 Problem statement

Increase in the geriatric population have resulted in increased cases of hospitalization among this group. However, this situation should not be seen as the nature of ageing progress per se. Geriatrics has an equal right to receive good quality healthcare service (WHO, 2004). Besides, nutritional care is one of the clinical components that should not be neglected and must be delivered to all hospitalized communities, primarily geriatrics. Even though previous studies have provided a bundle of evidences

regarding malnutrition risk factors and implications, it is crucial to continue studying this aspect in order to provide a clear figure of this occurrence among the population studied.

Higher prevalence of malnutrition, as mentioned earlier, however did not in line with the awareness level among healthcare provider (Correia and Campos, 2003; Volkert *et al.*, 2010; Holyday *et al.*, 2012). Failure to identify and intervene malnourished geriatrics have placed this high risk population to continuously experience nutritional deterioration (Volkert *et al.*, 2010). This worldwide issue will remain hidden in the clinical setting if action is not taken. Beginning with the process of identifying those at risk of malnutrition or malnourished, nutritional screening and assessment are primary elements to be conducted beginning at the admission and throughout hospitalization followed by appropriate nutritional intervention (Ockenga *et al.*, 2005; Schindler *et al.*, 2010). All these components must be clearly documented as standard reference and evidence of nutritional services provided. Failure to complete details of nutritional information may affect overall clinical progress.

Moreover, in the current transition of evidence-based medicine practice, the quality and the transparency of healthcare services are critically on demand. Adequate nutritional information assists recognition of susceptible individual and facilitates in monitoring of nutritional status throughout hospitalization. In addition, it served as index of communication among health care professionals (Ockenga *et al.*, 2005; Marco *et al.*, 2010). Therefore, documentation of nutritional information must possess primary criteria of good documentation practice such as accurate, complete and corroborated with clinical evidence (Bargaje, 2011). For these reasons, database of

nutritional elements needs to be observed in order to assist the evaluation of current nutritional care practice for malnutrition, which previous local studies have limited explanation on this critical issue.

In the process to generate clinical coding, all clinical information available in medical records will be utilized by coders in order to select accurate codes. Hence, inadequate information available in medical records potentially increases bias in the quality of coded data (Ockenga *et al.*, 2005, Alvarez *et al.*, 2010). As reported by previous studies, coding for malnutrition is extremely low despite the prevalence found is high (Raja *et al.*, 2004; Marco *et al.*, 2010). Therefore, the information provided by the hospital will not reflect the true prevalence of malnutrition if the coding fails (Marco *et al.*, 2010). Moreover, if this situation occurs continuously, it will interrupt the implementation of the Casemix system in the future. It is well known that the Casemix system highly demands quality for coding practices. Failure to improve malnutrition coding will further hinder the evaluation of clinical management in the nutritional aspect for malnutrition. In fact, malnutrition will be blindly assumed as it have no significant implication in overall clinical progress and services provided.

Besides, several sources of coding issue have been highlighted, which mainly occurred at ward level and in coding process (O'Malley *et al.*, 2005; Cheng *et al.*, 2009; Pongpirul *et al.*, 2011). Along these trajectories, there are many elements which potentially influence the end product of coded data generated. However, a systematic study on this occurrence has not been carried out. Thus, it is important to specifically identify the causes of coding issues in order to the shed the light on the barriers to produce good quality clinical coding of malnutrition.

Meanwhile, with the absence of record data regarding malnutrition in the clinical setting, the complexity of malnutrition is fairly assessed and appropriate action to combat malnutrition is far from implementation. Hence, this study purposely conducted to identify a complex dimension pertaining to the interaction of documentation and clinical coding for malnutrition through a depth investigation. The barriers identified may assist in the revision process with hospital management to improve the quality of clinical coding for malnutrition. A unified vision involving multidiscipline awareness at every single hospital level will further help in combating hospital malnutrition. Moreover, there will be improvement in clinical coding practices once the magnitude of malnutrition is comprehensively presented closer to the reality.

In addition, University Sains Malaysia (USM) has been given a golden opportunity by the Malaysian Ministry of Higher Education to implement the Accelerated Program for Excellence (APEX). In conjunction with this transformation phase, Hospital USM indeed strives for excellence in quality of teaching and referral hospital to contribute to the acceleration of the health care industry. Thus, aligned with the APEX status, the implementation of the Casemix system will improve the overall quality of healthcare services provided by Hospital USM. However, the successful of this system highly demands for good quality of clinical documentation and coding practice. Hence, details assessment of the quality for malnutrition will provide the magnitude of current nutritional care practice for this area. Moreover, Hospital USM possesses a good platform that functions as the impetus for the progress and dissemination of clinical knowledge. Hence, to cater to need for the transformation

phase, all requisite elements must be evaluated to boost the efficiency and the quality in the healthcare delivery system in Hospital USM.

1.3 Conceptual framework

A conceptual framework underpinning this research study and the relationship between the key concepts is presented in Figure 1.1. At the outset, three types of risk factors were named as the risk factors that lead to malnutrition among geriatrics. Malnutrition is characterized by several aspects such as anthropometry, biochemical, and score of nutritional screening and assessment tools. These indicators are useful in nutritional assessment as they are primary elements to identify malnourished individual. In a standard clinical practice, nutrition diagnosis is derived after assessment is performed. Furthermore, this information will be able to guide healthcare professionals to select appropriate nutritional intervention to be given for individual. All this nutritional information must be written in medical records. It serves as clinical evidence with details of nutritional care being provided. Moreover, it acts as the communication index among all healthcare professionals involved. These processes occur at the ward level.

Upon discharge, the medical records, together with the discharge summary, will be sent to the Medical Record Department. At this hospital administrator level, clinical coders are responsible to review all clinical information available in the medical records and discharge summary to capture relevant diagnoses and procedures. The process continues with the selection of appropriate codes related to the diagnoses and procedures based on standard guidelines drawn by the International Classification

of Diseases (ICD), ICD-10 and ICD-9-CM (Clinical Modification). After that, the coded data are stored in the computerized system as data bank for the hospital.

Finally the implications of malnutrition could be figured out by three aspects; longer hospital stay, clinical complications, and readmission that indicates poor clinical progress among malnourished. These need to be assessed to identify the significant mark of malnutrition on clinical outcomes. All the elements involved along the trajectories to generate a clinical coding will be systematically studied to identify the causes of coding issues related to malnutrition.

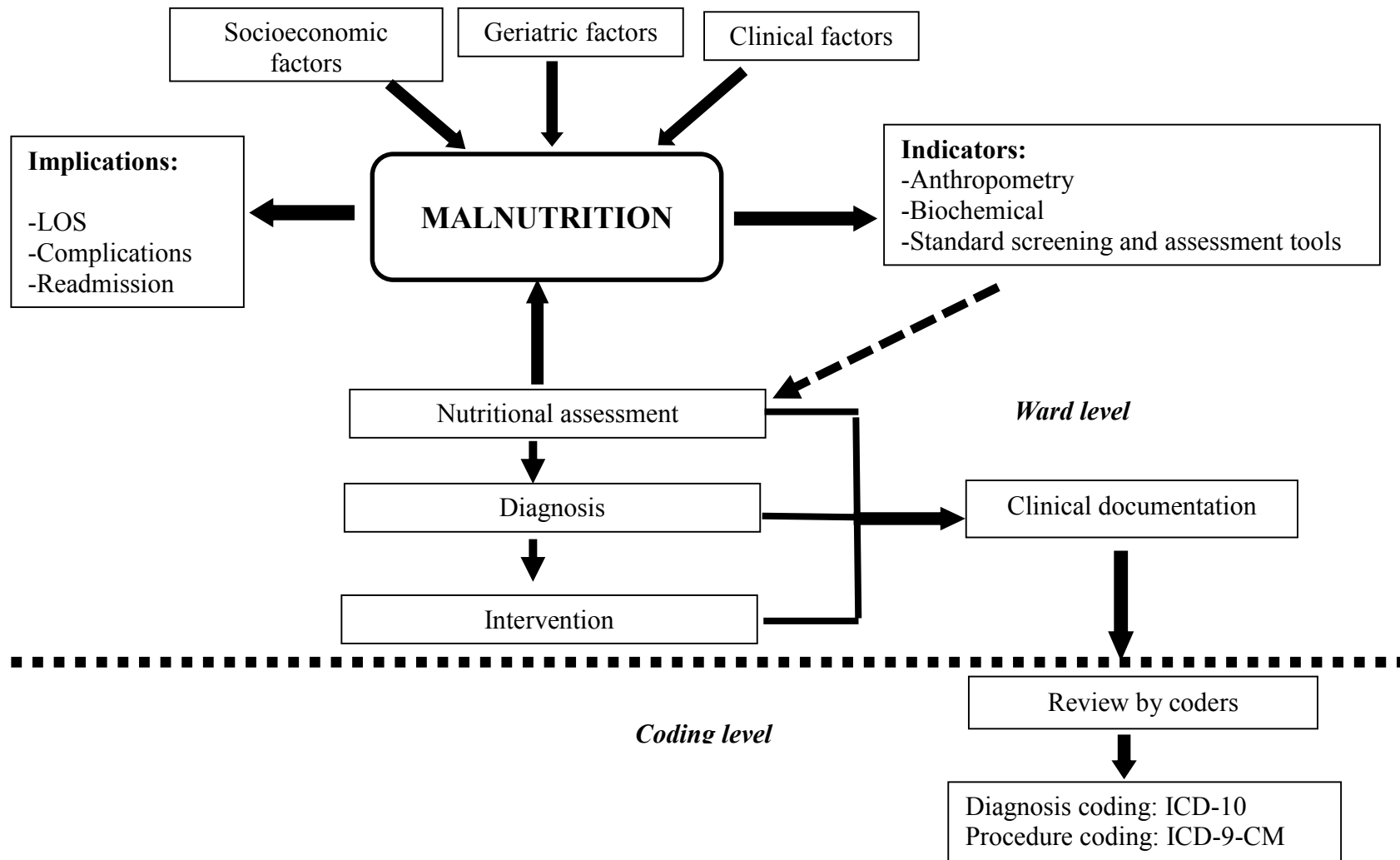


Figure 1.1 Conceptual framework of research study

1.4 Objectives

1.4.1 General objective:

To investigate the quality of clinical diagnosis and procedure coding for malnutrition among hospitalized geriatrics in Hospital USM.

1.4.2 Specific objectives:

1. To determine risk factors associated with malnutrition among hospitalized geriatrics in Hospital USM.
2. To study the impact of malnutrition on clinical outcomes among hospitalized geriatrics in Hospital USM in terms of length of hospital stays, complication rate and readmission rate.
3. To explore the completeness of documentation for nutritional information among hospitalized geriatrics in Hospital USM.
4. To identify the causes of coding issues for malnutrition among hospitalized geriatrics in Hospital USM.

1.5 Research questions

1. Does socioeconomic factors, geriatrics factors and clinical factors significantly associated with malnutrition among hospitalized geriatrics in Hospital USM?
2. Does malnourished geriatrics significantly had longer hospital stays, higher complications rate and readmission rate compared to well-nourished geriatrics?
3. To what extent the completeness of nutritional information is being documented among hospitalized geriatrics in Hospital USM?
4. What are the causes of coding issues for malnutrition among hospitalized geriatrics in Hospital USM?

1.6 Research Hypothesis

1. The socioeconomic factors, geriatric factors and clinical factors are significantly associated with malnutrition among hospitalized geriatrics in Hospital USM.
2. Malnourished geriatrics significantly had longer hospital stays, higher complication rate and readmission rate compared to well-nourished geriatrics.
3. The majority of hospitalized geriatrics in Hospital USM have incomplete medical documentation for nutritional information.
4. The causes of coding issues for malnutrition among hospitalized geriatrics in Hospital USM are due to the incomplete medical documentation and inaccurate coding technique.

1.7 Significance of the study

The study had been purposely conducted among hospitalized geriatrics since this vulnerable group is synonymous to higher hospitalization rates compared to younger adults. However, it is well known that the identification, documentation and coding for malnutrition was inadequate. Hence, the findings from this study should further increase the awareness among all parties involved in clinical management to quickly identify those at high risk and appropriate nutritional intervention can be initiated earlier. With this, the negative consequences of malnutrition can be prevented. Furthermore, nutritional deterioration can be avoided and overall clinical progress can be improved.

Besides, evaluation of the current nutritional practice will eventually increase the value added to improve professionalism among health care professionals in conjunction with the evidence-based medicine era. The quality of clinical coding highlighted will further increase the efficiency of the health care system by providing appropriate management for malnutrition cases and hence may prevent negative consequences which may affect the overall clinical progress and the health care cost. In addition, findings of this study could improve the quality of care, improve the management of hospital system and enhance the visibility of social health insurance to this issue. Moreover, the identified causes of coding issues may be revised and corrected. As a result, malnutrition, will not be hidden factor that could impair the overall clinical progress and service quality. On top of that, this fundamental database will help to ensure the effectiveness of the Casemix implementation, through the comprehensive documentation of malnutrition and its coding's quality. In a broader

context, findings may facilitate to generate appropriate CBGs for malnourished geriatrics.

1.8 Definition of terms

Geriatric: Elderly aged 60 years old and above (WHO, 2012; Malaysian Ministry of Women, Family and Community Development, 2012)

Malnutrition: In the context of medical conditions, malnutrition is defined as undernutrition resulted from continuously insufficient dietary intake and/or changes in metabolic requirements, impaired digestion and absorption, altered transport and nutrition utilization (Isaia *et al.*, 2011; White *et al.*, 2012).

Length of stay: Total number of days patient stays in the hospital from the date of admission until date of discharge.

Complication: Clinical event that develop during the hospitalization.

Readmission: Admission to any hospital or health care institution within the three months from the date of previous admission.

Clinical diagnosis coding: Conversion of the free text diagnoses written by healthcare professionals in the medical records into alpha numerical codes based on ICD-10 guidelines (Zafar, 2011; Medical Record Department of Hospital USM, 2012)

Clinical procedure coding: Conversion of the free text procedure written by healthcare professionals in the medical records into numerical codes based on ICD-9-CM guidelines (Zafar, 2011; Medical Record Department of Hospital USM, 2012)

Quality of clinical coding: The collection of accurate and complete data for coded diagnoses and procedures (Cassidy, 2012).

Uncoded: The malnutrition code was not assigned by coder.

Missing code: Patient's diagnosis and procedure related codes were not coded by the coder.

Miscoding: Incorrect code at the third digit level coding for malnutrition

Unavailable code: Related malnutrition code is not available in ICD catalogue.

CHAPTER 2

LITERATURE REVIEW

2.1 Geriatric population

Malaysia has an increasing trend for the geriatric population. The chronological age of the geriatric population in Malaysia is 60 years and above. This definition is adopted from the World Assembly of Ageing that took place in Vienna in 1982. Besides, it was applied in the National Policy for Older Persons, 1995. The geriatric population steadily rose from 5.7% in 1990 and projected to reach 6.3% in 2000. By the year 2020, it is expected to be 9.8% of the total population (Ambigga *et al.*, 2011). A report in 2012 revealed that the geriatric population was 8.2%, which was equivalent to 2.4 million out of 29.34 million people (Ruhaini, 2013). The average life expectancies for male and female are 72.3 and 77.2 years, respectively (Ruhaini, 2013). This phenomenon results from decline in fertility, decreased mortality rates and improvement in health care system (Ambigga *et al.*, 2011).

Although there is improvement in life expectancy, other factors such as poverty, lack of education and social isolation can potentially influence the well-being of this golden population (Ambigga *et al.*, 2011). A report in 2004 using disability adjusted life years (DALY), demonstrated that coronary heart disease, mental illness, cerebrovascular disease, road traffic accident and cancer are the leading causes of

disease burden (Malaysian Ministry of Health, 2010). Moreover, some of these have been listed as the ten principle causes of mortality in government hospitals in 2011 (Ministry of Health, 2012). Thus, our country is in the phase of epidemiological transition of non-communicable diseases, which are highly prevalent among the geriatric population. This has results in higher rate of hospitalization and thereby, increases the expenditure in healthcare for this population.

The admission rates among the geriatrics population in Hospital USM also demonstrated an increasing trend. Based on the data retrieved from Medical Record Department (MRD) of Hospital USM, the total number of patients discharged for the geriatric population (>60 years) had increased from 4947 in 2006 to 6125 in 2011. This figure indicates that the increase in the ageing population has directly increased the demands for clinical care among this group. Furthermore, due to their positive role in society development, geriatrics must be acknowledged and possess the right to enjoy good quality life (WHO, 2004). Moreover, they have to be ensured to have full equity to access optimal healthcare services.

2.2 Definition of malnutrition

Malnutrition is a broad term, which refers to several definitions used to describe nutritional status. At present, there is no standard definition for malnutrition. Thus, it has resulted in widespread confusion of this term. The first definition is however had been stated by Derrick (1966). He defined malnutrition as pathological state resulting from a relative or absolute deficiency or excess of one or more essential nutrients. Meanwhile, authorized organisations have outlined a number of definitions of

malnutrition as depicted in Table 2.1. The primary concept of this condition is simply defined as nutritionally imbalanced. It consists of two major components, which are undernutrition and overnutrition. Inadequate calories, proteins and other essential nutrients result in undernutrition while those who consume too much calories may experience overnutrition (White *et al.*, 2012). Concern have aroused for these conditions, as both should receive appropriate intervention. However, the primary concern in the current clinical practice is more focused identification and intervention for undernutrition as it has great implications to individuals and healthcare institution (White *et al.*, 2012).

In 2009, Jensen and colleagues had proposed etiology-based definitions of malnutrition. It was then, endorsed by the American Society for Parenteral and Enteral Nutrition (ASPEN) and the European Society for Clinical Nutrition and Metabolism (ESPEN) (White *et al.*, 2012). In this concept, the principle criteria to diagnose malnutrition in adult are the presence of inflammation, in addition to impaired dietary intake and loss of body mass. It further classifies malnutrition into three sub-categories of starvation related malnutrition, chronic disease-related malnutrition and acute or injury-related malnutrition (Jensen *et al.*, 2009).

For the purpose of this study, the term of malnutrition is synonymous with undernutrition and excludes overnutrition for further discussion. Malnutrition commonly referred as undernutrition in literature and the term interchangeably used among the authors. In the context of medical conditions, undernutrition is a result from continuous insufficient dietary intake and/or changes in metabolic requirements, impaired digestion and absorption, and altered transport and nutrition utilization

(Isaia *et al.*, 2011). It can be either acute or chronic malnutrition. The National Centre for Health Statistics defines chronic disease or condition as one that occurs and last for three (3) months or longer (Marcason, 2012). In an acute phase due to acute disease or injury, it will result in acute malnutrition (International Dietetics and Nutrition Terminology, (IDNT, 2010). Individuals with this condition may also experience inflammatory, hypermetabolic and hypercatabolic phases. Consequently, weight loss and muscle wasting apparently observed (White *et al.*, 2012).

Table 2.1 Definitions of malnutrition

<p>ICD-10 Tenth Revision, Volume 1, 2008 Edition</p> <p>• E43 Unspecified severe protein-energy malnutrition Severe weight loss or wasting leads to an observed weight that is at least 3 standard deviations below the mean value for the reference population (or a similar loss expressed through other statistical approaches).</p> <p>• E44.0 Moderate protein-energy malnutrition Weight loss observed at 2 or more but less than 3 standard deviations below the mean value for the reference population (or a similar loss expressed through other statistical approaches).</p> <p>• E44.1 Mild protein-energy malnutrition Weight loss observed at 1 or more but less than 2 standard deviations below the mean value for the reference population (or a similar loss expressed through other statistical approaches).</p>
<p>European Society for Clinical Nutrition and Metabolism (ESPEN), (Lochs <i>et al.</i>, 2006) and British Association for Parenteral and Enteral Nutrition (BAPEN), 2012</p> <p>Malnutrition is a state of nutrition in which a deficiency or excess (or imbalance) of energy, protein and other nutrients cause measurable adverse effects on tissue or body form (body shape, size and composition) and function and clinical outcome.</p>
<p>American Society for Parenteral and Enteral Nutrition (ASPEN), 2012</p> <p>An acute, subacute or chronic state of nutrition, in which a combination of varying degrees of overnutrition or undernutrition with or without inflammatory activity have led to a change in body composition and diminished function.</p>
<p>International Dietetics and Nutrition terminology (IDNT), 2013</p> <p>Inadequate of protein and/or energy intake over prolonged periods of time resulting in loss of fat stores and/or muscle wasting including starvation-related malnutrition, chronic disease-related malnutrition, and acute diseases or injury related malnutrition.</p>

2.3 Prevalence of malnutrition

In 1974, Butterworth highlighted the existence of malnutrition among hospitalized patients in a report entitled 'The Skeleton in the Hospital Closet'. An abundant of evidences were provided to support the justification the important of malnutrition management in the clinical setting. Moreover, the report suggested a new window of recognizing this preventable and reversible condition. However, in today's sophisticated and advanced medical specialities, malnutrition has been reported to be high and has remained unrecognized (Butterworth, 1974; Bavelaar *et al.*, 2008; Volkert *et al.*, 2010).

In fact, studies too have discovered high prevalence of malnutrition among hospitalized geriatrics. However, the findings varied It varies according to the time of studies were conducted, characteristics of the population and the method used. Thus, direct comparison is inappropriate to be presented. Table 2.2 shows the tabulation of prevalence of malnutrition among the geriatrics population in the clinical setting. Generally, the worldwide prevalence of malnutrition is within the range of 20% to 60%. Most often, the prevalence in South-East Asia is generally lower (<25%) compared to Europe (30% to 60 %). The differences in life style, the rate of geriatric population and number of hospitalization causes great influenced to the prevalence (Raja *et al.*, 2004).

Besides, an earlier local study conducted in the central region indicated that the prevalence of malnourished hospitalized geriatrics was 12% (Suzana *et al.*, 2002a). However, the prevalence showed an increasing trend in the same region where the

study was conducted. In addition, a report published in 2012 by Sakinah and colleagues revealed that the prevalence had been double compared to ten years since the first report. The detailed tabulation is presented in Table 2.3. This figure illustrates that malnutrition has been continuously prevalent among hospitalized geriatrics. Statistical prevalence is critically important to be revised periodically, as it truly reflects the current situation. Moreover, it is a vital element as the benchmark of services provided and facilitates for the manifestation of standard protocol as far as nutritional provision of care is concerned.