IMPROVING THE PERCENTAGE OF INPATIENTS RECEIVING ENTERAL NUTRITION PRODUCT (ENP) WITHIN 24 HOURS OF DIETITIANS' PRESCRIPTION IN SERDANG HOSPITAL

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Abstract

Enteral nutrition product (ENP) is a product that contains dietary ingredients to further add nutritional value to one's diet. Dietitians prescribe ENP to ensure patients with malnutrition receive sufficient nutrients to improve their clinical status during the hospital stay. Delay in nutrition support may pose patients to a higher risk of disease complications, and increase mortality rate and length of hospital stay. This study aimed to achieve 90% of patients receiving ENP within 24 hours of dietitians' prescription. Verification study showed only 59.3% achievement against the current standard. A quality improvement study was conducted using universal sampling in three selected wards with 140 subjects in two consecutive phases by using an audit form. Pre-remedial study showed that 40.7% (n=57) patients did not receive ENP within 24 hours of dietitians' prescription. Products are not served to patients (67%, n=38), ENP not indented (23%, n=13), products not collected from dietetic department (5%, n=3), indent not processed (4%, n=2), and wrongly indented by staff (2%, n=1) were identified as contributing factors in delayed nutritional support. The improvement strategies included the establishment of a dietetic chart, provision of a formatted dietetic board, updating standards of work procedures, and conducting continuous nursing education. Additional strategies included updating the formatted nursing report, empowering hospital attendants to prepare ENP, conducting bedside teaching for nurses and providing bedside tagging. The percentage of patients receiving ENP within 24 hours of dietitians' prescription had improved from 59.3% to 85.4% in Cycle 1 and increased to 95.0% in Cycle 2. The interventions successfully reduced the duration of patients receiving the ENP from the time ENP was prescribed, from an average of 34 hours to 20 hours. This study has been expanded to all wards in the Serdang Hospital and replicated in all Ministry of Health (MOH) Hospitals in Selangor.

KEYWORDS: Enteral nutrition product, Dietitian, Quality improvement study

Problem

Nutritional support has emerged as an important component in the management of critically ill patients. For such hospitalised patients, Enteral Nutrition Product (ENP) will be prescribed when needed by dietitians to malnourished patients, especially undernourished patients and patients who have feeding difficulties through oral intake. ENP is intended to provide dietary, antioxidants, vitamins, and minerals that optimise recovery from illness. Patients must receive early nutrition support within 24 to 48 hours of hospitalisation to ensure good nutritional status while maintaining the healthy gut function, as well as avoid bacterial translocation and reduce infection. Serdang Hospital is a government-funded multispecialty hospital under the Ministry of Health located in the district of Sepang, Selangor, near Putrajaya, the Malaysian federal government administrative centre. Serdang Hospital started its operation in 2006 and is equipped with the Total Hospital Information System (THIS). The hospital has 19 clinical departments, nine clinical support and three non-clinical support departments and units, with a total of 694 beds and bed occupancy rate (BOR) between 89% and 100% from 2015 to 2019 and reduced to 78% in 2020. It is a reference for clinics and hospitals in the vicinity, especially for the population Serdang, Kajang, Putrajaya, Dengkil, and Puchong. Serdang Hospital serves as a reference centre for cardiology in the central region of the country, as well as a reference centre for cardiothoracic and pulmonology for the whole of Malaysia. Dietetic service is one of the clinical support services with a current manpower strength of ten dietitians. On average, 300 inpatients are referred to the dietitians monthly, half of whom require nutrition support. Dietitians will prescribe ENP to ensure patients receive adequate nutrient intake. From 2006 onwards, dietitians found out that ENP delivery was delayed and there were incidences of ENP that were not delivered to patients until they were discharged.

A preliminary study conducted in February 2016 in selected wards showed that only 56.4% of the patients received ENP within 24 hours of dietitians' prescription. The problem happened largely in three wards; Medical Ward (Ward 7C), Surgical Ward (Ward 6C), and Orthopaedic Ward (Ward 7E). The study involved a multidisciplinary approach consisted of dietitians, operational assistants (PO) and ward staff, including medical officers, nurses, and hospital attendants (PPK). Dietitians and ward sisters were the core team members of this study.

The aim of this study was to improve the percentage of patients receiving ENP within 24 hours of dietitians' prescription to be more than 90% in one year.

Background

Nutrition support therapy should be initiated within 24 to 48 hours following hospitalisation in patients who are unable to maintain oral nutritional intake (1,2). There are several mechanisms, whereby early Enteral Nutrition (EN) support may improve the patient outcome. Early EN has demonstrated to improve nitrogen balance, wound healing, and host immune function, as well as augment cellular antioxidant systems, decreased hypermetabolic response to tissue injury and preserving intestinal mucosal (3,4). Clinical studies showed that early EN helps maintain gut integrity, support the role of commensal bacteria, reduce the gut/lung axis of inflammation, sustain the mass of gut-associated and mucosal-associated lymphoid tissue, and attenuate systemic inflammatory responses (5). As such, the team aimed to commence ENP within 24 hours of dietitians' prescription to ensure that nutrition support is delivered as early as possible.

Malnutrition among inpatients is a prevalent problem worldwide. An international multicentre observational study concluded that increased intakes of energy and protein appear to be associated with improved clinical outcomes in critically ill patients, particularly when the body mass index is between 25 and 35 kg/m^2 (6). The length of hospital stay was

found to be longer for those patients with a poorer nutritional status (7). Based on a study in Korea, 20%–50% of hospitalised patients are malnourished. (8). In Ramathibodi Hospital, Thailand, the prevalence of malnutrition amongst inpatients between January and September 2016 was 15.3% (9). Another study in acute hospital settings in Australia, the prevalence of malnutrition ranged between 20%–50% depends on population, definition, and criteria used (10).

Multiple researches have shown a significant relationship between mortality and the average total calorie received in hospitalised patient (6). A meta-analysis on the effectiveness of oral nutritional supplements among malnourished patients suggested that clinical complications associated with malnutrition can be decreased by as much as 70%, while mortality can be reduced by around 40% (5).

In Malaysia, a study conducted in Tanah Merah Hospital in 2016 (n=32) reported that 87.5% of patients received ENP within 48 hours of prescription, with ENP not indented by ward as the main contributing factor.

Effective management of malnutrition requires a more holistic collaboration among multiple clinical disciplines (11). However, in many hospitals, malnutrition continues to be managed in silos, with knowledge and responsibility provided predominantly by the dietitian. Once the patient is identified as malnourished, appropriate nutrition intervention must be promptly ordered and fully implemented. Lack of nutrition-focused nursing procedure instructions leads to delays in the start of feeding. Policy surrounding ward supplies ordering, storage, stock rotation, and management needs to be developed at the local level, including those that undertake the overall responsibility (12).

Training for hospital staff not only raises awareness on the issue, but also helps them to identify their role and how it can be modified to improve nutrition care. Patients and families need to be aware of the importance of food for their recovery and how they can advocate for their needs while in hospital, as well as post-hospitalisation. A multi-level approach that promotes being "food aware" for all involved will help hospitals to achieve patient-centred care with respect to nutrition (13).

Measurement

The main indicator of this study was the percentage of inpatient who received ENP within 24 hours of the dietitian's prescription which assessed the timeliness domain. This was calculated as the total number of patients received ENP within the stipulated time over total number of patients who had been prescribed for ENP by a dietitian. After considering a few factors which are beyond control, the standard was set in the clinical department meeting as equal or more than 90%.

This was a quality improvement study conducted in three selected wards: medical (7C), surgical (6C), and orthopaedic (7E), as these wards showed the highest percentage of ENP delivery beyond the targeted timeline of within 24 hours. All patients with ENP prescriptions were included in this study. Patients who refused ENP, either died or were discharged from the ward before 24 hours prescription, were kept nil by mouth after prescription and already had the ENP on their own were excluded. A total of 140 subjects were needed based on sample size calculation in each verification and post-remedial study phase.

A pre-developed audit form was used for data collection by dedicated dietitians who were part of the study team. Content validation was made through feedback from the Head of Dietetic Department, senior dietitian, and senior staff nurse in the hospital, as well as expert practitioners in research. The audit form was improved and pre-tested in other wards, such as the medical ward (7B) and multidisciplinary ward (6A). The audit form contains information on patient registration number, admitted ward, date and time of ENP prescription issued as well as date and time of patient received ENP. The dietitian will identify the reasons for patients not receiving the ENP within the targeted timeline of 24 hours, whether due to ENP not indented, indented

but not processed, ENP not collected from the dietetic department, ENP not served to patients and others. A time-and-motion study was also conducted to measure the time taken for each step in the process of care.

This preliminary study to verify the magnitude of the ENP delivery problem was conducted in February 2016, followed by four-month data collection phase (March to June 2016) to complete 140 subjects. Remedial measures had been developed and implemented for two months (July to August 2016), followed by four months (September to December 2016) of post-remedial data collection. The authors completed the first cycle of data analysis in January 2017.

The second cycle of the study was carried out from February to April 2017 with more remedial measures implemented. This was followed by four months of post-remedial data collection from May to August 2017. Findings from this study were presented and shared at the Malaysian Dietitians Association Conference, Selangor Research Day, and Selangor Innovation Day throughout the year 2017.

In January 2018, this study was then expanded to all wards in Serdang Hospital. Data collection had been conducted for three months (February to April 2018) with a total sample size of 140. Subsequently, sharing sessions and meetings for study replication in Selangor were conducted in May and June 2018. Next, the verification study at the state level was conducted in July 2018. The one-month period was allocated to obtain data for the pre-remedial phase before three months (from September to November 2018) of implementing the remedial measures in 12 hospitals in Selangor. Results from this study were presented and discussed in Quality Assurance (QA) meetings in January 2019 at the state level. A few rectification sessions were held at the state level before the results were shared at the National QA Convention in October 2019.

The verification study results showed that only 59.3% (n=83) of patients received ENP within 24 hours of dietitians' prescription, whereas the remaining 40.7% (n=47) patients did not receive ENP within the stipulated time, in which needed to be intervened.

Initial Assessment of the Problem

Dietitians performed a nutritional assessment of patients once referred by medical officers or any medical practitioners including Houseman Officer. Following nutrition assessment, dietitians prescribed ENP for eligible patients and continued the indenting process through the e-Hospital Information System (e-HIS). Staff nurses in wards were responsible for indenting ENP upon receipt of prescriptions from dietitians. The system transferred data to Dietary Management System (called as DTrax), which is linked to another system known as e-Dietary system in staggered time. Due to this limitation, ENP could not be processed immediately after indention. Dietitians prepared ENP twice a day; before 10 am and 3 pm every working day. ENP will be provided on daily basis, and extra ENP will be supplied over the weekend and public holiday needs.

The dietetic department provides an extra service counter for ENP and dry rations to wards, apart from filing and dispatching task ENP distribution purposes, which is tasked by an operational assistant, a multitasking staff. The counter operates from 10.00 am to 12.00 pm and 3.00 pm to 4.00 pm during working days. Ward staff, usually health attendants (PPK) collected ENP within the specified time frame. Each ward was given a copy of the receipt slip which listed the ENP supplied for verification purposes, signed by both ward and dietetic staff. Due to miscommunication, lack of awareness, and a short number of staff in certain days, there were cases where ENPs were not collected within the specified period.

The ENP was brought by hospital attendants to respective wards and was placed at a different location in each ward before being served to patients; either in the pantry, counter cabinet, counter table, bedside table, trolley, and etc. depending on the preference of the respective ward. Generally, ENP were served by staff nurses, but some were

assisted by trained caregivers depending on their availability during the feeding times. Family members were taught by the nurses on the process of serving ENP. Due to time constraints and irregular, heavy workload, occasionally, the ENPs were not served to patients. Figure 1 shows the workflow of pre- and post-remedial phases.

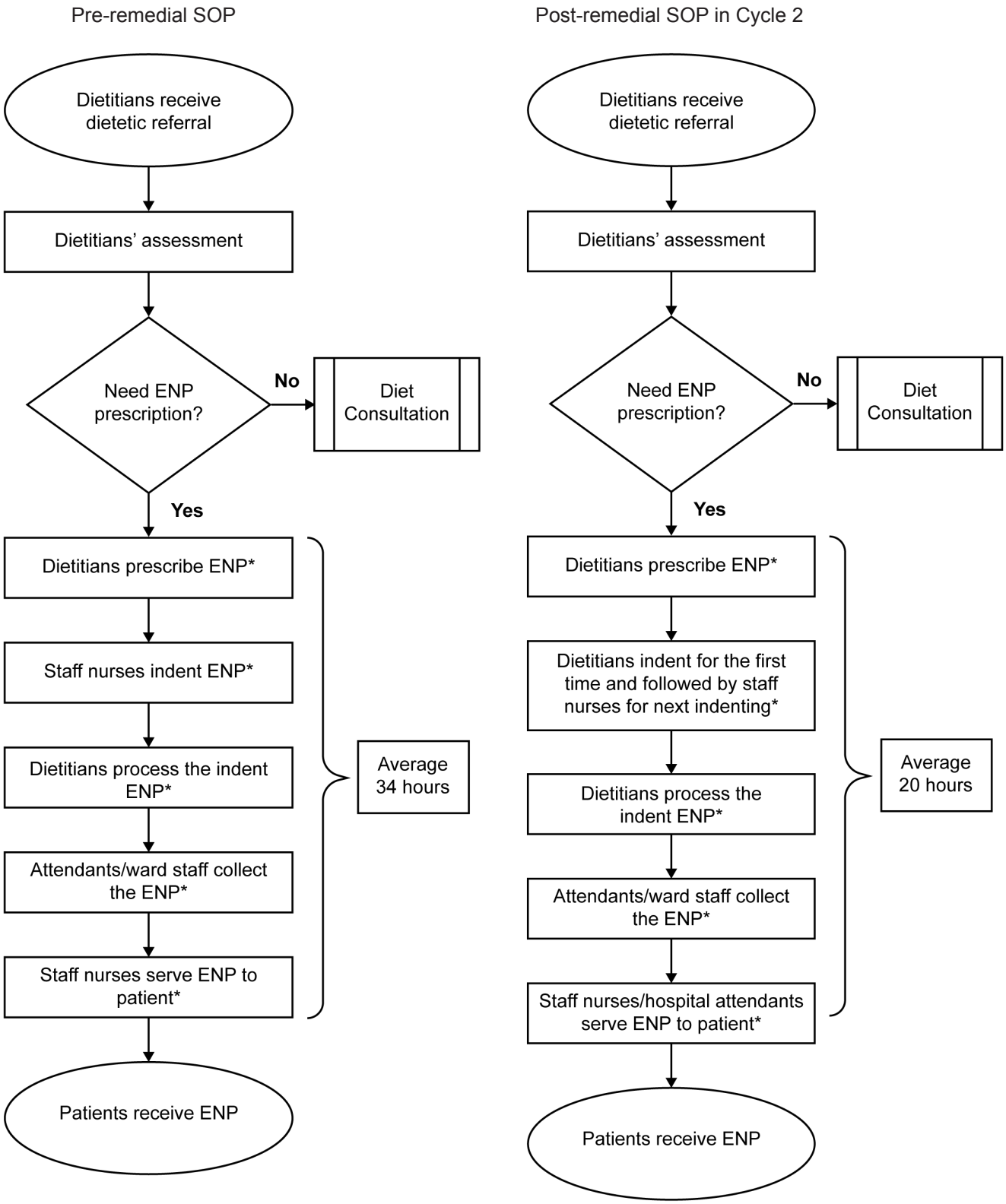

Figure 1: Process of care for ENP delivery in ward pre- and post-remedial measure in Cycle 2 (* indicates critical step)

Verification study conducted among the total sample (n=140) shown an average of 34 hours needed to complete the ENP delivery. Only 59.3% (n=83) of patients received ENP within 24 hours of dietitians' prescription. The identified contributing factors among those that had not achieved the standard (40.7%, n=57) were ENP not served to patients (67%, n=38), ENP not indented accordingly (23%, n=13), ENP not collected from dietetic department (5%, n=3), ENP indent not processed (4%, n=2), and wrongly indented by staff (2%, n=1). Two key contributing factors were focused on, which need to be resolved to overcome the problem (Figure 2), as illustrated in the Pareto chart.

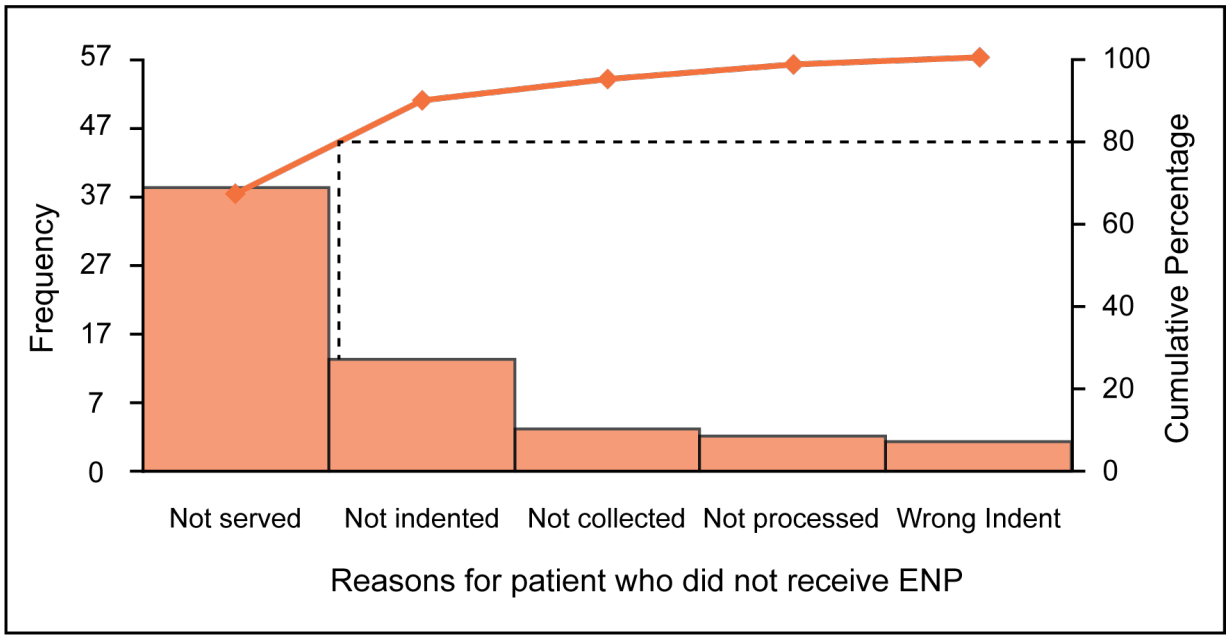

Figure 2: Reasons for patient not receiving ENP

Concurrently, a knowledge survey consisting of ten questions related to ENP management were conducted among the staff nurses who perform indenting and serving ENP. Their knowledge level was categorised under a good rating of 8 over 10 mean points. They were aware of the purpose of ENP prescription, able to differentiate the variety of ENP's categories, and can perform indenting and ordering process of ENP through THIS.

Strategy

The remedial actions were formulated based on the identified main contributing factors according to the Pareto chart. A few strategies had been developed involving a modified process of care in ENP administration at wards and the dietetic department level. The strategies were divided into two phases: four in Cycle 1 and another four in Cycle 2.

Firstly, a dietetic chart was introduced in the ward to ensure the product was served according to the feeding plan. The dietetic chart is a printed A4 paper with information of patient's details, feeding's regimen, date and time of prescription, and verification (stamp and signature) of the dietitian in charge. The individual dietetic chart should be available in the patient's file or bed head ticket (BHT) where nurses updated the date, time and signed their initial every time feeding had been provided for the patient. The same dietetic chart was also used to monitor the feeding progress of the patient.

Secondly, a diet board which is an A4 size paper clipped on the writing board was standardised and re-formatted. The diet board was placed at the nursing counter in each ward and used by ward staff as a reference for indenting diet or ENP through e-HIS. The previous diet board had the patient's name, bed number, and diet type only. After

modification, columns were added for ENP, order frequency and remarks for additional information, and instructions. Dietitians wrote their prescriptions for each referred patient in this diet board to avoid the ward staff from missing in ordering ENP.

Thirdly, the standard operating procedure (SOP) on ENP delivery was reviewed and updated. Previously, nurses indented the ENP in e-HIS following dietitians' prescription. In compliance with the new SOP, the dietitian who reviewed the case indented ENP for the first time to ensure a more efficient progress and appropriate ENP was indented right from the beginning. The new SOP was endorsed by the Hospital Director and subsequently distributed to all wards and clinical departments.

In addition, continuous nursing education (CNE) was conducted on ENP role and delivery to patients as a supplementary remedial measure. Each ward had its own CNE session conducted by the dietitian in charge. Half of the nursing staff in those three wards attended the CNEs. In view of good rating of knowledge among staff nurses, the aim of CNE is to create awareness of the study, and empower and enforce delivering of efficient ENP services.

More strategies were initiated in Cycle 2. The fifth strategy was to update the e-HIS nursing report format by adding the nutrition element from a free text report. The nursing unit practices ISBAR checklist as their pass-over report format to ensure that the complete information is communicated among nurses. ISBAR is a structured communication method consisting of Introduction/Identification, Situation, Background, Assessment, and Recommendation/Risk for each patient. Feeding prescription was made compulsory in nursing report format, thereby lowering the rate of missing in passing over report among the staff nurses.

In the sixth strategy, the job description of the health attendants (PPK) was reviewed. PPK's tasks on preparing and serving ENP to patients were reinforced by modifying the SOP to include this responsibility. This newly updated SOP was endorsed by the Hospital Director.

Only half of nursing staff were approached formally through three CNE sessions during Cycle 1. Therefore, in the seventh strategy, the knowledge of all nurses was re-enforced by providing bedside teaching. In this teaching session, the dietitian will explain to individual staff nurse the details about ENP delivery shortfalls and all remedial measures in the study, especially the dietetic chart and diet board usage which needed their involvement. Attendance was taken as proof of bedside teaching. Nurses in charge were approached directly after the dietitian's ward round. A total of 43 nurses were managed to be reached within two months.

Finally, dietitians prepared bedside tagging for all ENP patients, where it was placed on the patient's bed as a physical reminder. Bedside tagging is a laminating A4 size paper with a colourful picture that contains phrases reminding patients must be served with ENP accordingly. Patients and family members shall remind or request for ENP delivery from ward staff if they do not receive ENP at the scheduled time.

During brainstorming of remedial strategies, there was a suggestion for ENP to be kept in the ward as floor stock. However, this suggestion was turned down as there was limited space in the ward to keep ENP with irregular demand. Besides that, it burdens workload in the ward in terms of monitoring the ENP movement and misuse of ENP. Meanwhile, there had been an initial consideration of simplifying the indenting and ordering process in e-HIS but the changes are costly. Currently, the e-HIS is in the process of being upgraded to a newer version. Interim strategy in Cycle 3 adopted manual measures until a new version that can further enhance the patient's experience receiving ENP within 24 hours of dietitians' prescription.

Results

Results for post-remedial measure (n=144) in Cycle 1, showed increment to 85.4% (n=123). Higher improvement was observed in Cycle 2, where the outcome was 95.0% (n=133). The details of each study cycle by type of ENP administration and discipline were illustrated in the Table 1.

Table 1: Cycle 1 to Cycle 4 by type of ENP administration and discipline

QA Study cycle	ENP administration		Discipline								
	Ryles' tube	Oral nutrition supplement	Surgical	Medical	Ortho	Critical care	Pead	Nephro	O&G	Cardio	ORL/ Ophtal
Cycle 1 Total n=144	n=46 (31.9%)	n=98 (68.1%)	n=78 (54.2%)	n=55 (38.2%)	n=11 (7.6%)	-	-	-	-	-	-
Cycle 2 Total n=140	n=55 (39.3%)	n=85 (60.7%)	n=70 (50%)	n=58 (41%)	n=12 (9%)	-	-	-	-	-	-
Cycle 3 Total n=140	n=84 (60.0%)	n=56 (40.0%)	n=52 (37.1%)	n=37 (26.4%)	n=13 (9.3%)	n=12 (8.6%)	n=10 (7.1%)	n=2 (1.4%)	n=1 (0.7%)	n=1 (0.7%)	n=12 (8.6%)
Cycle 4 Total n=119	n=62 (52.1%)	n=57 (47.9%)	n=14 (11.8%)	n=36 (30.3%)	n=7 (5.9%)	n=4 (3.4%)	n=19 (16.0%)	n=27 (22.7%)	-	n=9 (7.6%)	n=3 (2.5%)

The time taken for delivering ENP was reduced from an average of 34 hours during the verification phase, to an average of 20 hours in the post-remedial phase of two months, with a reduction of 14 hours. This was mainly due to the new role of dietitians in initiating the ENP indenting instead of waiting for staff nurses to initiate the process.

Successful implementation of this study in those three wards has led to the expansion of the remedial measures to the whole hospital in Cycle 3. Meetings and discussions were arranged with the support and endorsement from the Hospital Director. Formal memo, briefing through hospital CNE session and training had been conducted to all 25 wards. Another data collection of total new 140 subjects in Cycle 3 showed that Serdang Hospital achieved an excellent result of 97.1% (n=136) of patients receiving the ENP within 24 hours of dietitians' prescription. The duration of ENP delivery to the patient was substantially reduced to an average of 12 hours. The time consumed in processing the indented ENP managed to be cut down. In order to overcome the limitation of the e-Dietary system, the dietitian processed ENP orders manually for cases that were referred during the period that was not captured by the e-HIS.

The ENP received among inpatients was continually monitored through yearly audits in Serdang Hospital. All dietitians will provide data collection in December every year. The results of the first audit in 2019 are demonstrated in Cycle 4, with an excellent achievement of 97.5% of patients who received ENP within 24 hours of dietitians' prescription. All results are shown in Model of Good Care in Table 2.

Improvement of the Achievable Benefit Not Achieved (ABNA) for Serdang Hospital could be seen in Figure 3. The ABNA was 30.7% in the verification phase (three wards) and reduced to 4.6% in post-remedial actions (three wards). ABNA has further reduced in Cycle 2 (three wards) and in Cycle 3 and Cycle 4, which involved all wards (25 wards) in the hospital. In these three cycles, the achievement had exceeded the target set.

Table 2: Model of Good Care (MOGC) achievements in Serdang Hospital from verification to Cycle 4.

Process	Criteria	Standard		Verification March–May 2016 3 wards		Cycle 1 Oct–Dec 2016 3 wards		Cycle 2 May–Aug 2017 3 wards		Cycle 3 Feb–Apr 2018 All wards		Cycle 4 Dec 2019 All wards	
		%	Average time	%	Average time	%	Average time	%	Average time	%	Average time	%	Average time
Dietitian prescribes the nutritional plan	• Dietitian must inform nurses either through verbal, notes or eHIS	100%	≤ 1 hour	100%	1 hour	100%	1 hour	100%	1 hour	100%	¾ hour	100%	½ hours
Dietitians/Staff nurses order/ indent diet/ ENP in eHIS	• Indent through eHIS or manual Ensure 2R:	100%	≤ 8 hours	90.7%	10 hours	99.3%	4 hours	100%	4 hours	100%	3 hours	100%	2 hours
	• Right patient	100%		100%		100%		100%		100%		100%	
	• Right ENP	100%		99.3%		100%		97.9%		100%		100%	
Dietitians process the ordered ENP	• Dietitians must process order through system or manual form.	100%	≤ 8 hours	98.6%	8 hours	99.3%	8 hours	100%	8 hours	100%	3 hours	100%	1 hour
	• Countercheck 2R and correct errors detected.	100%		100%		100%		100%		100%		100%	
Ward staff collect the ENP from Dietetic Department	• Ward staff should collect the ENP from JDS.	100%	≤ 4 hours	97.9%	7 hours	91.0%	5 hours	100%	5 hours	99.3%	4 hours	98.3%	4 hours
	• Reminder: Call/Whatsapps/ Telegram/SMS	100%		100%		100%		100%		100%		100%	
	• Receipt slip	100%		100%		100%		100%		100%		100%	
Staff nurses/ PPK serve the ENP as prescribed by dietitians	• Staff nurses/PPK serve the ENP to patients	90%	≤ 3 hours	72.9%	8 hours	95.8%	3 hours	97.1%	2 hours	97.9%	2 hours	99.2%	2 hours
	• Input-Output charting	100%		91.7%		100%		100%		100%		100%	
All entire process	• Patient receive the ENP	90%	≤ 24 hours	59.3%	34 hours	85.4%	21 hours	95.0%	20 hours	97.1%	12 ¾ hours	97.5%	9 ½ hours

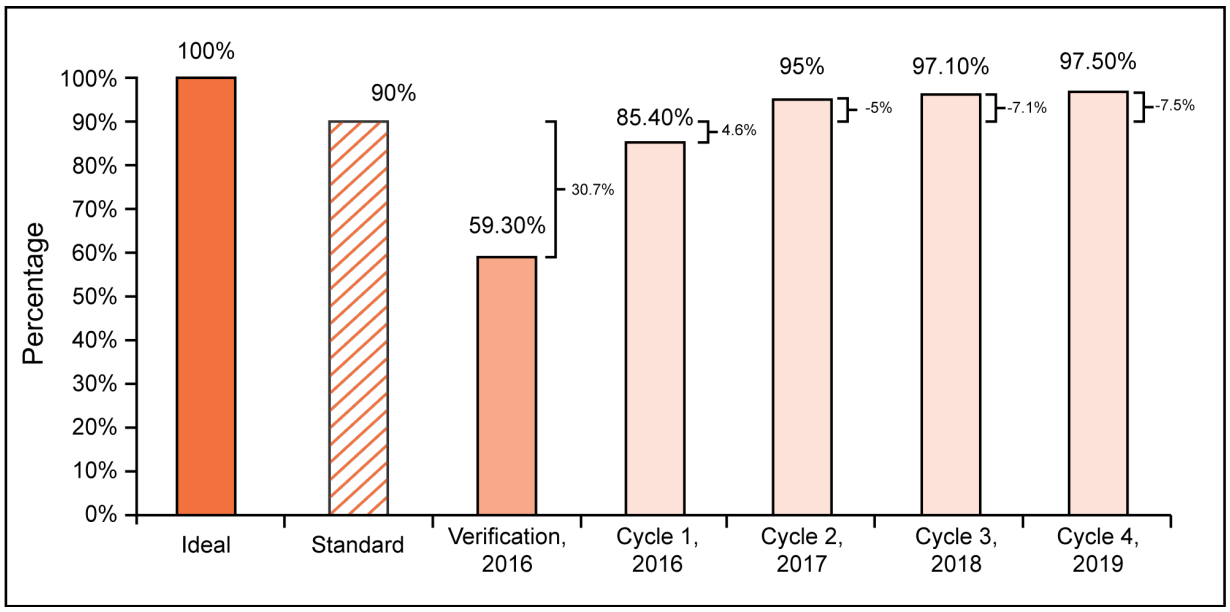

Figure 3: Percentage of patient received ENP within 24 hours of dietitian prescription from 2016–2019 in Serdang Hospital.

The study was presented at the state and national levels through conferences and carnivals. It had been replicated in all Selangor government hospitals with full support from the Selangor State Health Department (JKNS). The Quality Assurance (QA) secretariat in JKNS arranged and conducted series of meetings among dietitians in the state and collaborated with the nursing unit to run the study at each hospital in Selangor. Training, manual guidelines and circulars from the JKNS level were provided to all 12 hospitals in Selangor state and full cooperation and commitment were received from each hospital. At the state level, there were 133 subjects in pre-remedial data collection and 161 subjects in post-remedial data collection within one-month duration for each phase. Results showed an improvement from pre-intervention phase of 85.0% (n=113) to 91.9% (n=148) post-implementation of strategies at the state level, as shown in Appendix 1. The implemented strategies are now continued in all MOH hospitals in Selangor. The hospitals are allowed to choose and prioritise the remedial measures based on their shortfalls and the hospital settings.

Even though three hospitals (Sabak Bernam, Kuala Kubu Bharu, and Gombak) showed 100% achievement during the pre-remedial phase, the interventions were also introduced in these hospitals to test and prove that it can be practiced at multi-centre.

Shortfalls in other hospitals were contributed by ENP not indented (n=10, 50.0%), product not collected from dietetic department (n=5, 25.0%), ENP not served to patients (n=4, 20.0%), and indent not processed (n=1, 5.0%).

Sungai Buloh Hospital received more enteral nutrition support referrals from *Pusat Kawalan Kusta Negara* during post-remedial data collection. Distance factors affect the monitoring of ENP delivery. Kajang Hospital showed a decrease in patient receiving ENP within 24 hours of dietitians' prescription but remained above the current standard of 90%.

Lessons and Limitations

Teamwork is important in completing this study. Great commitment and cooperation among health care workers across multidisciplinary including top management in hospital and state level is absolutely needed

to make this study successful. Everyone acknowledges and plays their crucial roles in nurturing work culture in order to provide efficient services, thus improving the patient clinical outcomes.

Besides that, the awareness done has made an impact. During the implementation of the remedial measures, the Hawthorne effect might occur, which refers to the observer effect or people's tendency to work harder and perform better when they participate in an experiment (14). It describes a change of behaviour of an individual that results from their awareness of being observed. By understanding the importance and benefits of having this study, every health care worker involved and even patients or family members will ensure patients receive ENP accordingly and without missing any steps in the work process. Reminding and sharing tasks among dietitians, nurses, and hospital attendants in any step in the workflow had contributed to the successful outcomes of this study.

The authors managed to optimise the role of hospital attendants in addressing the shortage of human resources. As a result, dietitians, nurses, and hospital attendants have additional and privileged roles and responsibilities in the new work process. Through sharing the workload, the successful outcomes were able to be accomplished and sustained.

Quality is always about customer satisfaction. A simple satisfaction survey was conducted among patients and family members on ENP prescription and timing of delivery. Only family members were interviewed for the unconscious patient. The satisfaction survey showed that there was 100% of satisfaction among patients (n=46) and their caretakers (n=63) of receiving ENP within 24 hours of dietitians' prescription. An important lesson here is to ensure a patient-centred service in the healthcare system, which can be fostered through the development of trust between patients, family members and medical practitioners.

In this study, papers were printed for charting and tagging purposes. Even though paper usage was increased, it is still cost-effective compared with prolonged hospital stay costs and clinical management costs in patients with poor nutritional status.

In conducting this study, there were lots of limitations, weaknesses and also problems that occurred as this project was studied in different hospitals and wards with different process of care, working environment, culture and also personalities, of which they were looked at as an opportunity for learning and improvement. Experiences and practices were shared among hospitals in Selangor to overcome similar problems and therefore, contributing to the success of this study.

It is generally known that involvement in QA study is rather challenging among clinical practitioners. The team members greatly appreciate the protected time for clinical workers to run this quality study successfully.

Conclusion and the Next Steps

In conclusion, this study proved that percentage of patients receiving ENP within 24 hours of dietitians' prescription had improved successfully, not only at Serdang Hospital but also in Selangor state. In Serdang Hospital, the achievement of the indicator increased from 59.3% to 85.4% in Cycle 1, and to 95.0% in Cycle 2. Achievement improved to 97.1% in Cycle 3 and maintained at 97.5% in Cycle 4, where the study expanded to hospitals. Whereas the results for the replication study at the state level showed an increment from 85% to 91.9%. The contributing factors to the problem were identified, followed by formulating and implementing a few working strategies as remedial actions until the results showed the effectiveness of those measures.

Next, continuous monitoring of the work process will ensure that it is conducted efficiently through regular education, enforcement, and audits until it develops into a culture in hospitals. In addition, regular audits will be conducted at hospitals from time to time to ensure the sustainability of the practices and audit results will be presented in the departmental meeting to appreciate

staff who are committed to the tasks. A higher standard with a shorter time might be considered as a quality target in future study cycle.

In addition, there is a consideration to maintain a minimal ENP floor stock in wards as future remedial measures, even though different wards require different types of ENP. Hence, cooperation from all health care workers is needed to ensure ENP is kept in good condition and monitored closely to avoid misuse, wastage, and expiry. Further meetings and discussions will be conducted with nursing and ward staff for the purposes mentioned above.

Given the benefits of enteral nutrition support therapy, which had been proved, there is a plan to expand this study to the national level and share the remedial actions and experiences with hospital in other states for better achievement. Some ground levels preparations were initiated, where further discussions and promotions will be conducted. It is hoped that more studies will be undertaken on monitoring and evaluating nutrition support among patients in Malaysia.

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Conflict of Interest

None.

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Appendix 1

Pre- and Post-remedial Results among other Government Hospitals in Selangor

Hospital	Pre-remedial study, 1–31 July 2018		Post-remedial study, 1–31 December 2018	
	Numerator/ Denominator	Percentage (%)	Numerator/ Denominator	Percentage (%)
Klang Hospital	5/15	33.3	8/9	88.8
Sungai Buloh Hospital	25/27	92.6	36/44	81.8
Selayang Hospital	28/31	90.3	25/25	100
Shah Alam Hospital	15/17	88.2	20/20	100
Ampang Hospital	7/7	100	12/12	100
Kajang Hospital	18/19	94.7	28/30	93.3
Tanjung Karang Hospital	1/2	50.0	1/1	100
Banting Hospital	7/8	87.5	12/13	92.3
Sabak Bernam Hospital	4/4	100	3/3	100
Kuala Kubu Bharu Hospital	2/2	100	4/4	100
Gombak Hospital	1/1	100	0	-
TOTAL	**113/133**	**85.0**	**148/161**	**91.9**