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Using a web-based platform to apply the Nutrition Care Process and capture nutrition outcomes and patient satisfaction in a student-led dietetic outpatient clinic: a pilot study

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Abstract

Evaluation of health care services utilising student providers is essential in determining effectiveness, quality of care, and student performance. We investigated the effectiveness of a student-led dietetic clinic in patient satisfaction and nutrition outcomes. A mixed-methods observational cohort pilot study utilising surveys and focus groups was conducted in outpatient student-led dietetic clinics at a university used for student education. Nutrition care and outcomes were documented using the Nutrition Care Process Terminology (NCPT) in a web-based platform. The patient satisfaction survey (n=88) of patients attending student-led dietetic clinics revealed an overall ranking of 4.0 (mean score 4.33 ± 0.34) out of 5, ranging between “very satisfied” and “satisfied.” Survey and focus group data showed that the highest satisfaction rates were for students’ interpersonal skills (4.80 ± 0.43). Fourteen patients attended >2 consultations. 23.5% of the patients resolved their nutrition diagnoses, and an average weight loss of 2.2 kg per patient was achieved (n = 8). Positive patient satisfaction ratings, combined with improved nutrition outcomes, support the value of student-led clinics as an education and health care delivery modality. These findings are worthy of exploring further on a large scale.

I INTRODUCTION

Student-led clinics are a way to reduce patients' costs and barriers to access health care and create a safe experiential learning space for students (Buckley et al., 2014). The available research on the effectiveness of student-led healthcare services is minimal (Kent & Keating, 2013; Suen et al., 2020). Students are rated highly in their respect for patients, sensitivity to confidentiality, and professionalism in various healthcare disciplines (Bennard et al., 2004; Forbes & Nolan, 2018; Hajioff & Birchall, 1999; Lafont et al., 1999). However, patient satisfaction studies in the nutrition and dietetic setting are lacking. One study has reported on the efficacy of student-led dietetic (SLD) clinics in generating significant weight loss outcomes (Burrows et al., 2013). Improvements in patient health outcomes (such as anthropometric, biochemical, and physiological outcomes) have been reported, and the needs of the community served were addressed with high quality, low cost, and accessible care (Buckley et al., 2014; Forbes & Nolan, 2018; Kent et al., 2016). However, the effect of nutrition intervention provided by student dietitians using the Nutrition Care Process (NCP) in primary care facilities has not been explored.

Standardisation and consistent documentation of patient notes within and between health professions are important for measurable and comparable outcomes, and safe and equitable care (Hakel-Smith & Lewis, 2004; Lacey & Pritchett, 2003; Lövestam et al., 2017; Myers, 2014). ANDHII (Academy Nutrition and Dietetics Health Informatics Infrastructure) was created by the Academy of Nutrition and Dietetics to support documentation of the NCP that dietitians use to record delivered care and outcomes. ANDHII is a secure web-based, customisable data collection platform that utilises the standardised terminology of the NCP known as Nutrition Care Process Terminology (NCPT). The platform allows dietitians to input data from multiple sources, which are then securely stored and aggregated. Electronic documentation such as ANDHII is encouraged by the New Zealand Ministry of Health (Ministry of Health, 2013) to improve coordination of care across disciplines and provide objective results on the efficacy of dietetic practice.

With the demand for nutrition intervention increasing due to rising non-communicable disease and obesity rates, and with hospitals experiencing increasing wait times, SLD clinics can be beneficial to meet community demands. Demonstrating and evaluating the importance of nutrition intervention is essential for supporting the community. Additionally, surveying the effectiveness of SLD clinics and corresponding patient satisfaction is important in determining the use of students in clinics and feedback towards student development.

The present pilot aimed to investigate the effectiveness of an SLD clinic in improving nutrition outcomes and assessing the satisfaction of patients attending SLD clinics. This pilot study will be used to predict an appropriate sample size for a larger study and improve upon various aspects of this model of student-led nutrition care delivery.

The two outcomes explored in the study include (1) satisfaction with the clinic and the student dietitians collected via a satisfaction survey and a focus group discussion, and (2) changes in nutrition outcomes such as weight change (when appropriate), improvement in healthy eating intake, improvement in stages of behavioural change and nutrition diagnosis resolution.

II METHODS

This observational cohort pilot study took place between April 2018 and September 2018 at one on-site student-led dietetic clinic in New Zealand, where dietetic students consult patients independently, with registered dietitians supervising using two-way rooms. All final year dietetic students (n=18) held consultations at this clinic located on the university campus. Student dietitians are trained to provide evidence-based nutrition care based on the current food and nutrition guidelines in New Zealand (Ministry of Health, 2020). Students are also trained in the NCP through theoretical and practical training activities over the two years of their degree.

Referral to the clinic was through a patient's care provider, or as a self-referral for reasons like diabetes, gastrointestinal disorders, weight loss, and general healthy eating advice. For clients who are referred to this clinic via a health professional, each visit costs \$10. All patients (age >16 years) attending the SLD clinic were invited to complete a satisfaction survey after their consultation. At the beginning of the survey, an information statement outlining the study, which included collecting patient data for research, was provided. The completion of the survey was evidence of consent. All patients who completed the survey and then participated in the focus group discussion provided written consent to participate, and agreed that their comments could be recorded, transcribed, and anonymised for analysis. At the end of the focus group discussion, the patients received \$50 in cash for their participation.

Approval was obtained from the Institutional [removed for blind peer review] Human Participants Ethics Committee [Reference Number 019914].

A Patient Satisfaction Survey

Patients were asked to complete an electronic satisfaction survey regarding their initial consultation with a student dietitian. The supervising dietitian distributed this electronic survey on an iPad immediately following consultation to all patients to decrease bias within the results of the questionnaire. This survey was then re-distributed to the patients following subsequent appointments to monitor any changes in satisfaction. The patient satisfaction survey used in this study was adapted from an existing validated survey instrument (Vivanti et al., 2007). The survey included eight questions with 24 statements that assessed the areas of 'student dietitian presentation', 'interpersonal skill', 'perceived health benefit', 'written information' and 'overall expectations', answered with the use of a five-point Likert scale (1=low satisfaction to 5=highest satisfaction). The original survey used the word 'dietitian' in the survey items. For this study, the only adaptation was that the word 'dietitian' was changed to 'student dietitian.'

B Patient Nutrition Outcomes using ANDHII

Patient nutrition outcomes were determined using ANDHII (Murphy et al., 2018).¹⁷ The student dietitian collected and documented information such as food or nutrition-related history, biochemical data, medical tests and procedures, anthropometric measurements, nutrition-focused physical findings, and client history on ANDHII that incorporates the NCP and NCPT (Swan et al., 2019; Swan et al., 2017). Data collected during the nutrition assessment guided the student dietitian to select the appropriate nutrition diagnosis. The student dietitian used the 'readiness to change' ruler and asked patients to verbalise how ready they are to change using a scale of one to ten, where one = definitely not ready to change, and 10 = definitely ready to change (Prochaska & Velicer, 1997). This allows the student to immediately know their patient's level of motivation and stage of change. The student then selected the nutrition intervention directed to the aetiology of the nutrition problem to alleviate the signs and symptoms of the diagnosis. These signs and symptoms, such as diet history, weight, body mass index, and relevant health biomarkers such as glycosylated haemoglobin, were monitored and evaluated on ANDHII to determine if the client has achieved, or is making progress toward, the planned goals.

C Patient Satisfaction and Outcomes

Patient satisfaction and effectiveness of the SLD clinics, including the community perception of the SLD clinics in improving their outcomes, the delivery of nutrition care, how students are meeting the needs of the community, and how this can be enhanced, were explored during a focus group. A focus group was conducted with patients (n=6) who completed at least one follow-up appointment with the student dietitians. The focus group was held three months after the study

period. A focus group guide was developed that covered the following topics: best and worst features of the SLD clinic, description of the clinic, description of the student dietitian, description of a typical visit, expectations versus the reality of the clinic, motivation to continue care, a recommendation of student lead clinic to a friend, and how care can be improved. A moderator (a Master of Health Sciences Student) met with the principal and the co-investigators several times to review the guide, and the moderator was trained by a university faculty member with expertise in focus group methodology. The moderator used the focus group guide to facilitate semi-structured discussions, which lasted between 60 and 90 minutes.

D Statistical Analysis

Data analysis was conducted using Statistical Package for Social Sciences version 18 (SPSS, Inc., USA). Descriptive statistics were used to generate means and standard deviations for satisfaction survey results and baseline demographic characteristics. Changes in nutrition outcomes such as food or nutrition-related history; biochemical data, medical tests and procedures; anthropometric measurements, nutrition-focused physical findings, and stages of change outcomes (Prochaska & Velicer, 1997) were monitored and evaluated for all clients attending more than one appointment, using information from their initial and final visit during the study period. Spearman correlations and regression analysis were used to determine if there were any associations between level of client satisfaction, indicated by responses to overall satisfaction question-item in the survey, and patient outcomes achieved after adjustment for the number of visits. For all statistical tests, a level of $P < 0.05$ was considered significant.

Discussions from the focus group were transcribed, and this data, along with the open-ended survey question, was synthesised into themes using a semantic approach (Smithson, 2000). All audiotapes of the focus group discussion were transcribed and reviewed for accuracy. When the transcriptions were completed, coding categories were developed in consultation with a focus group expert. Two of the investigators independently reviewed all the transcripts and used the coding categories to synthesise broad themes from the data. These themes were independently validated by the research team, who reviewed any discrepancies until consensus was reached.

III RESULTS

A Patient characteristics

One hundred and forty-five patients attended the clinic during the study (five months). Baseline demographic characteristics of the 88 patients who consented to the survey are presented in Table 1. Females and New Zealand European ethnicity were a majority. Of the 88, 40 patients had at least one follow-up appointment. Of the 40, 17 patients had a complete set of NCP data. These 17 patients were invited to participate in a focus group discussion, and six patients agreed to participate. There were no significant differences between responders and non-responders.

Table 1
Baseline demographic characteristics of participants

Patient Demographics (n=88) Females = 63%, Males = 37%	Mean	Standard Deviation
Age (years)	41.2	15.6
Weight (kg)	103.6	33.8
BMI (kg/m ²)	33.8	9.3
Consults (n)	2.2	0.5

Time between appointments (Weeks)	4.4	2.1
Data displayed as mean +/- SD		

B Patient Satisfaction

Patient satisfaction surveys were completed by 88 patients (61%) (Table 2). The patients' experience was rated on a scale of 1 to 5, with 1 being least useful and 5 being most useful; the overall ranking was 4.0 (mean score 4.33 ± 0.34), falling between "very satisfied" and "satisfied." 'Students' interpersonal skills/presentation' (4.80 ± 0.43) received the highest scores when compared with all factors measured in the survey. The perceived 'health benefit' (4.54 ± 0.3) scored lowest but was still a high rating. There was no association between client satisfaction, as determined by overall satisfaction score, and weight loss (kg) over four weeks between consults after controlling for the number of visits.

Table 2
Mean response scores from the client satisfaction survey

Satisfaction statements ^a	Mean \pm SD score (n= 88)
Satisfaction with the care received	4.54 \pm 0.30
Satisfaction with the student dietitian	4.89 \pm 0.43
Satisfaction with the written information provided	4.77 \pm 0.37
Student dietitian and clinic was helpful, met expectations and will recommend to others	4.85 \pm 0.41
Rate overall satisfaction ^b	4.33 \pm 0.34

^a Scores ranged from 1 (strongly disagree/disagree) to 5 (strongly agree/agree).

^b Satisfaction with overall service was assessed on a five-point scale from 'very good' scored as 5 to 'very poor' scored as 1.

The final question of the survey was an open-ended text box for additional comments. Of the 88 responses, 40 comments were received. Of these 40, five were considered neutral, and 35 positive. Seven of these comments characterised the consultation with the student dietitian as 'helpful,' four felt heard and that the dietitian had 'listened,' three reported the student dietitian was 'non-judgmental,' two felt 'supported,' a further two deemed the advice 'realistic.' Of neutral comments, two provided suggestions to improve services with one suggesting 'meal plans' and one suggesting 'better preparation'. The themes uncovered through the semantic analysis were that student dietitians were non-judgmental and friendly, helpful, and supportive; the patients thought the advice was realistic and achievable and saw the perceived benefit of the consultation. These were all determined in consensus building meetings between researchers.

C Patient Outcomes

The distribution of the top-five nutrition diagnosis terms and their corresponding NCPT used in the dataset is shown in Table 3. The outcomes assessed were weight change, food intake improvements, stages of change, and diagnosis resolution (Table 4). Positive improvements in dietary intake were observed in the food, and nutrition-related histories in 64.7% of patients, and 23.5% of the patients resolved their nutrition diagnoses. Regarding the stages of change (Table 4) (Prochaska & Velicer, 1997),²⁰ eight remained stable in their stage of change over four weeks between their first and second consultations, although seven had already started at the action stage.

Table 3

Distribution of top-five Nutrition Diagnosis (n=88) and their corresponding most common Nutrition Care Process terms used in the student-led dietetic clinic patient dataset.

Nutrition Diagnosis (ND)*	No. of NDs	%	Aetiology	Signs and Symptoms	Intervention	Monitoring and Evaluation
Excessive energy/oral intake	17	19.3	Undesirable food choices	Body mass index Weight	Recommended nutrition modifications	Body mass index Weight (using Anthropometric Measurements)
Food and nutrition-related knowledge deficit	15	17.0	Unsupported beliefs/attitudes about food or nutrition related topics	Food and nutrition related knowledge Total carbohydrate estimated needs	Nutrition relationship to health/disease Priority modifications, nutrition education Other nutrition education	Area(s) and level of nutrition knowledge/skill Total carbohydrate estimated needs (using Food/Nutrition-Related History)
Excessive carbohydrate intake	12	13.6	Food and nutrition related knowledge deficit	Total carbohydrate estimated needs	Nutrition relationship to health/disease Priority modifications, nutrition education Other nutrition education	Total carbohydrate estimated needs (using Food/Nutrition-Related History)
Altered gastrointestinal function	11	12.5	Change in GI tract motility	GI tract motility	Recommended nutrition modifications	GI tract motility (using GI questionnaire)
Overweight/obesity	14	15.9	Predicted excessive energy intake	Body mass index Weight	Recommended nutrition modifications	Total energy estimated needs (using Food/Nutrition-Related History)

* 18 patients had 2 NDs at first visit, 1 patient had 3 NDs at first visit.

Table 4
Outcome changes ^c in patients (n=17) by referral reasons

Reason	No. of patients	Weight change (n)	Improvement in intake (n)	Stages of change (n) ^c	Diagnosis Resolution (n)
Weight loss	8	6 = Loss 1 = Gain 1 = No change	6	3 = progressed 1 = regressed 4 = no change	1
Healthy Eating	4	2 = Not weighed 2 = Loss	3	1 = progressed 3 = no change	1
Specific nutrition education	4				
• Parkinson's disease	1	1= No change	Not recorded	1 = regressed	1
• Diabetes Type 2	1	1 = Gain	No change	1 = regressed	
• Irritable Bowel Syndrome	1	1 = Not weighed	Not recorded	1 = regressed	
• Fatigue	1	1 = Loss	1	1 = no change	1
• Weight gain	1	1 = Gain	1	1 = progressed	
Total	17	10 achieved desired outcomes	11	5 = progressed 4 = regressed 8 = no change	4

^c These changes were measured 4.4 weeks after the first consult. ^d Prochaska's Model stipulates six stages of change (precontemplation, contemplation, preparation, action, and maintenance). ⁽¹⁸⁾

The changes in weight outcomes in patients who desired weight loss are described in Table 5. Weight loss was achieved in six of eight referred patients. There was an average loss of 2.2 kg per patient over four weeks, where weight loss was monitored and evaluated as a sign and symptom. The sample size was too small to determine a P-value or confidence interval to be an effective means of analysis.

Table 5
Changes ^e in weight outcomes in patients who desired weight loss (n=8) ^f

Weight	Total change in weight	Median (Range)
Patients who desired weight loss and lost weight (n=6)	15.5kg	1.8 (0.2-5.9)
Patients who desired weight loss and gained weight (n=1)	1.2kg	-

^e These changes were measured 4.4 weeks after the first consult.

^f There was one patient who desired weight loss and showed no change in weight after 4.4 weeks.

D Patient Satisfaction and Outcomes

The focus group discussion was analysed using a thematic approach, where key themes were documented and clustered (Braun et al., 2019). The themes deduced from this analysis emerged to be: (1) changes in patient outcomes, (2) student interpersonal skill and presentation, (3) patient-centred care, (4) patients' gratitude towards student dietitians, (5) accessibility and pricing, and (6) areas for improvement. Overall, patients expressed positive feelings regarding the clinics and their benefits in their lives. All expressed receiving individualised care that resulted in improving food choices.

E Changes in Patient Outcomes

Patients reported changes in outcomes during the focus group discussion. The changes discussed were consistent with data in ANDHII. The changes in outcomes not only focused on weight but the increased knowledge on food and nutrition they had achieved, and these are highlighted in the following:

“I’ve lost 13 and a half kilos... you know vegetables are our friends and lentils have snuck in and chickpeas... my blood pressure was... 130/80 and now it is... 110/72... So our word for the week is Longevity! I want to live for a long time.”

“I used to feel so guilty if I had a piece of [brand name] bread before, and after [the sessions] I was like oh, I’m eating healthy! You know I just think it was really good to be reassured. Don’t worry about all the fad diets.”

“I have adjusted my way I think about food, and portion sizes, and I have about a third less on my plate than I put on my husband plate. Before, I was eating the same as him, and now I have realised that he has a really physical job and he needs a lot more than I do. So, I’ve made those adjustments.”

F Student Interpersonal Skill and Presentation

Patients were impressed and complimented the skills and attitudes of the student dietitians they had interacted with. Words such as friendly, welcoming, lovely, and professional were used frequently to describe the students, as shown below:

“I thought the students were just like really professional and really liked lovely and welcoming and things, which I always really enjoy.”

“... and very friendly... was quite happy with her... very professional.”

“They’re so enthusiastic!”

“And she took time to explain.”

G Patient-centred Care

The individualised approach students had to facilitate positive food behaviours was deemed positive by patients. All expressed satisfaction that students had applied a holistic, lifestyle approach manageable for each of them rather than being overwhelmed with information. Some examples of this are detailed:

“And it was nice having the dietitians here be like, not trying to like change everything at once but being like, this is the next small step, and take it a thing at a time, and so you’re trying to re-haul your entire life, and I was like, I can go for that.”

“I was really pleased I thought it was going to be a regimented look into everything and all going to be very strict, and this is your list, and it was all really all about me and what I’m doing and how I can help me rather than here you go this is the prescription, off you go goodbye... and it was all about my family and my children.”

“... we spent a lot of time talking about my life, my lifestyle, and the little details and also the little details of what I eat, very individualised.”

H Patients’ gratitude towards student dietitians

Overall, patients were highly appreciative of the student approach the clinic held and enjoyed seeing students as highlighted in these examples:

“I don’t think I would have wanted to [see a registered dietitian] because, as I’ve said earlier, I have like more trust on the students. I think partly because it’s like you’re studying stuff currently... it’s probably fresher in your mind.”

“... I really like the whole student experience, like I am almost more comfortable seeing a student because like I'm a student so I'm like I know what you're up to. I get you guys, and you get my life kind of. It's quite nice.”

“I was really fine to go see a student because I believe that the University has a high standard.”

I Accessibility and Pricing

One of the major benefits to the SLD clinic, as described by patients, was the affordability and accessibility. Many felt a registered dietitian was unaffordable, and these clinics, therefore, filled an essential niche in the community:

“I was extremely grateful because you know going to a dietitian is so expensive, and so I was pleasantly surprised at the professionalism and how helpful they were, and still are because I still have some more sessions to go.”

“Me, I wouldn't have actually been able to afford to [see a registered dietitian]. So no, I would have thought twice.”

“I went to see the students because they're cheaper. And they have pretty much the same in knowledge about food. What other... so rather than paying a big amount for a dietitian... ah, so, I would rather go to a student.”

“Yup, very interested [in the price], I wouldn't have gone to a real dietitian.”

J Areas for Improvement

The examples below highlight that patients preferred to work with the same student dietitian at every consult.

“So, between my two sessions I had two different students which are probably what happened, but if it is at all possible to try and keep the same student between is probably quite good because A. like the client gets the benefit of having the same person and having the same kind of knowledge and then I guess the students would probably get a benefit out of like learning how to develop an ongoing rapport with clients and things.”

“Only two sessions I could have the one [student] and then she went away. And you know I would prefer if the same one would have continued so I could have also continued with her because she knew what I had discussed earlier. Of course, she would have asked by the everything, but still, it's not the same. So, I had to repeat and then I lost interest.”

Responses from the satisfaction survey comments and the focus group were compared. Student interpersonal skill was consistently rated positively throughout both data collection methods, as was a perceived benefit of the SLD clinic. Patient-centred care resulting in advice the patients felt was realistic and achievable was another common theme found in both methods. The theme of the participants' gratitude towards the clinic and the students themselves was consistent, with many explicitly expressing this in both the survey comments and the focus group discussion.

IV DISCUSSION

This is the first study to evaluate client satisfaction and nutrition outcomes of student-led dietetics (SLD) outpatient clinics where students consulted patients independently. The study assesses the effectiveness of students themselves, rather than a client's receptiveness to the presence of a student as part of a consultation team. The study, therefore, adds to the limited literature on patient satisfaction and outcomes from SLD outpatient clinics.

The satisfaction results in this study, both from the survey and the focus group, are similar to the results produced in another study in the student-led outpatient setting (Burrows et al., 2013),

which is that patients overall expressed a positive experience with student dietitians. These findings are consistent with studies from other areas of health, which have found that student involvement—particularly in student-led clinics—produce high levels of patient satisfaction (Bennard et al., 2004; Hajioff & Birchall, 1999; Lafont et al., 1999; Simon et al., 2000). This satisfaction is particularly important in student-learning environments because it indicates that students are performing well. Structured written and verbal consumer feedback improves patient-centred practice. Also, it effectively enhances the benefit of a multi-centred model and is a feature of programmatic assessment in health education (Lai et al., 2020). The study shows that SLD clinics are an important model for dietetics education (Burrows et al., 2013). A recognition of the satisfactory nature of student-led clinics further justifies their value for a broader populace, particularly for those that may otherwise see health services as unaffordable which the focus group reported. The results confirm that these services provide the community with services that may otherwise have left communities facing restriction and, therefore, unmet needs (Diab & Flack, 2013).

Positive patient outcomes were also found, specifically in achieving desirable weight reduction, stages of readiness change, food intake, and resolution of nutrition diagnoses. Overall high levels of client satisfaction and significant weight loss outcomes were identified. This change in weight was comparable to the obesity guidelines stating that interventions lasting a minimum of one year were necessary to produce more significant weight losses and minimise the risk of weight regain (Jensen & Ryan, 2014). Two of the patients in the focus group reported losses of 13.5 kg and 20 kg, which were not included in the results as the focus group was held three months after the study window. The patients reported further or delayed improvements in the behaviours downstream as sometimes skills/knowledge obtained during an intervention period may not be applied immediately (Prochaska & Prochaska, 2011). The time frame of outcome data collection was potentially too short and did not capture overall long-term changes in outcomes. The changes in weight outcomes compared well to an Australian SLD clinic, which did not find significant weight loss (Burrows et al., 2013).

Dietetic students are trained in principles and evidence-base related to motivational interviewing in the context of dietetic practice. Student dietitians use a patient-centred approach and have been trained in cognitive behaviour change techniques (Cunningham, 2016). With regards to stages of readiness change, patients moved to the next stage following the sessions, and some remained stable in their stage of change. However, of these patients, the majority were already in the action stage; in other words, they were implementing behavioural change while some patients were seen to regress. This study, to our knowledge, is the only one that has assessed the stage of change as a specific outcome in SLD clinics. Positive improvements in dietary intake and resolution of nutrition diagnosis were considered an important improvement given the short period. The study showed that the student dietitians' approach of emphasising nutritional education, manageable lifestyle changes, mindful eating, and long term eating behaviours (Bacon & Aphramor, 2011; Parham, 1996) lead to greater efficacy among patients.

V LIMITATIONS

The study is limited by its small sample size dictated by both students participating in clinics fortnightly and the limited capacity of the clinic space. This may have contributed to the lack of associations found. Study results may have been associated with a respondent bias, as those more satisfied with the services at the clinics may have been more likely to complete the survey. Social desirability bias is possible but was minimised by the anonymous nature of the surveys. The patients in the focus group mentioned wanting to participate in the discussion as they were exceptionally satisfied. The possible bias this suggests is that the worth of the clinics is overestimated and that problematic aspects of clinics are underreported. Another limitation is that

not all student dietitians documented in ANDHII thoroughly, with some not using ANDHII, leading to incomplete data collection. Studies involving registered dietitians have found that the adoption of ANDHII into dietetics practice has required considerable familiarisation and documentation time (Hickman et al., 2015; Murphy et al., 2018).

VI IMPLICATIONS FOR RESEARCH AND PRACTICE

The pilot study showed great preliminary potential for expanded use of SLD clinics in the community. A larger study of a longer duration and a powered sample size is being pursued to assess lasting changes in the outcomes of patients. Standardised training on the NCP and use of ANDHII as an application have already been put into practice to ensure students are competent to apply the NCP. As a result of this pilot research, changes have been made to first-year teaching workshops within the dietetic training program on all aspects of the NCP including, nutrition diagnosis (and how signs and symptoms must relate to the diagnosis) in addition to changes made to how the NCP is taught within clinics themselves during year two. In the first year of the Master's program, students now spend additional time working through a larger variety of cases discussing and applying the NCP. In their second year, for each client seen, clinic documentation for each client prompts students to consider all components of the diagnosis and how these fit within an overall nutrition consultation. In the pilot study, an NCP quality audit was not performed. However, this pilot testing has shown that ANDHII can act as a tool that could strengthen the application of the NCP. Future data collection will involve an evaluation of the documentation using the NCP audit tool (Chui et al., 2020).

Furthermore, SLD clinics need to address continuity regarding different students seen by patients at every consult, as this was a key suggested improvement. The study was based solely on one SLD clinic, which may not represent the practice in other SLD clinics around the world. Further research in this area is required to determine if these effects are seen in other SLD clinics (Tada et al., 2018). It is additionally necessary to test whether the aim of promoting independent, healthy food relationships has a lasting effect, and to this end, longitudinal studies are likely warranted.

VII CONCLUSION

This pilot is the first study that investigates satisfaction and effectiveness of independent SLD clinics. SLD clinics were found to be satisfactory and effective in aiding behavioural changes and weight loss. This study also identified how SLD clinics might improve. Although the accrual numbers are too small to allow the results to be generalisable, the results suggest that patient acceptance is favourable coupled with improved nutrition outcomes. Such findings warrant further investigation of SLD clinics in the care of patients within the community. Standardised training may be required to ensure students are competent in applying NCP, using ANDHII, and ensuring standardised documentation. The study adds to the limited research currently exploring SLD clinics, the use of ANDHII for outcomes-based research, and application of the NCP.

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