





Community-Based Nutrition Risk Screening in Older Adults (COMRISK): An Exploration of the Experience of Being Screened and Prevalence of Nutrition Risk in Alberta, Canada

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Article

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Résumé

Les objectifs de cette étude de faisabilité étaient de mesurer la prévalence du risque nutritionnel chez les personnes âgées vivant à domicile (≥ 65 ans) et d'explorer les points de vue de ces personnes sur l'acceptabilité, la valeur et l'efficacité du dépistage du risque nutritionnel dans des contextes de soins primaires et en milieu communautaire. Les résultats obtenus à l'aide du questionnaire SCREEN (Seniors in the Community : Risk Evaluation for Eating and Nutrition) en huit points ($n = 276$) ont révélé un risque nutritionnel modéré pour 50 % des participants et élevé pour 8 % d'entre eux. Les participants aux entrevues ($n = 16$) ont convenu que le dépistage est acceptable, important et porteur de valeur (thème 1). L'efficacité des entrevues était incertaine, seulement 3 des 16 répondants s'étant rappelé avoir été informés de leur état de risque nutritionnel. Dans la formulation des problèmes liés à la nutrition, le thème de la sécurité alimentaire, exprimé à la troisième personne, était dominant (thème 2). Le dépistage du risque nutritionnel et l'information sur la nutrition dans des contextes communautaires est acceptable pour les personnes âgées vivant à domicile, et médicalement nécessaire, compte tenu de la forte proportion de cette population qui présente un risque de modéré à élevé.

Abstract

The objectives of this feasibility study were to measure the prevalence of nutrition risk in community-dwelling older adults (CDOA, ages ≥ 65 years) and explore the perspectives of CDOA of the acceptability, value, and effectiveness of nutrition risk screening in primary care and community settings. Using the Seniors in the Community: Risk Evaluation for Eating and Nutrition (SCREEN)© eight-item tool ($n = 276$), results indicated that moderate and high nutrition risks affected 50 per cent and 8 per cent, respectively, of those screened. Interviewees ($n = 16$) agreed that screening is acceptable, important, and valuable (Theme One). Effectiveness was unclear, as only 3 of 16 respondents recalled being told their nutrition risk status. When articulating nutrition-related issues, a food security theme, expressed in the third person, was prominent (Theme Two). Screening for nutrition risk and receiving nutrition information in community-based settings are acceptable to CDOA and medically necessary, as evidenced by the high proportion of CDOA at moderate-high nutrition risk.

Introduction

Healthy eating promotes good nutrition and has numerous established benefits, including decreased risk of chronic illness and improved quality of life (Govindaraju, Sahle, McCaffrey, McNeill, & Owen, 2018; Health Canada, 2019). Chronic under- or over-nutrition and/or nutrient malassimilation can, over time, lead to suboptimal nutritional status and malnutrition, which are both associated with an increased risk of morbidity and premature mortality (Geirsdóttir, Hertz, Santy-Tomlinson, Johansen, & Bell, 2021). In Canada, over 60 per cent of adults ages ≥ 65 years admitted to the hospital are malnourished, which augments hospital treatment costs due to increased length of stay (Curtis et al., 2017) and suggests that interventions undertaken in primary care could alleviate this issue. The identification of factors associated with increased risk of malnutrition, such as dysphagia and poor appetite, is an essential first step in

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prevention (Borkent *et al.*, 2020). Such factors have been conceptualized as upstream contributors to general nutrition risk (Chan *et al.*, 2021; Keller, Goy, & Kane, 2005).

In Canada, between 34 and 70 per cent of community-dwelling older adults (CDOA) are at high nutrition risk (Borkent, Keller, Wham, Wijers, & de van der Schueren, 2020; Ramage-Morin, Gilmour, & Rotermann, 2017), yet close to 100 per cent of older adults hope to live independently at home as they age (National Institute on Aging, 2020; Statistics Canada, 2022b). Nearly 20 per cent of the Canadian population (Statistics Canada, 2022b) and approximately 16 per cent of the Albertan population (Government of Alberta, 2022) are over 65 years of age. Malnutrition can impact independence through, for example, loss of muscle mass and subsequent decreased functional ability (Saunders & Smith, 2010). Early identification of nutrition risk in CDOA is prerequisite to preventing malnutrition, reducing health care costs, and increasing independence and quality of life in this population.

The Community-based Screening for Nutrition Risk in Older Albertans (COMRISK) initiative was developed to address the lack of consistent nutrition risk screening of CDOA in Alberta. As recommended by the authors of the Malnutrition Symposium and Workshop study (Chan *et al.*, 2021), pre-existing initiatives and partnerships were utilized, including a community-based organization, two primary care networks (PCNs), Alberta Health Services (AHS) Nutrition and Food Services, AHS Diabetes, Obesity and Nutrition Strategic Clinical Network™ (DON SCN™) and researchers from University of Alberta. AHS Nutrition and Food Services leads development and implementation of policy and practices for all nutrition-related activities in Alberta. In addition, registered dietitian (RD) referral services for this study were provided by AHS. The mandate of the DON SCN™ is to catalyze health care innovation and improvements in patient care related to diabetes, obesity, and nutrition (Sargious, O'Connell, & Chan, 2019).

An evaluation plan to assess the feasibility of nutrition risk screening in primary care and community-based organizations, that would include feedback from all the participating organizations, including leadership, dietitians, and screeners, was co-developed by the stakeholders (Geary *et al.*, 2023). The parties, which included a client representative, agreed that incorporating the patient perspective into the evaluation was important. Thus, the purpose of this study was twofold. First, we evaluated and compared nutrition risk in CDOA, who were clients of either a community-based organization (CBO) or a provider of primary health care. Second, we aimed to assess the acceptability and effectiveness of screening as perceived by recently screened older adults. Previous studies report that screening is acceptable to older adults, but many refute the screening results (Hamirudin *et al.*, 2016; Reimer, Keller, & Tindale, 2012). In this regard, the current study contributes to filling a gap in existing exploratory and evaluative research. Feasibility from screener and organizational perspectives is addressed in another article (Geary *et al.*, 2023).

Methods

Study Overview

This multiple-methods report of nutrition risk prevalence and patient perspectives is part of a comprehensive feasibility study of nutrition risk screening in community settings. Using the RE-AIM framework (Glasgow, McKay, Piette, & Reynolds, 2001) for guidance, the evaluation team presented a list of potential outcome measures to the initiative partners, who then selected items based

on their ability to provide the data and their usefulness to the organizations. Multiple methods, including use of the screening data, surveys of screeners and organizational leadership, and patient interviews, were incorporated into the evaluation plan. Measuring prevalence within the target population is important to demonstrate that screening is appropriate while feedback from those screened can help demonstrate its value. The feasibility of implementing screening from the organizational perspective is addressed in a separate article (Geary *et al.*, 2023).

Ethics

The study was conducted in accordance with the Declaration of Helsinki. Ethics approval was obtained from the Research Ethics Board at the University of Alberta for this study, entitled “Community-based screening for nutrition risk in older Albertans: pilot study” (Pro00108949). Screening was provided as part of usual care of the participating organizations. Interviewed CDOA provided oral consent, which was documented by the study coordinator. The participating organizations provided operational approval to provide de-identified nutrition risk screening data to the researchers.

Study Population, Inclusion, and Exclusion

CDOA (≥ 65 years) who were living independently (*i.e.*, in a private residence) and were clients of the Golden Circle Senior Resource Centre (GCC), the Red Deer Primary Care Network (RDPCN), or the Peaks to Prairies Primary Care Network (P2PPCN) were invited to be screened for nutrition risk between June and November 2021. GCC and RDPCN serve the city of Red Deer (population 104,392 in 2021) and surrounding county (population 21,384 in 2021). The P2PPCN serves the towns of Olds (population 9,577 in 2021) and Sundre (population 2,616 in 2021) and surrounding rural areas (Government of Alberta, *n.d.*). The GCC provides supports and resources to older adults, including outreach and needs assessment such as a home safety audit, psychosocial support, and ability to perform activities of daily living. The SCREEN-8 questions were embedded in the assessment form, and all clients requesting an assessment during the pilot time frame were screened for nutrition risk. PCNs in Alberta serve as the medical home and provide physician and allied health services. Doctors and their staff can decide what optional screening to provide their patients. Screening was provided to clients booking appointments with participating screeners during the study period. In addition, the RDPCN conducted telephone visits during the coronavirus disease (COVID-19) pandemic as an add-on to the Alberta Screening and Prevention Program of adults 65–74 years of age.

Screening Tool and Resources

The screening tool and nutrition care pathway used for the COMRISK initiative were based on those developed by The Canadian Malnutrition Task Force (CMTF), a standing committee of the Canadian Nutrition Society (CNS) and the Primary Care Dietitians' Association. This evidence-based Primary & Community Care Malnutrition Toolkit (H. Keller, Donnelly, Laur, Goharian, & Nasser, 2022) is intended for use by primary care providers. For COMRISK, it was modified according to each site's specific circumstances, for example, resources available in the community. The screening tool chosen was the Seniors in the Community: Risk

Evaluation for Eating and Nutrition (SCREEN)[®], which was recommended by the CMTF and, importantly, can be administered by allied health and community workers and is validated for both in-person and telephone administration (Keller et al., 2005). The abbreviated eight-item SCREEN[®] version (SCREEN-8) was selected to limit the time required for screening (Keller et al., 2005). All SCREEN[®] tools and guidance on their use are available on the Older Adult Nutrition SCREENing website: <https://olderadultnutritionscreening.com>.

The SCREEN-8 sums responses on eight items, resulting in a risk score that corresponds with a particular risk category (i.e., high [scores 0–37] and low [scores 38–48]). The eight screening items include queries regarding weight change, skipping meals, appetite, difficulty swallowing, vegetable and fruit intake, fluid intake, eating with others, and meal preparation. Alternative risk categories (i.e., high [scores 0–21, HNR], moderate [scores 22–37, MNR], and low [scores 38–48, LNR]) can be used to increase the probability that those most at risk will have preferred access to specialized services post-screening (e.g., RD), particularly when such services may be limited, for example, a community setting (Keller et al., 2005). For the purposes of this study, the “moderate” risk category was deemed essential to identifying those individuals who could benefit from specific resources and services to prevent progression to higher risk. At the screener’s discretion, referral to an RD was also possible for those at MNR.

With permission (H. Keller, personal communication), the SCREEN-8 was modified to suit the needs of the organizations involved in COMRISK. Two items were added: Item #9 was obtained from the Poverty: A Clinical Tool for Primary Care Providers (AB) tool (Centre for Effective Practice, 2016), which has been adopted by the Alberta College of Family Physicians to assess financial strain (as a possible indicator of food insecurity), and item #10 was obtained from the SCREEN-14 item that queries difficulty procuring groceries. These items were not included in the SCREEN-8 scoring but were used to help identify sources of risk relevant to the catchment populations. Response options for each item were clarified (i.e., additional detail about each response was provided to facilitate a valid response selection), and a section for screeners to record provision of resources and referrals was added (Supplemental Figure 1).

Based on the Primary Care Nutrition Pathway for Adults Aged 65+ (Keller et al., 2022), and to enhance feasibility of the screener providing appropriate resources, AHS created a Nutrition Care Pathway Algorithm (NCP) – Desk Reference. The NCP was developed to assist screeners administering the SCREEN-8 in determining what resources and/or services to provide to individuals identified as *at nutritional risk*. Frontline personnel (e.g., nurses, community workers) were trained by an AHS Population and Public Health RD on SCREEN-8 administration and use of the NCP.

Nutrition Risk Screening Analysis

Study data were collected and managed, using Research Electronic Data Capture (REDCap) tools hosted at the University of Alberta (Harris et al., 2009, 2019). REDCap is a secure, web-based software platform designed to support data capture for research studies, providing (a) an intuitive interface for validated data capture, (b) audit trails for tracking data manipulation and export procedures, (c) automated export procedures for seamless data downloads to common statistical packages, and (d) procedures for data

integration and interoperability with external sources. Trained research assistants entered and audited SCREEN-8 data.

Data were analysed using GraphPad Prism (version 9.4) or SPSS (version 26 for MacIntosh). Means \pm SD were calculated for ordinal and scale items, and frequency was calculated for nominal data. The total risk score was determined by the summation of the weight associated with selected responses for each SCREEN-8 item. Nutrition risk was stratified as high (HNR; total risk scores 0–21), moderate (MNR; total risk scores 22–37), or low (LNR; total risk scores 38–48). The SCREEN-8 missing data that did not contribute to the risk score (i.e., items #9 and #10) were analysed separately. One-way analysis of variance (ANOVA) with Bonferroni post hoc analysis was conducted to determine whether group differences were significant based on risk category or screening location to take into account the nested design. Data expressed as proportions were compared using the χ^2 test. Differences with $p \leq 0.05$ were considered statistically significant.

Interview Recruitment Procedures

After completion of the SCREEN-8, clients were verbally informed of their nutrition risk, using a defined script (Table 1). Following determination and provision of appropriate supports, resources, and referrals, screeners offered clients an opportunity to participate in telephone interviews to assess screening feasibility from their perspectives. Contact information for clients who agreed to be interviewed was sent to the study coordinator via encrypted e-mail. Interested participants were phoned approximately 2 months post-screening. Initial interviews ($n = 7$) revealed clients were having difficulty recalling the screening appointment, therefore telephone interviews were made sooner (i.e., within 4 weeks) ($n = 9$). Participants were read the COMRISK Informed Consent and Information Letter; those who provided verbal consent were booked for a one-on-one telephone interview. Recruitment stopped when data saturation from the interviews was reached (i.e., later interviews provided no new information) for all question codes (except for service referral and experience), as is appropriate for qualitative research (Hennink & Kaiser, 2022). Data saturation for services provided (e.g., by a registered dietitian) was not sought in view of low referral and/or acceptance of referrals post-screening. All interviewed participants were compensated with a \$20 gift card for a grocery store of their choice. Completed SCREEN-8s were de-identified before being provided to the study coordinator.

Interview Content

A script was developed to guide the semi-structured interviews and included modifications as per feedback obtained from two pilot

Table 1. Scripts used to inform clients of their nutrition risk

Risk	Script Used to Inform Client
Low	<i>Based on your answers today, you are at low nutrition risk. We can review some resources based on your responses and any questions you may have.</i>
Moderate	<i>Based on your answers today, you may benefit from some resources that can address your specific risk factors and help prevent malnutrition.</i>
High	<i>Based on your answers today, you would benefit from a referral to a dietitian to discuss your eating habits. I can also share some resources and services available to you.</i>

tests by RF of two volunteers (age ≥ 65 years) external to the study. The script was modified after each pilot, based on feedback from the volunteers and the interviewer. Participants were asked about what they were told about their nutrition status, their experience of being screened (either in person or via telephone), any referrals and related experiences, any education or other resources received and their reaction to and use of those, barriers to uptake of referrals, resources or services, and any change in eating habits as a result of being screened. Additionally, three Likert scale questions were added to the script to quantify older adult thoughts on the acceptability of being screened (phrased as “being asked questions about eating habits and nutrition when seeing your health care team”) and the usefulness of any resources and/or services provided post-screening. A scale of 1–10 was used, with “10” indicating screening was highly acceptable and resources and/or referrals were extremely useful. The interview script is provided in Supplemental Table 1. Demographic data (i.e., age and sex) were collected during the interviews. Participants were not informed of their nutrition risk category during the interview.

Interviews with Participants

To collect participant thoughts and experiences in an iterative process (DeJonckheere & Vaughn, 2019), a semi-structured one-on-one telephone interview was conducted with each consented participant. The interviewer (RF) was a registered dietitian who had no prior relationship with the interviewees and did not work in any of the sites involved in this study. The risk score was unknown to the interviewer at the time of the interview. The interviews, all of which occurred between September and December 2021, ranged in duration from 10–45 minutes and were recorded in duplicate. The interviewer performed reflection and memoing immediately following the interview. This consisted of notes regarding details, learnings, and ideas generated during the interview (DeJonckheere & Vaughn, 2019). As they were received, recordings were transcribed verbatim via professional transcription services, then de-identified to protect participant privacy, and audited by the study coordinator to ensure accuracy.

Analysis of Interview Transcripts

The Braun and Clarke 6-phase framework (Braun & Clarke, 2006) was used to facilitate thematic analysis of each interview, which was conducted by a single researcher. Data were organized and analysed using MAXQDA2020 software (www.maxqda.com). After Phase I (i.e., data familiarization), a deductive approach was used to assign codes to each of the nine main interview questions. Coding was a dynamic process and evolved as each new analysed interview revealed new data, thereby triggering the development of new codes. Next, an inductive approach was used to generate additional codes based on recurring or novel phrases and topics. Finally, a broad analysis of all codes generated potential themes, and within each theme relevant coded data were collated. Potential themes were then reviewed by the interviewer, and one other member of the research team, and revised, and codes were reassigned if further analysis revealed a more appropriate fit with an alternative theme. Using VENNGAGE online visualization tools (www.venngage.com), a Phase 3 and Phase 4 Thematic Map was created to facilitate theme review and revision and final assessment via comparison to the full data set. The essential meaning of each theme was determined within and between themes, and

comprehensive theme labels were finalized (Phase 5). Interpretation of the results was discussed with other members of the research team, including a client ambassador, prior to finalizing themes.

Cross-referencing was conducted to compare participant recall of resources, referrals, and appointment efficacy versus corresponding information recorded on the SCREEN-8 document. This was done to ensure findings were based on clients' recall of screening appointment outcomes and not on referrals made and appointments attended due to unrelated health care visits. These analyses were completed as the transcripts were received so that data saturation could be assessed.

Results

Prevalence of Nutrition Risk and Comparison of SCREEN-8 Scores in Selected Subgroups

Overall, nutrition risk was categorized as HNR 8 per cent ($n = 23$), MNR 50 per cent ($n = 138$), and LNR 42 per cent ($n = 115$) for 276 clients screened (Table 2). Table 2 also presents SCREEN-8 individual items and total score stratified by risk category for all screened participants. Significant differences were found between all groups for all items, except for fluid intake.

Table 3 shows that SCREEN-8 individual items and total score differed by location. The mean SCREEN-8 total score for GCC clients was significantly lower (i.e., higher nutrition risk) than those from RDPCN. For GCC clients, lower scores were driven by more dramatic weight change, poorer appetite, and more swallowing difficulties compared with RDPCN. In addition, GCC participants reported eating with others less often compared to either PCN. P2PPCN participants reported less vegetable and fruit intake compared to RDPCN and less fluid intake compared to participants from both the GCC and the RDPCN.

Recruitment and Description of Interviewed Participants

Summarized in Figure 1, a total of 276 CDOA were screened for nutrition risk and, ultimately, 16 participated in a one-on-one telephone interview, resulting in qualitative data saturation. Demographic data collected during the interviews (Table 4) described the sample of interviewees as age 74 ± 6 years (range 66–88 years) and 69 per cent female. The mean SCREEN-8 nutrition risk score was 34 ± 6 (score range 23–43), with 9 (56%) at MNR and 7 (44%) at LNR. None were HNR. No significant differences emerged between individual item scores, total SCREEN-8 scores, or risk category between the overall and interviewed groups (not shown). No HNR participants volunteered to be interviewed, although they constituted 8 per cent ($n = 23$) of those screened. As shown in Table 3, overall participant response ($n = 266$) to item #9 (difficulty making ends meet at the end of the month) revealed that 18 per cent ($n = 49$) may be at risk for financial strain. Participant response ($n = 269$) to item #10 (difficulty getting groceries) indicated that 12 per cent ($n = 33$) sometimes, often, or almost always had difficulty getting groceries. For both items, people at HNR were 8- to 10-fold more likely to report financial strain and difficulty getting groceries. The interviewed subgroup had a similar proportion of participants having financial difficulties (19%) but reported “rarely” or “never” having difficulty getting groceries (Supplemental Table 2).

Mode of screening (i.e., in person or telephone) could not consistently be determined because some participants had

Table 2. Demographics, nutrition risk, and mode and recall of screening appointment.

Interview ID	Age (years)	Sex (m/f)	Risk Score ¹	Risk Category	Mode of Screening Appointment	Appointment Recalled ²
INTVrd-02	74	m	33	moderate	in-person	yes
INTVrd-03	88	f	23	moderate	unknown	no
INTVrd-04	75	m	39	low	phone	yes
INTVrd-05	69	m	38	low	unknown	no
INTVrd-06	83	f	39	low	unknown	no
INTVrd-07	66	f	26	moderate	unknown	no
INTVrd-10	71	f	29	moderate	phone	yes
INTVrd-11	68	f	30	moderate	phone	yes
INTVrd-12	69	f	39	low	phone	yes
INTVrd-13	71	m	32	moderate	phone	yes
INTVrd-14	68	m	31	moderate	in-person	yes
INTVgc-15	74	f	39	low	unknown	no
INTVgc-16	83	f	38	low	in-person	yes
INTVpp-17	69	f	43	low	in-person	yes
INTVgc-18	79	f	32	moderate	unknown	no
INTVgc-19	76	f	34	moderate	in-person	yes
Mean ± SD or Percent	74 ± 6	69% female	34 ± 6	56% moderate	-	62% recall

¹Risk category scores: high risk 0 – 21, moderate risk 22 – 37, low risk 38 – 48.

²The term “unknown” indicates the participant could not recall the mode of screening.

Table 3. SCREEN-8 individual items and total score stratified by risk category

Item (Maximum Score)	Total (n = 276)	High Risk (n = 23)	Moderate Risk (n = 138)	Low Risk (n = 115)	p*
1. Weight change (8)	5.1 ± 3.5	0.9 ± 2.3 ^a	4.3 ± 3.5 ^b	6.9 ± 2.4 ^c	0.00
2. Skipping meals (8)	5.3 ± 3.3	1.7 ± 2.6 ^a	4.0 ± 3.3 ^b	7.6 ± 1.5 ^c	0.00
3. Appetite (8)	5.7 ± 2.0	2.7 ± 2.5 ^a	5.5 ± 1.7 ^b	6.6 ± 1.3 ^c	0.00
4. Swallowing difficulties (8)	6.9 ± 2.1	5.0 ± 3.0 ^a	6.6 ± 2.4 ^b	7.6 ± 1.1 ^c	0.00
5. Veg./fruit intake (4)	2.2 ± 1.3	1.0 ± 1.2 ^a	1.9 ± 1.2 ^b	2.8 ± 1.1 ^c	0.00
6. Fluid intake (4)	3.2 ± 0.8	3.4 ± 0.8 ^a	3.1 ± 1.0 ^a	3.3 ± 0.7 ^a	0.13
7. Eating with others (4)	2.6 ± 1.8	0.7 ± 1.3 ^a	2.4 ± 1.8 ^b	3.2 ± 1.5 ^c	0.00
8. Meal preparation (4)	2.8 ± 1.6	1.7 ± 1.9 ^a	2.4 ± 1.6 ^b	3.5 ± 1.1 ^c	0.00
Total score (maximum 48)	33.9 ± 8.2	17.1 ± 2.7 ^a	30.3 ± 4.4 ^b	41.5 ± 2.6 ^c	0.00

Mean ± SD; lower score indicates potential for higher nutrition risk. Scoring range: HNR 0-21, MNR 22-37, LNR 38-48. For a description of each item, refer to the www.olderadultnutritionscreening.com website.

*Mean differences compared via one-way ANOVA with Bonferroni post hoc analysis. Within rows, different superscripts (a, b, c) are significantly different ($p \leq 0.05$).

difficulty remembering the screening appointment, and the mode of screening appointment was not always noted on the screening form. Of those who did recall being screened ($n = 10$), equal numbers were conducted on the telephone and in person. In some cases, participants were adamant that they did recall the screening experience, but statements made during the interview indicated this was not accurate.

Acceptability of Being Screened for Nutrition Risk from the CDOA Perspective

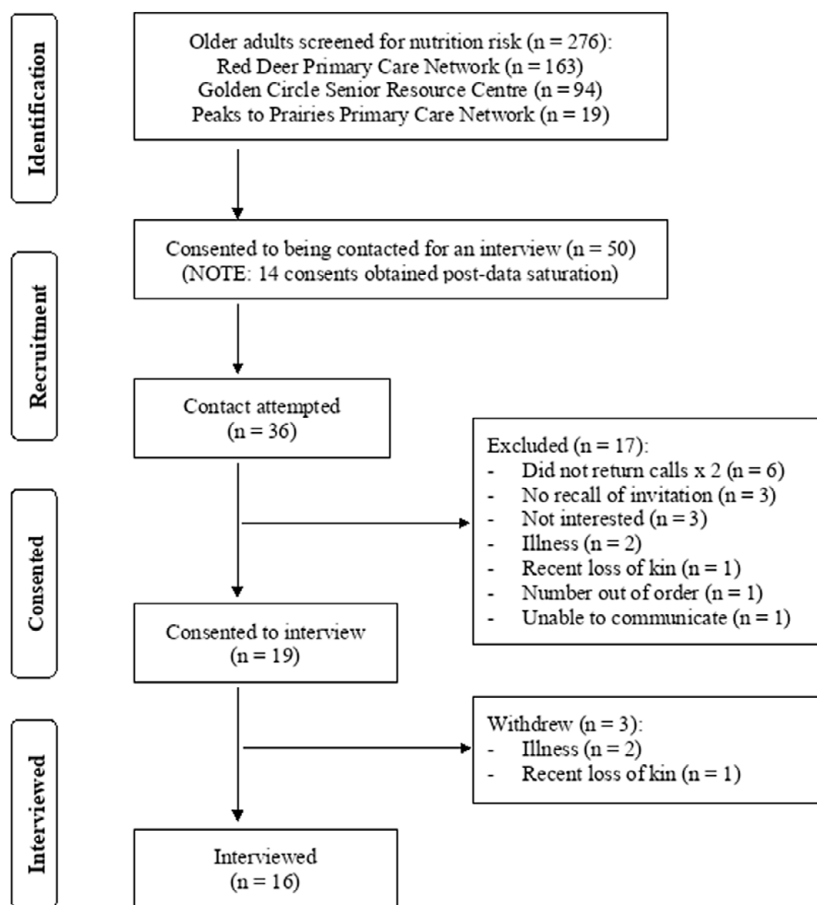
Two main themes emerged from the qualitative analysis of the 16 interviews and related SCREEN-8 resource/referral data: (a) discussing nutrition is important and valuable and (b) preference to talk about nutrition problems from the third-

person point of view. The full data set is provided in Supplemental Table 3.

Theme 1: Discussing nutrition is important and valuable, but communicating nutrition risk lacks impetus

This theme captures the significance that the interviewed CDOA placed on health as a function of nutrition, making it valuable and relevant to discuss during health care appointments. While none of the respondents recalled being told their nutrition risk status, they indicated that being asked about eating habits and nutrition reportedly increased awareness about the importance of nutrition:

So, it's a good wake up to saying you should maybe be looking at this or even be a little concerned about some of the things or choices that you're



Modified from: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-analyses: The PRISMA Statement PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097

Figure 1. Flow diagram of participant recruitment.

Table 4. SCREEN-8 individual items and total score stratified by location

Item (Maximum Score)	Total (n = 276)	GCC (n = 94)	P2PPCN (n = 19)	RDPCN (n = 163)	p*
1. Weight change (8)	5.1 ± 3.5	4.4 ± 3.6 ^a	5.9 ± 3.4 ^{a,b}	5.4 ± 3.3 ^b	0.04
2. Skipping meals (8)	5.3 ± 3.3	4.9 ± 3.3	5.2 ± 3.1	5.6 ± 3.3	0.32
3. Appetite (8)	5.7 ± 2.0	5.3 ± 2.3 ^a	5.6 ± 1.3 ^{a,b}	6.0 ± 1.8 ^b	0.01
4. Swallowing difficulties (8)	6.9 ± 2.1	6.4 ± 2.3 ^a	7.2 ± 1.5 ^{a,b}	7.1 ± 2.1 ^b	0.04
5. Veg./fruit intake (4)	2.2 ± 1.3	2.0 ± 1.3 ^{a,b}	1.5 ± 1.2 ^a	2.4 ± 1.2 ^b	0.01
6. Fluid intake (4)	3.2 ± 0.8	3.4 ± 0.8 ^b	2.6 ± 0.9 ^a	3.2 ± 0.8 ^b	0.00
7. Eating with others (4)	2.6 ± 1.8	1.8 ± 1.8 ^a	2.8 ± 1.6 ^b	3.0 ± 1.6 ^b	0.00
8. Meal preparation (4)	2.8 ± 1.6	2.6 ± 1.5	2.3 ± 1.8	3.0 ± 1.6	0.10
Total score (maximum 48)	33.9 ± 8.2	30.8 ± 9.2 ^a	33.1 ± 7.6 ^{a,b}	35.7 ± 7.1 ^b	0.00

Mean ± SD: lower score indicates potential for higher nutrition risk. Scoring range: HNR 0-21, MNR 22-37, LNR 38-48. For a description of each item, refer to the www.olderadultnutritionscreening.com website.

*Mean differences compared via one-way ANOVA with Bonferroni post hoc analysis. Within rows, different superscript letters indicate differences ($p \leq 0.05$).

making ... To be asked questions, it wakes you up to the fact that you have a responsibility, too, to yourself. (INTVrdpcn-10)

I think it just calls to mind that we sometimes don't follow the food guidelines when we get older. It's easier to just have some toast or whatever. So, it makes you think more of what you should be eating. (INTVgcc-19)

Several individuals expressed appreciation for being screened, for example: *No problem at all. I don't mind when it comes to stuff like this, I want to be informed and find out what I could do going forward* (INTVrdpcn-04). Nutrition was understood to impact health and thus longevity, and participants expressed a belief that they could in this way have some control over their lifespan: *I think*

it should be on the minds of people my age and older. Yeah. It's, each day that you have you should do what you can to make sure that you're around the next day (INTVrdpcn-04).

Attention to nutritional status, similar to general monitoring of health in a primary care setting, was desired: *It's important to have them tell you if there was anything lacking ... Because the older person can slip up with memory and maybe not be eating ...* (INTVrdpcn-06). *It was quite informative ... she [the screener] seemed quite interested in my health and well-being, so I found it [the screening process] quite good* (INTVrdpcn-14).

While not recalling nutrition risk status, one participant who had been referred to a dietitian said:

I had a voice consult ... on how to gain weight ... It gave me a guideline to the foods ... it's just made that awareness of hey, wait. What you're going to put in your mouth – is it good for you? Does it have any value? ... That information has definitely helped me get on track. (INTVrdpcn-02)

The other contributed:

I did speak with the dietitian ... I had a good talk with her. She said it's good to know that even before she was able to call me, that I had done something ... she was going to send me the information she said you might be receiving in like other avenues that I could explore, online courses available, new activities and that sort thing that you could look at. (INTVrdpcn-10)

Thus, while specific interventions may have been effective, the language or the oral method used to convey nutrition risk (see Table 1) was not internalized.

Theme 2: Addressing nutrition problems in the third person

This theme identifies nutrition issues faced by CDOA and demonstrates a tendency to use third-person language when discussing them. There was a striking difference in how participants talked about nutrition in Theme 1, using first-person language versus some of their commentary in Theme 2. In that regard, several contributions provided in the third person indicate that the cost of food contributes to nutrition problems: *I'm better off than a lot of them and they have found it really, really hard eating properly, being able to even afford to eat on a pension* (INTVrdpcn-07). Another participant said:

... a week before all the pension checks come in, they've got \$10 left in their account ... I can't really think of anybody, especially in our building here that has an issue with meals other than the fact that the price of food ... they take advantage of whatever the Safeway first Tuesday deal is. (INTVrdpcn-13)

A third person talked about the price of meat as being an issue:

... a lot of elderly people do not have an income sufficient enough to be able to buy nutritious food. And quite often you see elderly people standing by the meat counter, looking at the different meats. And quite often they have to select very cheap cuts of meat, liver, or something like that they can afford ...” (INTVrdpcn-14). Finally, one person talked about others' forgetfulness, “Because often older people forget to eat and well, especially drink, sufficient fluids and then that precipitates other problems. (INTVgcc-18)

Acceptability of Being Screened and Resource Usefulness

Of the 16 interviewed participants, 15 were asked to rate three items on a scale from 1–10 (1 = “perceived not to be,” and 10 = “perceived

to be, acceptable, or useful/helpful”): being screened is acceptable (even those who did not remember being screened were asked this question), resources provided were useful, and services accessed were helpful. Participants indicated being screened for nutrition risk (phrased as “being asked questions about eating habits and nutrition when seeing your health care team”) was very acceptable: 9.6 ± 0.8 (mean \pm SD, range 8–10). Usefulness of resources could not be assessed since no participants were able to accurately recall resources that were provided. The two participants who received services, in both cases RD appointments, rated the appointment as very helpful (9.0 ± 1.4 ; range 8–10).

Discussion

This study, which focused on the feasibility of nutrition risk screening from the client perspective, indicates that risk is highly prevalent in the cohort sampled, and that nutrition risk screening of CDOA is acceptable to clients – although none recalled being told their nutrition risk, pointing to a need for more effective communication of this concept. Participants reported that being screened for nutrition risk in primary care or community organization settings increased awareness about the importance of nutrition. They also linked nutritional issues to the cost of food but seemingly preferred to talk about nutrition issues in the third person. Identification of MNR and HNR in CDOA is prerequisite to the provision of services and resources that have the potential to prevent and treat malnutrition, which might otherwise result in significant personal and societal costs.

Screening for nutrition risk in CDOA provides an opportunity to intervene early by identifying factors known to contribute to the onset and/or progression of malnutrition. The high prevalence of nutrition risk reported here (i.e., 50% MNR, 8% HNR) is comparable to other studies in Canada and adds to the existing pool of evidence that a need for screening exists (Allard et al., 2016a; Borkent, Keller, et al., 2020; Ramage-Morin et al., 2017). There is significant value in identifying those at MNR, as that risk might otherwise go unnoticed by both the health care system and the at-risk individual, and addressing its underlying causes may increase the likelihood of long-term independent living. Malnutrition at hospital admission has been associated with a prolonged length of stay (Allard et al., 2015, 2016b); decreased nutrition risk may lead to lower incidence of malnutrition and thereby decrease health care spending. Based on current Canadian population growth patterns, the National Institute on Aging predicts publicly funded supportive care spending will at least triple in the next 30 years (MacDonald, Wolfson, & Hirdes, 2019). Nutrition risk screening could be a strategy to support healthy aging, if executed strategically.

Two overarching themes emerged from the interview data and the resources and referrals section of the SCREEN-8. The first theme, discussing nutrition is important and valuable but communicating nutrition risk lacks impetus, was evident in every telephone interview conducted with CDOA. Nutrition was unanimously considered essential to health as well as a valuable element of discussion during health care appointments. Similar to results from the Bringing Nutrition Screening to Seniors in Canada study (Keller, Haresign, & Brockest, 2007) that used an earlier version of the SCREEN tool, interviewees in the current study reported a higher level of nutrition awareness after being screened. Some of the interviewed CDOA indicated that the screening and interview process increased their focus on personal nutrition

similar to the sentiment that screening provides an opportunity for learning (Bullock, Greenley, Patterson, McKenzie, & Johnson, 2021). Such observations were not related to risk score, suggesting that screening might benefit LNR older adults simply by the topic being brought to their attention, and not necessarily due to any other intervention component. This finding may also be reflected in a recent study of older adults that reported accessing nutrition counselling services doubled after being screened for risk, despite not receiving information about personal nutrition risk status (Capicio et al., 2022). Our findings that nutrition risk screening is acceptable and raises awareness are also consistent with a recent systematic review of patient perceptions of nutrition risk screening, although seven of nine studies included in the review were focused on either in-patient or specific outpatient populations (Bullock et al., 2021).

Tactful, effective communication regarding areas identified as contributing to nutrition risk to the screened individual is a fundamental aspect of the screening process. Communicating risk to older adults provides opportunity to emphasize the importance of nutrition, highlight sound dietary behaviours, and provide support (i.e., resources, referrals), based on screening results (Canadian Malnutrition Task Force and Canadian Nutrition Society, n.d.; Laur & Keller, 2017). Training tools exist to assist with administration of the SCREEN and for communicating the results (Keller, n.d.). Screener guidance for communicating nutrition risk to screened individuals was provided via inclusion of a brief script on the SCREEN-8, and training was delivered on how to use the NCP to select appropriate resources/services based on screening results. Verbal delivery of nutrition risk appeared to be relatively ineffective, as none of the participants interviewed could recall being told. However, mailing letters with a similar nutrition risk message and individualized guidance based on the underlying factors precipitating risk were poorly understood by recipients (Reimer et al., 2012). Few of the CDOA interviewed recalled having been provided with the resources recommended by the NCP, although this was hard to confirm in view of difficulties with recall. During stakeholder meetings, it was mentioned that screeners were providing handouts during the appointments but not recording them on the form due to lack of time. Informing older adults about which items/areas contribute to their nutrition risk and informing them about following the NCP recommendations are important components of screening for nutrition risk; screeners may require additional training and more time for screening and follow-up. We are conducting follow-up work to determine more effective ways of communicating nutrition risk to clients.

The second theme, addressing nutrition problems in the third person, encompassed two sub-themes, the cost of nutritious food being identified by participants while the transcripts also revealed a shift in voice from first person (when talking about being screened) to third person when talking about challenges to maintaining good nutrition. During 2021, when this study was conducted, food security in Alberta was the highest in Canada at 20.3 per cent of households (Tarasuk, Li, & Fafard St-Germain, 2022), which may have been reflected by our participants. Interviewed CDOA often referred to nutrition problems, for example, the affordability of nutritious foods, as though the problems belonged to people other than themselves and appeared to rationalize that their nutrition was better than many other CDOA. This language pattern may reflect their perception that such problems are common amongst their peers. A similar trend was reported in a study to investigate the experience of being informed of nutrition risk. When older adults were informed of their nutrition risk and, consequently,

were required to talk in the first person, numerous attempts were made to negate the validity of the screening tool, for example, claiming that the items had not been accurately responded to (Reimer et al., 2012). This tendency to deflect nutrition risk may stem from negative connotations associated with malnutrition, including poverty or lack of self-care and being ashamed or afraid to admit to suboptimal nutritional intake for fear of losing independence. A recent study investigating opportunities to combat nutrition risk in CDOA included participant views that corroborate this hypothesis, such as: *... guilt—pretending to my family that everything is all right. The last thing I need is my family to know is that I am potentially in trouble* (Chan et al., 2021). A systematic review noted that common reactions to nutrition risk screening are disbelief, disappointment, and offence (Bullock et al., 2021). Such negative interpretations of nutrition risk and the potential for optimistic bias (Miles & Scaife, 2003) should be considered when screening CDOA for nutrition risk and subsequent discussion of their screening results.

Referral to an RD was provided to two interviewed participants with MNR, and both indicated the appointment was helpful. For one participant, the screening increased awareness and motivated action directed towards improving nutritional status even before the RD appointment. In this regard, the RD appointment functioned as a source of support by acknowledging recent nutritional improvements, which was appreciated by the older adult. The other participant, who had recently experienced significant weight loss, reported that the appointment and resources provided by the RD were extremely beneficial, as evidenced by some much needed weight regain. According to the pathway followed, most clients at MNR will not require an RD consult but will benefit from community resources and services. Further analysis of referrals in this study is reported elsewhere (Geary et al., 2023).

This study revealed that screening for nutrition risk in a variety of community settings might be particularly important, as indicated by a higher nutrition risk in those attending the CBO. Factors that significantly contributed to this difference included a more dramatic weight change, poorer appetite, more swallowing difficulties, and eating alone more often. Poorer appetite (Malafarina, Uriz-Otano, Gil-Guerrero, & Iniesta, 2013), swallowing difficulties (Sura, Madhavan, Carnaby, & Crary, 2012), and isolation (Gilmour & Ramage-Morin, 2020) are more prevalent with advancing age. Many of the services provided by the GCC cater to these issues (<https://www.goldencircle.ca>). For example, community dining options may be particularly valuable for those eating alone due to loss of a loved one, falls prevention programs are beneficial for those with advancing frailty, and assistance with grocery procurement is an important benefit for those having difficulty with transportation. Demographic data, however, were not collected for at the time of screening, and therefore the contribution of age to the nutrition risk of GCC participants cannot be confirmed. The services provided by CBOs can improve the self-reported health of clients (Stevens et al., 2021), and increasing the partnership and cooperation between health care and community-based organizations could improve access to a broader spectrum of services and resources, depending on client preferences (Bruce, Jordan, & Halseth, 1999; Employment and Social Development Canada, 2019; Plumb, Carson Weinstein, Brawer, & Scott, 2012).

Nutrition risk screening outcomes were also different between urban and rural settings. P2PPCN provides services to residents living in two small towns, with older adults making up 22–24 per cent of the population (Statistics Canada, 2022a). GCC and the RDPCN cater to a more urban population consisting of only 12 per

cent older adults (Statistics Canada, 2022a). Vegetable and fruit intake was lowest for the P2PPCN participants. The prevalence of low income in adults ≥ 65 years of age is 7.5, 11.7, and 8.2 per cent, in Olds, Sundre, and Red Deer, respectively (Statistics Canada, 2022a), and therefore differences in income cannot be directly related to the variability noted. However, the decreased availability and increased cost of vegetables and fruit common in rural communities may have been contributing factors (Hardin-Fanning & Rayens, 2014; Sharkey, Johnson, & Dean, 2010). Regardless of what factors contribute most to increasing the nutrition risk of CDOA, it is apparent that screening in different types of community and primary care organizations, and rural and urban locations, is needed to ensure malnutrition prevention and risk identification occur equitably.

A strength of this pilot study is that SCREEN-8 was collected under conditions normally employed by the CBO or the PCNs, suggesting feasibility of implementation. The evaluation framework, including interviews of participants, was co-developed by the stakeholders in the partnership, increasing the relevance of findings to them. Findings of the current report are limited by data collection strategies, recall bias, and selection bias. Selection bias could not be objectively assessed because of limited demographic data; however, we acknowledge that people who consent to be interviewed are unlikely to represent the full spectrum of those screened. Interviewed CDOA may have differed from those who did not agree to be interviewed (e.g., none had high nutrition risk). On the other hand, in Canada, primary health care is provided to all residents, which increases accessibility to screening. Specificity of responses to certain questions was limited by poor recall of the screening event; thus, reducing the amount of time between screening appointments and the consent telephone call and/or interview is recommended. Also, the question about acceptability was combined with usefulness, which may have conflated responses. Particularly for CDOA, having multiple appointments, seeing multiple health care providers, and cognitive impairment may all hamper accurate recall. Thematic analysis conducted by at least two researchers is recommended in all qualitative analysis guidelines, and therefore analysis by only one researcher is a limitation. Qualitative findings presented in this report need to be interpreted with caution, but themes such as deflection of nutrition risk have been identified elsewhere (Reimer et al., 2012).

The pilot study occurred during public health pandemic interventions for COVID-19, which included social isolation and reduced health care and other services. Such public health measures may have influenced participant response to SCREEN items as well as recruitment and responses to interview questions. The impact that COVID-19 and associated public health measures had on nutrition risk status, recruitment, and interview results also cannot be overlooked. Capicio et al. conducted a study of CDOA from Alberta during 2020 and found that, compared with those at LNR, at-risk participants reported a lower intake of vegetables/fruit, protein, milk, and soy (Capicio et al., 2022) – perishable foods that may be harder to obtain during COVID-19 public health restrictions. A comparison of current findings to post-COVID-19 findings may help clarify the role of pandemic health measures in screening results and experiences of CDOA.

Overall feasibility of new processes, such as screening, in organizations depends not only on clients finding the intervention acceptable and useful, but also on factors commonly referenced in implementation science literature, such as measures from the RE-AIM framework (e.g., adoption, implementation, maintenance) that depend on its incorporation into daily workflows and

its ability to influence outcomes, that is, efficacy and cost-benefits (Pearson et al., 2020). We address feasibility from the screener and organizational perspective, as well as explore the benefits of community organization–health system partnerships in another publication (Geary et al., 2023).

The following recommendations for practice are based on our findings: (a) Screen older adults for nutrition risk in primary care and CBO settings to increase nutrition awareness; (b) develop strategies to respectfully and candidly communicate nutrition risk screening outcomes to older adults so appropriate action is taken when risk is identified; (c) follow up with individuals referred to services to determine efficacy of the referral process and services provided, and if nutrition risk status was ultimately improved; and (d) promote the resources and services available to CDOA by describing and providing strategies for accessing these supports (e.g., dietitian). Policies to promote holistic screening of older adults, for example, to include nutrition risk screening in regular client assessments for frailty and chronic diseases, could help clients prevent nutrition-related health decline and, at minimum, raise awareness of the importance of key nutrition recommendations for CDOA. Avenues for future studies include provider–client communication strategies, assessment of barriers and facilitators to sustainability of screening initiatives, and research to better appreciate the role of CBO in preventing nutrition risk in the community.

Conclusion

From the client perspective, screening for nutrition risk in the community was acceptable and increased awareness of the importance of nutrition. However, communication of nutrition risk needs to be optimized to increase its effectiveness to elicit behavioural change in clients. We also identified that talking about nutrition risk may be difficult for individuals, as evidenced by a shift to third-person language when talking about challenges such as the cost of nutritious foods. The sustainability of the screening initiative in the primary care and community organization setting is yet to be determined.

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