2-5-2014

Pancreatitis Quality of Life Instrument: Development of a New Instrument

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SAGE Open Medicine 2014 2:
DOI: 10.1177/2050312114520856

Original Article

SAGE Open Medicine

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SAGE Open Medicine
2: 2050312114520856

DOI: 10.1177/2050312114520856
smo.sagepub.com

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Abstract

Objectives: The goal of this project was to develop the first disease-specific instrument for the evaluation of quality of life in chronic pancreatitis.

Methods: Focus groups and interview sessions were conducted, with chronic pancreatitis patients, to identify items felt to impact quality of life which were subsequently formatted into a paper-and-pencil instrument. This instrument was used to conduct an online survey by an expert panel of pancreatologists to evaluate its content validity. Finally, the modified instrument was presented to patients during precognitive testing interviews to evaluate its clarity and appropriateness.

Results: In total, 10 patients were enrolled in the focus groups and interview sessions where they identified 50 items. Once redundant items were removed, the 40 remaining items were made into a paper-and-pencil instrument referred to as the Pancreatitis Quality of Life Instrument. Through the processes of content validation and precognitive testing, the number of items in the instrument was reduced to 24.

Conclusions: This marks the development of the first disease-specific instrument to evaluate quality of life in chronic pancreatitis. It includes unique features not found in generic instruments (economic factors, stigma, and spiritual factors). Although this marks a giant step forward, psychometric evaluation is still needed prior to its clinical use.

Keywords

Quality of life, chronic pancreatitis, Pancreatitis Quality of Life Instrument

Date received: 21 September 2013; accepted: 23 December 2013

Introduction

Chronic pancreatitis is a significant worldwide medical problem which can be caused by a variety of etiologies including toxins (alcohol), metabolic disorders (hyperlipidemia and hypercalcemia), and genetic disorders (cystic fibrosis, serine protease inhibitor Kazal type 1 (SPINK), and cationic trypsinogen mutations).[1] Worldwide prevalence rates vary from 3% to 20%.[2–4]

Once injury is initiated, the disease process can result in a progressive course of irreversible organ destruction leading to exocrine pancreatic insufficiency, endocrine pancreatic insufficiency, and pain.[5] In a natural history study of patients with chronic pancreatitis followed for nearly 10 years, 141 of 311 (45%) patients developed exocrine pancreatic insufficiency, 117 of 311 (38%) patients developed endocrine pancreatic insufficiency, and up to 202 of 311 (65%) patients had pain.[6] The syndrome of chronic pancreatitis pain, in conjunction with the patient's pancreatic exocrine and endocrine insufficiency, can affect a number of quality-of-life issues.[7–9] This has been recently demonstrated in a well-designed case-control study where both physical function and mental function were significantly lower in chronic pancreatitis patients than their corresponding cohort of control subjects.[10] These issues in turn can be exacerbated by the therapeutic interventions used to treat them. For example, narcotics may relieve pain, but interfere with everyday activities causing deterioration in the patient's quality of life. Therefore, to truly evaluate the impact of therapy in this group of patients, one must evaluate quality of life with every intervention.[11,12]

Unfortunately, there are no disease-specific instruments currently available in the literature to measure quality of life in chronic pancreatitis patients.[13] A review of the literature reveals that an abstract for a disease-specific

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Table 1. Inclusion–exclusion criteria for chronic pancreatitis patients.[19,20]

Inclusion criteria	Exclusion criteria
Patient must have abdominal pain, not related to other identifiable etiologies in conjunction with one of the following two features: (a) Presence of pancreatic calcification as demonstrated by an imaging study such as CT scan or KUB imaging (b) Presence of five out of nine criteria of pancreatic injury by endoscopic ultrasound in conjunction with a positive secretin stimulation test to confirm pancreatic insufficiency	Patient to be excluded from the study if they have one of the following features: (a) Age less than 18 years (b) Comorbidities such as end-stage cancer (estimated survival < 6 months), HIV (T4 cell count < 50), end-stage congestive heart failure, end-stage chronic obstructive pulmonary disease, uncompensated cirrhosis, renal failure (on dialysis or with CrCl < 25), or preexisting diabetes mellitus (c) Non-English speaking

CT: computer tomography; KUB: kidney–ureter–bladder; CrCl: creatinine clearance.

chronic pancreatitis instrument was developed in 1995.[14] However, there has been no subsequent follow-up study or validations of this instrument in any peer-reviewed journal to date. Three generic instruments have occasionally been used in this population. These include the following: (1) the McGill pain questionnaire, (2) the Medical Outcomes Study Short Form-36 (SF-36) Health Survey, and (3) the European Organization of Research and Treatment of Cancer (EORTC QLQ-C30 and QLQ-PAN26) scale.[15–17] Yet, each of these instruments presents deficiencies and shortcomings hindering their use in this group of patients. The McGill pain questionnaire, for example, is an instrument that was developed to focus solely on evaluating the impact of pain on quality of life.[15] As a result, it does not cover the wide range of problems that affect quality of life in chronic pancreatitis patients. Furthermore, it has never been psychometrically tested in this population of patients making its use here somewhat questionable. The SF-36 is an instrument that was developed to evaluate the impact of chronic medical illnesses on quality of life. Unfortunately, it too has its own set of limitations. In its only psychometric evaluation study in patients with chronic pancreatitis, it has been found to be reliable with Cronbach's alpha score of 0.82, but lacking sensitivity as demonstrated by significant ceiling and floor effects.[16] Furthermore, it has only been evaluated in a Bavarian population of patients indicating limited generalizability to our US population. The EORTC QLQ-C30/QLQ-PAN26 is an instrument that was developed for pancreatic cancer making its role in the evaluation of a chronic benign condition suspect. In fact, in its only psychometric evaluation in patients with chronic pancreatitis, it was found to have a number of significant limitations: (1) its study population was too small ($n = 66$) with insufficient numbers for an appropriate evaluation; (2) multiple cultures were involved, but no cultural adaptations identified; and (3) internal consistency in some items revealed that Cronbach's alpha score was extremely low (0.18), but the items were never adjusted.[17]

The goal of this study was to develop a disease-specific instrument for the evaluation of quality of life in this group of patients.

Materials and methods

Our study is divided into three parts: an instrument development phase, a content validation phase, and a precognitive testing phase.[18]

Instrument development phase

This phase of the study was accomplished through the use of a qualitative descriptive study using focus groups to collect items that were felt to impact quality of life in chronic pancreatitis patients. Those patients who were concerned about disclosure and did not wish to participate in focus group sessions but still wanted to be part of the study were offered one-on-one interviews. No one participated in both types of sessions.

Patient selection. Following Institutional Review Board (IRB) approval of the protocol (Docket no. H-12787), patients from the pancreatitis clinic of a large medical center in the Northeastern United States were invited to participate in this study. Those who were interested and signed an informed consent were recruited into the study if they met the inclusion/exclusion criteria as outlined in Table 1. Studies have shown that these diagnostic criteria provide a sensitivity of 80%–84% and a specificity of 90%–100% compared to histology or surgical pathology.[19,20]

Setting. The focus groups and individual interviews were held outside the hospital environment, in local libraries where rooms were rented to ensure privacy and to avoid any hospital setting influences.[21,22]

The sessions were conducted by two members of the research team: a facilitator and an observer (scribe) neither of whom had been involved in the medical care of the patients to avoid any potential bias.[23] The facilitator has her master's degree in education and is a licensed social worker who has had prolonged experience in management of focus group research and interviews in the field of health care and education. The observer was a research assistant with a master's degree in education and has been a research

Table 2. Semi-structured guide for focus group sessions and individual interviews.

Introduction
The moderator introduces himself or herself and discusses the purpose of the interview/focus group. He or she also introduces the scribe and the need to take notes as well as tape the session. He or she also presents the format and methods of data collection.
1. Opening question
Tell us your first name and anything else that you want to share with us about yourself
2. Introductory question
How long have you had chronic pancreatitis?
3. Transition questions
How has chronic pancreatitis changed your life?
Are there any particular symptoms that are most bothersome? (pain, nausea, vomiting, and diarrhea)
4. Key questions
Has chronic pancreatitis affected your physical function? How?
Has it affected your emotional function? How?
Has it affected your social function? How?
Has it affected your role function? How?
Has it changed your general health function? How?
5. Ending questions
Has chronic pancreatitis affected anything else in your life that we have not discussed?
How could we help you improve your life?

assistant to the facilitator in similar projects in the past. The focus group sessions were small (four to five participants) to maximize patient interactions.[22] Sessions lasted 1–2 h. The facilitator followed a semi-structured interview guide (Table 2) to stimulate participants' discussion about the impact of chronic pancreatitis on essential elements of their quality of life. This interview guide was developed by the facilitator and the primary author in accordance with the Wilson and Cleary[24] theoretical framework. According to the Wilson and Cleary model, one's quality of life depends on the following three components: (1) characteristics of the individual which are impacted by two major domains (physical function and emotional function), (2) characteristics of the environment which are impacted by one major domain (social/role function), and (3) one's overall sense of well-being which is impacted by one major domain based on nonmedical factors. These three components are impacted by disease processes and impact one's quality of life. Therefore, to meet the theoretical framework of the Wilson and Cleary model, the interview guide included questions that addressed these five major areas: physical function, emotional function, social function, role function, and general health function. However, to allow as much patient input as possible and to obtain a greater wealth of information regarding the impact of chronic pancreatitis on the patients, an open-ended question was included in the guide: "Has chronic pancreatitis affected anything else in your life that we have not discussed?" (Table 2). Brainstorming and synectics were two of the many group exercises that were used during the sessions to encourage this process.[22] These are exercises used to simultaneously create a noncritical atmosphere while forcing participants to think away from traditional modes of analysis and more into creative and innovative modes.[22] The individual interview was conducted using the same set of questions as the focus groups (Table 2).

Data collection. Both the demographic characteristics and the clinical characteristics were collected using a self-report questionnaire and confirmed through the patients' medical records by our research nurse. The demographic characteristics included age, sex, race/ethnicity, marital status, level of education, and employment status. The clinical characteristics included the following: (1) exocrine gland function as reflected by body mass index (BMI), albumin, symptom history (diarrhea) and need for pancreatic enzyme therapy; (2) endocrine gland function as reflected by use of medications for diabetes mellitus; (3) level of pain caused by pancreatitis as reflected by the need for narcotic therapy; (4) etiology of pancreatitis; and (5) health-related behaviors included history of smoking, alcohol use, and use of narcotics. The data for these behaviors were collected based on whether the patients were actively using these substances at the time of the study (yes or no). No attempts at quantification or past use were explored in our questionnaire.

Qualitative data were collected through focus groups and individual interviews as previously described. The interview content was transcribed using notes from the sessions supplemented by audiotaped recordings.[22] Participants' own words were used to ensure the intensity and quality of their concerns and experiences. Interview data were summarized by transferring transcribed interview notes to 3×5 in^2 index cards. Each card contained one item or idea linked only to date and time of focus group session/interview to ensure anonymity.

Data management. Demographic data and clinical characteristics were entered into a Microsoft Office Excel 2007 spreadsheet. Transcribed interviews and session summaries were entered into a Microsoft Office Word 2007 files.

Data analysis. Demographic and clinical characteristics of all patients who met the inclusion/exclusion criteria were

analyzed by descriptive statistics. Continuous variables were analyzed by means and standard deviations. Categorical variables were analyzed by frequency, percent, cumulative frequency, and cumulative percent. Due to the small sample size, differences between patients who agreed and declined to participate were compared using Wilcoxon rank test for continuous variables and by Fisher's exact test for categorical variables.

Item generation. Qualitative data from interviews and focus groups were analyzed following each session using a modified concept mapping technique to generate key themes.[25] First, index card items were sorted into piles of like statements. This process was performed in the presence of three analysts: the primary author, the focus group leader, and the scribe, to maximize reliability of coding and to minimize bias. Second, the major concepts were identified based on ideas represented by each of the items. This entire process was repeated until data saturation was reached.[26]

Item reduction. Once the item list was developed, the three team members (the primary author, the focus group leader, and the scribe from the item generation study) met to limit the large number of items within each domain. The item reduction was accomplished as described by the Krippendorf[27] method. First, each item was generated during the focus group and interview session was examined for content ($n = 50$). If all three members of the team felt that the item's content was overlapping by more than 75% with another, the more comprehensive item was kept and the lesser item was removed. However, every effort was made to avoid the elimination of unique items.

Formatting the instrument. The reduced list of items that were identified was formatted into questions to produce a self-administered instrument for the evaluation of quality of life in this group of patients.[28] Each question stem was based on a single construct from the items generated from parts 1 and 2 of this phase of the study. The phrasing of the question followed a number of rules:[28] (1) it was written at a sixth-grade reading level with less than 20 words; (2) it was put together in a clear concise fashion with one idea/concept per question; (3) double negatives were avoided; (4) universal words were avoided; and (5) each question covered a specific time frame, the previous 4 weeks, to ensure specificity.

Responses to the questions were formatted using a four- or five-response option Likert scale with one exception. The question addressing pain severity had a 10-point response scale.

Content validation phase

Following IRB approval (Docket no. H-12958), physician experts in the field of pancreatology were asked to evaluate the instrument through an online survey.[29]

Target population. The physician experts were selected from the physician registry of the American Pancreatic Association. Of 230 registered physicians specializing in pancreatic disease, 35 were purposefully selected as a convenience sample to represent various geographical regions of practice.

Survey administration. Once selected, each expert was invited by e-mail to participate.[30] Those who did not respond to our invitation initially were re-invited. After three attempts, they were excluded from the study. The web-based survey included the following items: (1) cover letter to briefly introduce the study, (2) instructions on evaluating the instrument for relevance and clarity, and (3) a modified questionnaire that included the 40-item Pancreatitis Quality of Life Instrument (PANQOLI) and 5 items from the Health Care Relationship (HCR) Trust Scale. The HCR Trust Scale is an instrument that was developed by one of the authors of this article (C.B.) to evaluate the issue of trust between patients and their health-care providers. It would not be related to the impact of chronic pancreatitis on quality-of-life issues; however, it was added in this context as part of the instrument to determine whether or not the physicians were able to distinguish between items that measure quality of life and those that measure trust.[31] Furthermore, in order to help truly test the physicians' ability to distinguish between it and the PANQOLI, it was not labeled or identified separately. Item relevance was rated on a Likert scale from 0 (not relevant) to 3 (highly relevant). Clarity was rated on a yes/no scale.

To ensure privacy, login entry was used. This also helped prevent multiple entries.[30] Once each physician completed the survey, they were not allowed further access into the web site.

Data collection. After each expert completed the web-based survey, the data were transmitted electronically from the web site to our center and entered directly into an Excel spreadsheet.

Data analysis. Only completed surveys were analyzed. To evaluate potential bias in selecting expert physicians, the characteristics of those who agreed and declined to participate in the study were compared in terms of region of practice. Differences between experts who agreed and declined to participate were analyzed by chi-square tests.

The relevance of items were assessed by their average item-level content validity index (I-CVI), which was calculated by summing all experts' scores on item relevance or clarity and dividing by the number of experts.[32] Items were considered relevant if they were identified as 2 or 3 on the scale by the majority of experts (i.e. if 7 physicians participated, it would require that 5 out of 7 considered the item valid by giving it a score of 2 or 3; this would translate into an average I-CVI of 5/7 physician acceptance rate which would be >0.714, and the item would be kept). Those items that would be kept were then evaluated for clarity (yes/no). Items deemed to be clear by the majority of experts (5/7, i.e.

average I-CVI > 0.714) were kept unchanged, otherwise they were modified. The number of items accepted and/or rejected by expert physicians on the PANQOLI (items 1–40) and HCR Trust Scale (items 40–45) were assessed by descriptive statistics as described above. Differences in frequency of accepted and/or rejected items between the two scales were compared by chi-square test.

Precognitive testing phase

Content validation of the instrument by physicians, however, is insufficient. Studies have shown that using heterogeneous expert panels of patients provides a more thorough validation of an instrument, making it more relevant to the target population.[33] Therefore, in this phase of the study, one-on-one interviews were used to re-evaluate the PANQOLI for completeness and clarity by patients. This does not replace psychometric testing, but it does ensure that patients do understand the instrument and do support its validity and comprehensiveness before psychometric testing is conducted.

Patient selection. Following IRB approval of the protocol, all 10 patients who had previously participated in the first part of the study and had signed an informed consent were re-invited to participate.

Setting. All cognitive pretesting sessions were conducted as one-on-one interviews held outside the hospital environment, in local libraries where rooms were rented to ensure privacy and to avoid any hospital setting influences.[21,22] Prior to the interview, each patient was asked to fill out a demographic data sheet as in the first part of the study. During each interview, as discussed in the first part of the study, the session was conducted by two members of the research team: a facilitator and an observer (scribe) neither of whom had been involved in the medical care of the patients to avoid any potential bias.[23] The interview session was conducted one patient at a time to maximize patient interactions.[22] Each interview lasted 1–2 h. During the interview, the facilitator reviewed the modified instrument, as determined by the content validation phase of the study, one question at a time to address two areas of concerns: (1) relevance of each item (0–3) and (2) clarity of each item (yes, no). At the end of each session, each patient was asked whether there were any additional items that they would like to include in the instrument.

Data collection. Qualitative data were collected in individual, audiotaped interviews led by a facilitator with an observer present to record notes. Interview data were based on notes taken by the observer and supplemented by the audiotapes.

After data were collected, they were double entered electronically into an Excel spreadsheet to ensure maximum accuracy.

Data analysis. The relevance and clarity of the PANQOLI items were assessed as in the previous section of the study by their average I-CVI. This was calculated by summing all patients' scores on item relevance or clarity and dividing by the number of patients. Items were considered relevant if they were identified as 2 or 3 on the scale by the majority of patients (i.e. if 4 patients were interviewed and 3 out of the 4 patients rated the item as 2 or 3, then the acceptance rate would be 3/4, giving an average I-CVI > 0.75, meaning the item is to be kept). Items were deemed unclear if they were identified as such by the majority of patients (3/4, i.e. average I-CVI > 0.75), and at that point, they would be modified and re-evaluated at the subsequent patient interview. Once data saturation was reached, this part of the study was terminated.

Results

Part A: instrument development phase

Participant characteristics. In this part of the study, 64 chronic pancreatitis patients at the UMass Memorial Pancreatitis clinic were identified and consented. Of 64 patients, 13 were excluded from the study due to lack of confirmatory evidence for chronic pancreatitis. The remaining 51 patients met the inclusion/exclusion criteria and were invited to take part in the study. Of the 51 patients who agreed to participate, only 10 did so (20% response rate). Reasons for not participating were that patients were too busy ($n = 25$), too ill ($n = 3$), could not be contacted to set up an appointment ($n = 9$), and did not keep their appointment ($n = 4$).

Demographics of patients who did agree to participate ($n = 10$) and those who did not ($n = 41$) were compared (Table 3). Some minor sociodemographic differences were noted between these two groups. These included differences in age (55.60 vs 47.90 years; $p = 0.06$), employment status (30% fully employed vs 12%; $p = 0.10$), and alcohol use (30% active use vs 61%: $p = 0.15$). Although none of these was statistically significant, it is noteworthy to realize that those patients who participated in the study may have been slightly older, more likely employed full time, and not actively using alcohol compared to those who did not participate. However, the only significant differences noted between the two groups were etiology of pancreatitis and diarrhea. Yet, markers of severity such as nutrition, albumin, use of pancreatic enzymes, prevalence of insulin-dependent diabetes, and narcotic use did not show significant differences between the groups. Those who agreed to participate ($n = 10$) were scheduled for one of two focus group sessions ($n = 4$ and $n = 5$). One individual opted for and was granted a personal interview rather than a focus group session ($n = 1$), based on personal preference.[19]

Data saturation. At the end of the first focus group, patients identified 31 areas in which chronic pancreatitis affected

Table 3. Demographic and clinical characteristics of eligible patients who agreed and refused to participate in the item development part of the study.[a]

Variable	Agreed (n = 10)	Refused (n = 41)	p value[b]
Demographics			
Age (years), mean ± SD	55.60 ± 14.74	47.90 ± 12.60	0.06
Median	58	48	
Gender			
Male	2 (20%)	14 (34%)	0.47
Female	8 (80%)	27 (66%)	
Race			
White	9 (90%)	32 (78%)	0.88
Black	1 (10%)	3 (7%)	
Hispanic	0 (0%)	2 (5%)	
Asian	0 (0%)	4 (10%)	
Marital status			
Single	1 (10%)	14 (34%)	0.35
Married/partnered	6 (60%)	18 (44%)	
Divorced/widowed/separated	3 (30%)	9 (22%)	
Employment			
Full time	3 (30%)	5 (12%)	0.10
Part time	1 (10%)	0 (0%)	
Unemployed	3 (30%)	18 (44%)	
Disabled	1 (10%)	13 (32%)	
Retired	2 (20%)	5 (12%)	
Education level			
Secondary school	0 (0%)	1 (2.4%)	0.51
Commercial/vocational school	7 (70%)	33 (80.5%)	
College/university	3 (30%)	7 (17.1%)	
Health-related behaviors			
Smoking (yes/no)	4/6 (40%/60%)	25/16 (61%/39%)	0.30
Alcohol use (yes/no)	3/7 (30%/70%)	25/16 (61%/39%)	0.15
Clinical characteristics			
Pancreatitis etiology			
Alcohol	1 (10%)	14 (34.2%)	0.02
Idiopathic	4 (40%)	20 (48.8%)	
Autoimmune	2 (20%)	1 (2.4%)	
Triglyceridemia	0 (0%)	2 (4.9%)	
Cystic fibrosis	0 (0%)	1 (2.4%)	
Hereditary	1 (10%)	0 (0%)	
Biliary	2 (20%)	0 (0%)	
Divisum	0 (0%)	1 (2.4%)	
Cyst/other	0 (0%)	2 (4.9%)	
Diarrhea (yes/no)	6/4 (60%/40%)	6/35 (15%/85%)	0.006
BMI (kg/m^2), mean ± SD	25.15 ± 5.02	25.19 ± 5.65	0.96
Median	23.35	24.5	
Albumin (g/dL), mean ± SD	3.55 ± 0.78	3.63 ± 0.60	0.89
Median	3.75	3.7	
Pancreatic enzymes (yes/no)	9/1 (90%/10%)	26/15 (63.5%/36.6%)	0.14
Narcotics (yes/no)	5/5 (50%/50%)	30/11 (73%/27%)	0.25
Diabetes mellitus (yes/no)	4/6 (40%/60%)	11/30 (27%/73%)	0.45

SD: standard deviation; BMI: body mass index.
[a]Unless otherwise indicated, values are expressed as the number of participants and percentages (%). Percentages may not add to 100 due to rounding.
[b]Group differences for categorical and continuous variables were computed using Fisher's exact test and the Wilcoxon rank-sum test, respectively.

their quality of life including the following: physical function ($n = 10$), social/role function ($n = 7$), emotional function ($n = 6$), general health function ($n = 3$), economic function ($n = 3$), spiritual function ($n = 1$), and stigma of their condition ($n = 1$) (Table 4). At the end of the second focus group, patients cited 31 areas, but only 19 of 31 were new (61%; Table 4). This included the following: physical function ($n = 8$), social/role function ($n = 8$), emotional function ($n = 6$), general health ($n = 1$), economic function ($n = 5$), spiritual function ($n = 2$), and stigma of their condition ($n = 1$). At the end of the individual interview, 17 areas were cited, and of these only 2 of 17 were new (12%; Table 4). This included the following: physical function ($n = 5$), social/role function ($n = 4$), emotional function ($n = 5$), general health ($n = 1$), economic function ($n = 1$), spiritual function ($n = 0$), and stigma of their condition ($n = 1$). Since the amount of new information was decreasing over the three sessions (100%, 61%, and 12%, respectively) and since only 12% of the information was new in the third session, it was decided that a saturation point had been reached and that this would be a reasonable point to end data collection for this phase of the study.

Item generation. Analysis of qualitative data from the two focus groups and one interview identified 50 items related to the quality of life of patients with chronic pancreatitis (Figure 1). Of these, 40 items were related to generic quality-of-life issues: 13 were identified as impacting physical function, 13 as impacting social/role function, 11 as impacting emotional function, and 3 as impacting general health function.

Within the domain of physical function, participants described 13 symptoms that impacted their day-to-day functioning. Paramount among these was pain ($n = 8$). This seemed to impact patients the hardest: "I live with the pain every day, but when I am stressed, it makes it worst"; "it hurts sitting, it hurts to walk, and it hurts to lie down"; and "pain is all the time." Another item that impacted physical function dramatically in this group of patients was diarrhea ($n = 2$): "losing dignity due to diarrhea and accidents from bowel movements" and "you always need to know where the bathroom is—you have to find out before you even go to a place." Other items that were noted to impact physical function included nausea and vomiting ($n = 4$), inability to sleep ($n = 3$), dietary modifications ($n = 3$), number of hospital admissions ($n = 3$), weight loss ($n = 2$), number of pills used ($n = 2$), heartburn ($n = 1$), constipation due to pain meds ($n = 1$), and number of procedures/surgery ($n = 1$).

Social/role function was the second key conceptual domain being impacted by chronic pancreatitis with 13 items identified. Within this domain, participants seemed to be most impacted by their inability to fulfill their parental role ($n = 7$): "Having an attack, kids don't understand; they're scared," "can't volunteer at my kid's school," and "kids neglect their own lives to help me out." Participants also discussed their inability to maintain their friendships ($n = 4$)—"Not being able to make long range plans, like a trip or a vacation" and "friends have faded away, there's not much to talk about and I can't really go anywhere to eat with them"—and inability to maintain their spousal intimacy ($n = 2$)—"my husband needs to be supportive, but sometimes I need to pull back away from him. It hurts both of us. Sometimes I lie to him about the severity of the pain that I'm in to spare him" and "I can barely function. I can't do most of what I used to—no love making either." Other items discussed by the patients included the following: lack of a social life ($n = 4$), stress on the family structure ($n = 4$), inability to drive ($n = 2$), poor self-care ($n = 2$), and inability to do household chores ($n = 1$).

Emotional function was the third major domain with 11 items identified. Within this domain, study participants discussed depression ($n = 3$), hopelessness, and suicidal ideation ($n = 2$): "I had lots of goals in life, now they are gone," "now I don't know …," "I don't take pride in my clothing or shopping anymore, priorities change … it comes on at any given time," "I feel lonely," "I think I feel good at first, then very sick and far away," "nothing can help, I'm just dying," "I wish I was dead," "I don't take pride in my clothing or shopping any more," and "I had a lot of goals in life, now they are gone." Numerous other emotions seemed to be raised by chronic pancreatitis. These include stress ($n = 6$), frustration ($n = 3$), anger ($n = 2$), embarrassment ($n = 1$), and fear ($n = 1$).

Another 10 items were identified, but these were impacting new domains: 6 impacting economic function, 3 impacting spiritual function, and 1 impacting stigma.

Economic function. Several ($n = 6$) participants discussed the lack of employment due to recurrent absenteeism and often the need to retire early due to their health condition as important concerns: "Employers don't want to hire me"; "I had to retire early"; "the doctor said to work, my lawyer said not to …"; "I can't work. If you tell people of your condition, they don't want to hire you"; and "you get fired because you miss too much work … because of my condition." Others raised concerns regarding the high cost of medicines ($n = 5$), the high cost of hospital/doctor bills ($n = 3$), and the high cost of healthy foods ($n = 2$).

Stigma ($n = 1$). The stigma associated with the diagnosis of chronic pancreatitis was mentioned by five of the participants. They discussed their difficult experiences in the emergency room: "I've been dry and sober for 3 years and they still ask me if I've been drinking," "… we are not drug seekers," and "you need a personal advocate when in the ER (Emergency Room) … I'd rather be in labor!"

Item reduction. Items were deleted from the final pool if they were felt to be redundant by the three-member team (primary author, focus group leader, and scribe) as discussed

Table 4. Data saturation during the item development part of the study.

Item	Discussed in focus group 1 (n = 4)	Discussed in focus group 2 (n = 5)	Discussed in personal interview (n = 1)
Impact on physical function			
Large number of pills	New	Old	
Heartburn	New		
Diet changes	New		
Length of hospitalizations	New	Old	
Pain	New	Old	Old
Stigma with alcohol	New	Old	
Weight loss		New	
Can't drive		New	Old
Relish the rest of your life			New
Wears me down	New		Old
Not knowing when pain is coming	New		
Nausea/vomiting	New	Old	
Diarrhea	New	Old	Old
	10	8	5
Impact on social/role function			
Unable to travel	New	Old	
Daily plans interrupted by pain	New		Old
Can't drink	New		
No social life with friends		New	Old
Can't be with kids	New		
Absenteeism from work	New	Old	
Hurts to do housework		New	Old
Affects significant other		New	Old
Relationships with friends changed		New	
Every day is constant interruptions because of meds	New		
Unable to be a parent	New		
Can't make plans		New	
Can't be a bread winner		New	
	7	8	4
Impact on emotional function			
Unable to work	New	Old	
Anger		New	
Embarrassment	New		
Frustration with condition	New		Old
Depression		New	Old
Lonely			New
Fear of drug addiction	New		Old
Feel handicapped	New		
Feel tired	New		
Fear of pain		New	
Stress		New	Old
Suicidal thoughts		New	
	6	6	5
Impact on general health			
Need to diet	New		
Physically draining	New	Old	
Constipation	New		Old
Patients unable to take care of other medical problems			
	3	1	1

Table 4. (Continued)

Item	Discussed in focus group 1 (n = 4)	Discussed in focus group 2 (n = 5)	Discussed in personal interview (n = 1)
Other areas impacted			
Economic impact			
Early retirement		New	Old
Expensive child care support		New	
Expensive ER visits	New		
Increased medical costs for meds	New	Old	
Healthy foods are expensive		New	
Lost wages from absenteeism	New		
Unemployment		New	
	3	5	1
Spiritual impact			
Religion is a blessing	New		
Religion is a nightmare		New	
Can't get to church		New	
	1	2	0
Stigmata			
Health-care professionals accuse patients of being drug addicts	New	Old	Old
	1	1	1
Total number of items	31	31	17
Number of items new	31	19	2
Percentage of new items	31/31 = 100%	19/31 = 61%	2/17 = 12%

ER: emergency room.

in section "Materials and methods." The reduced item pool consisted of 40 items (Figure 1).

Formatting the instrument. Each of the 40 items was formatted into a question as described in section "Materials and methods" (Table 5). This lead to the following distribution of questions for the instrument: physical function (n = 17), social/role function (n = 8), emotional function (n = 8), general health function (n = 2), economic function (n = 3), religious/spiritual function (n = 1), and stigma (n = 1). The response was formatted into a 4- or 5-item Likert scale.

Part B: content validation phase

In this part of the study, 35 physician experts were recruited for content validation through the electronic survey described in section "Materials and methods." Of 35 of these physicians, 7 completed the item validation survey (acceptance rate of 20%). Experts who agreed and those who refused to participate did not differ significantly in geographic location of practice (p = 0.94).

All items with average I-CVI of >0.714 were included in the instrument. This resulted in a decrease in the number of items to 22 (Table 6). Of the 18 items that were removed, 15 were thought to be redundant and 3 were felt to have no relationship with pancreatitis. This included items related to the impact of spirituality on chronic pancreatitis. The physician panel correctly identified all five HCR Trust Scale items as irrelevant to quality of life in patients with chronic pancreatitis. The physician panel also made two recommendations to improve the scale: (1) adding an item in the PANQOLI on the impact of chronic pancreatitis on patients' sex life and (2) using a 5-point Likert response scale instead of a 4-point scale to offer patients a "no change" option. As a result, this lead to the formation of a 23-item instrument with a 5-point Likert scale for each item, except for the first item on pain level which had a 10-point scale (Figure 1).

Part C: cognitive pretesting phase

All 10 patients, who were involved in the first phase of the study, agreed to participate in this phase of the study. However, after four interviews, no new data were obtained and the cognitive pretesting phase of the study was terminated. Based on this phase of the study, three of four patients believed that chronic pancreatitis did at times impact their spiritual function, and therefore, the spiritual item was reinserted back into the instrument. According to the patients, the rest of the instrument seemed comprehensive, clear, and did not require modifications. This resulted in a 24-item instrument with 5-item Likert scale (Figure 1).

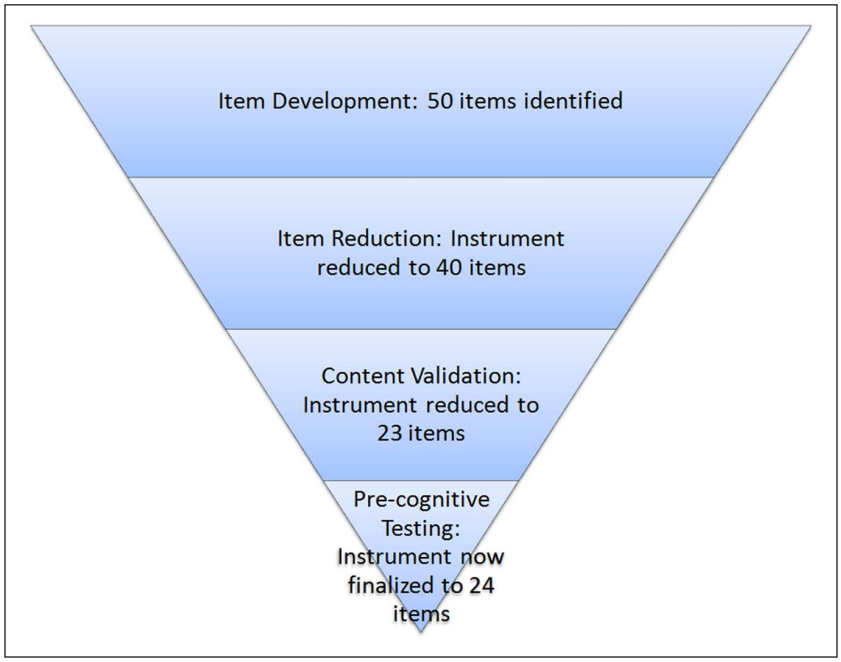

Figure 1. Instrument development flowchart.

Table 5. Examples of questions formatted for the PANQOLI.

DIRECTIONS: The following items ask about your physical, social, economic, general, and emotional response to living with chronic pancreatitis. Please circle the number that corresponds with your best answer. When you answer each question, please let us know how you have felt in the past 4 weeks, as compared to the previous 4 weeks.

1.	Over the last 4 weeks, the severity of your pain has been …					
	0	1	2	3	4	5
	Not Applicable	much less	slightly less	no change	slightly more	much more
2.	Over the last 4 weeks the severity of your vomiting has been …					
	0	1	2	3	4	5
	Not Applicable	much less	slightly less	no change	slightly more	much more
3.	Over the last 4 weeks, the severity of your nausea has been …					
	0	1	2	3	4	5
	Not Applicable	much less	slightly less	no change	slightly more	much more
4.	Over the last 4 weeks, the severity of your diarrhea has been …					
	0	1	2	3	4	5
	Not Applicable	much less	slightly less	no change	slightly more	much more
5.	Over the last 4 weeks, the amount of weight loss that you have experienced has been …					
	0	1	2	3	4	5
	Not Applicable	much less	slightly less	no change	slightly more	much more

PANQOLI: Pancreatitis Quality of Life Instrument.

Table 6. Content validation of PANQOLI items by physician panel (n = 7).

Item number	Theme	Physician panel		Decision
		Clarity (%)	Relevance (%)[a]	
1	Pain	85.7	100	Accept
2	Pain	100	85.7	Accept
3	Pain	100	85.7	Accept
4	Vomiting	85.7	28.6	Reject
5	Vomiting	85.7	28.6	Reject
6	Nausea	85.7	71.4	Accept
7	Nausea	85.7	71.4	Accept
8	Diarrhea	85.7	71.4	Accept
9	Diarrhea	85.7	85.7	Accept
10	Anorexia	100	85.7	Accept
11	Anorexia	71.4	85.7	Accept
12	ER visits	100	100	Accept
13	ER visits	100	42.9	Reject
14	Admissions	100	85.7	Accept
15	Admissions	85.7	42.9	Reject
16	Sleep	71.4	57.2	Reject
17	Sleep	100	71.4	Accept
18	Family	100	85.7	Accept
19	Family	100	71.4	Accept
20	Friends	100	42.9	Reject
21	Friends	71.4	42.9	Reject
22	Children	85.7	85.7	Accept
23	Children	85.7	85.7	Accept
24	Spouse	85.7	71.4	Accept
25	Spouse	85.7	71.4	Accept
26	Work	71.4	100	Accept
27	Finances	71.4	42.9	Reject
28	Money	57.1	42.9	Reject
29	Health	100	100	Accept
30	Health	71.4	42.9	Reject
31	Spiritual	85.7	0	Reject
32	Stigma	85.7	14.3	Reject
33	Stress	100	71.4	Accept
34	Stress	100	57.2	Reject
35	Depression	85.7	71.4	Accept
36	Depression	71.4	57.2	Reject
37	Frustration	85.7	57.2	Reject
38	Frustration	71.4	57.2	Reject
39	Anger	85.7	57.2	Reject
40	Anger	85.7	57.2	Reject
41	HCR Trust Scale	71.4	0	Reject
42	HCR Trust Scale	42.9	0	Reject
43	HCR Trust Scale	57.1	14.3	Reject
44	HCR Trust Scale	85.7	14.3	Reject
45	HCR Trust Scale	85.7	42.9	Reject

PANQOLI: Pancreatitis Quality of Life Instrument; ER: emergency room; HCR: Health Care Relationship; df: degree of freedom.
[a]PANQOLI items 1–40 and HCR Trust Scale items 41–45 differed significantly for physicians (p = 0.0014, chi-square 10.20, df = 1).

Discussion

Summary of main findings

Here, we report on the development of the first disease-specific instrument for evaluating quality of life in patients with chronic pancreatitis. This new instrument presents latent variables underlying health-related quality of life in chronic pancreatitis not seen in generic instruments nor in Wilson and Cleary's[24] model of patient outcomes. These include impact of disease on economic variable, on stigma, and on spirituality. Based on our study, what is being proposed is that in chronic pancreatitis patients, quality-of-life evaluation must include these three items.

Strengths and limitations of the study

Before considering this new instrument for the evaluation of quality of life in chronic pancreatitis patients, one needs to address a number of study limitations. First, the results of Part A (item development) may have been compromised by the potential for selection bias, after all only 10 out of 51 eligible patients were included in the study, and the small sample size. However, on closer examination, it seems that neither issue was significant:

1. *Selection bias*: although some minor sociodemographic differences were noted between the patients who did participate and those who did not, including age, employment status, and active use of alcohol, none of these was statistically significant. In fact, the significant differences between the two groups were the etiology of the disease, which is not related to the severity of the disease, and the prevalence of diarrhea (p = 0.002), which can be related to the severity of the disease (Table 3). However, an evaluation of other measures of chronic pancreatitis severity (e.g. diabetes, albumin, and narcotic use) does not demonstrate significant differences between the groups, indicating that this difference in diarrhea may have been a spurious finding related to other confounding factors that were not measured (i.e. medications) rather than one related to differences in severity of the disease.
2. *Small sample size*: although large sample size is crucial for quantitative studies, that is not always needed in qualitative studies. In qualitative studies, the most important factor is whether data are collected from enough participants to reach data saturation. A review of the data collected reveals that 31 of 31 (100%) were new items introduced during the first session, 19 of 31 (61%) were new items introduced during the second session, and only 2 of 17 (12%) were new items introduced during the third session (Table 4). Based on this, the data had reached a saturation point implying that the sample size used was sufficient in providing information for the question at hand.

A second potential study limitation could have been "interpreter bias." In qualitative analysis, subjective interpretation of data is always involved, especially when determining how people felt about their disease and how it impacted them. While this issue cannot be completely excluded, it was minimized in this study by avoiding data editing during the item development phase of the study and by involving multiple analysts in the evaluation phase of the study (the primary author, the focus group leader, and the scribe).

A third potential study limitation could have been design issues related to the content validation part of the study such as reliability and accuracy of data collected from the Internet, the expertise of the selected physicians, and the potential likelihood of obtaining our results by chance rather than knowledge and true understanding of the subject at hand. Carefully designed controls in our study methodology were used to address these concerns:[30]

1. To ensure the reliability and accuracy of our data set, SurveyMonkey was used as our web site with specific log-on codes. This approach ensured that only our selected physicians had access to the survey and that each of them only had single use capabilities.
2. To evaluate the quality of our panel of physicians, we administered the 5-item HCR Trust Scale in conjunction with the PANQOLI items without separating them and without informing the panel members. This blinded control methodology allowed us to truly test the ability of our panel of experts confirming their true knowledge on the subject matter. Our panel of physicians rejected all five HCR Trust Scale items, but only 18 of 40 PANQOLI items ($p = 0.001$) (Table 6).
3. To ensure that our content validation was not merely due to chance agreement, we used a cutoff value of >0.71 (five of seven physicians agreed on the relevance of an item). Using binomial distribution calculations, this would make the likelihood of chance agreement between each of our panels small, but not negligent (less than 0.164 for our physician panel and less than 0.375 for patients).

A fourth study limitation is that rather than recruit new patients, the same group of patients were asked to participate in the cognitive pretesting phase of the study as in the instrument development phase. Although this was a choice that we made to allow patients to elaborate more fully on their initial thoughts and feelings gathered during the first phase of the study, we may have limited the potentially broader range of answers and comments that we could have obtained had we recruited a new group of patients. To overcome this potential internal bias, and learning effect that may have developed as a result of our methodology, we plan to obtain further input from patients at other sites before we undergo our next phase of instrument testing.

Finally, one needs to consider whether the newly identified variables which include economic factors, stigma, and spirituality may be spurious findings. A review of the literature, however, shows that all these items have been identified as items of concern for chronic pancreatitis patients elsewhere in the literature. A survey, conducted at four US pancreas centers of 111 chronic pancreatitis patients, revealed that, when asked about their economic status, work experience is impacted in 74% of patients because of their disease process and that only 37% are able to maintain steady employment because of it.[8] Similarly, when asked regarding their experience in the health-care system, 80% reported that on at least one emergency department visit, they had not been treated with respect or dignity; furthermore, 45% stated that they were labeled as alcoholic and 29% as drug seekers simply based on their chronic pancreatitis condition at one point during their emergency department visit. Similarly, the relationship between religion–spirituality and chronic pain syndromes have been demonstrated in other studies.[34]

Implications for future research

In view of these findings, one must consider this new instrument to be a useful instrument for the evaluation of quality of life in chronic pancreatitis patients. However, since it was developed at a single center, its impact nationwide may not be apparent until nationwide testing is performed to determine its reliability and its construct validity at a national level. Therefore, national psychometric testing would need to be performed prior to its clinical use.

Conclusion

PANQOLI is the first disease-specific instrument to be developed for chronic pancreatitis. Based on our initial study, it does represent variables not found in generic instruments for the evaluation of quality of life that may be unique to chronic pancreatitis patients (economic variables, stigmata, and spiritual factors). However, its use nationwide would have to await its psychometric evaluation at other centers to assess its reliability and construct validity using a different cohort of chronic pancreatitis patients.

Declaration of conflicting interests

The authors declare that there is no conflict of interest.

Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

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