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Distribution of prognostic subgroups, assessed by STarT Back Screening Tool, in Veterans with low back pain receiving on-site chiropractic care: a cross-sectional chart review

Charles W. Penza, DC, PhD[1]
Casey J. Rogers, DC, MPH[2]
Michael R. Cole II, DC, MS[1]
Samuel M. Schut, DC[3]
Alexis M. Cornelius, DC[4]
Matthew J. Bair, MD, MS[5]

Objective: *The primary aim of this study was to report the distribution of prognostic subgroups, as determined by The Keele (STarT) Back Screening Tool (SBT) in Veterans with low back pain presenting for consultation at a chiropractic clinic within the Veterans Health Administration (VHA).*

Methods: *A chart review was conducted on all Veterans completing an initial consultation at a single VHA chiropractic clinic between April 15th, 2021 and January 31st, 2023. STarT Back Screening Tool scores and PROs were collected from the medical record corresponding to the date of consultation available in the VHA's electronic healthcare record (EHR) system. The proportion of each SBT subgroup (i.e., "low-risk", "medium-risk", and "high-risk") was calculated and subgroup differences across patient reported outcomes (PROs) were assessed.*

Répartition des sous-groupes de pronostic, évaluée par l'outil de dépistage de lombalgie STarT, chez les anciens combattants souffrant de lombalgie et recevant des soins chiropratiques sur place: une étude transversale

Objectif: *Le principal objectif de cette étude était de déclarer la répartition des sous-groupes de pronostic, tels que déterminés par l'outil de dépistage de lombalgie (STarT) de Keele (SBT) chez les anciens combattants souffrant de lombalgie qui se présentent pour une consultation dans une clinique de chiropratique au sein de la Veterans Health Administration (VHA) des États-Unis.*

Méthodes: *Une étude a été réalisée sur tous les anciens combattants ayant assisté à une première consultation dans une seule clinique de chiropratique de la VHA entre le 15 avril 2021 et le 31 janvier 2023. Les notes et les sous-groupes de pronostic du SBT ont été recueillis à partir du dossier médical correspondant*

[1] Integrated Wellness Center, Orlando VA Healthcare System, Orlando, FL
[2] Birmingham VA Health Care System, Birmingham, Al
[3] Center for Wellness Research and Training, Department of Wellness and Preventive Medicine, and Cleveland Clinic Lerner College of Medicine of Case Western Reserve University School of Medicine, Cleveland, OH
[4] VA Central Iowa Healthcare System, Des Moines, IA
[5] VA Center for Health Information and Communication, Richard L. Roudebush VA Medical Center, Indiana University School of Medicine, and Regenstrief Institute, Indianapolis, IN

Corresponding author: Charles W. Penza DC, PhD, 13800 Veterans Way, Orlando, FL 32827
Tel: (407) 590-6443
E-mail: charles.penza@va.gov

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Results: *Of 458 completed consultations, 386 (84.3%) sought care for low back pain and 251 (54.8%) had SBT data collected; 51 (20.3%) scored low-risk, 107 (42.6%) medium-risk, and 93 (37.1%) high-risk for persistent disability. As expected, the subgroups differed across baseline PRO.*

Conclusions: *In this chiropractic clinic, the percentage of Veterans with a favorable prognosis suggested by SBT was low.*

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KEY WORDS: veterans, veterans health, low back pain, prognosis, chiropractic, patient reported outcome measures

à la date de la consultation disponible dans le système de dossiers de santé électroniques (DSE) de la VHA. La proportion de chaque sous-groupe du SBT (c.-à-d. « risque faible », « risque moyen » et « risque élevé ») a été calculée et les différences entre les sous-groupes de pronostic ont été évaluées.

Résultats: *Des 458 consultations terminées, 386 (84,3 %) concernaient une lombalgie et 251 (54,8 %) ont vu leurs données recueillies par le SBT; 51 (20,3 %) ont obtenu la note « faible risque », 107 (42,6 %) ont obtenu « risque moyen » et 93 (37,1 %) ont obtenu « haut risque d'invalidité persistante ». Comme prévu, les sous-groupes différaient selon le niveau de référence des sous-groupes de pronostic.*

Conclusions: *Dans cette clinique chiropratique, le pourcentage d'anciens combattants ayant un pronostic favorable suggéré par le SBT était faible.*

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MOTS CLÉS : anciens combattants, santé des anciens combattants, lombalgie, pronostic, chiropratique, mesures des résultats déclarés par les patients

Introduction

Low back pain (LBP) is highly prevalent among United States (US) military Veterans[1] and prompts them to seek medical care.[2] Germane to treatment of Veterans with LBP is the recently updated Veterans Administration and Department of Defense (VA/DoD) clinical practice guideline (CPG) for the diagnosis and treatment of low back pain.[3,4] The VA/DOD CPG suggests there is sufficient evidence to support the use of predictive screening instruments in the evaluation of LBP to inform prognosis and treatment planning, although the optimal method is not defined. The Keele Subgroups for Targeted Treatment (STarT) Back Screening Tool (SBT), as discussed in the VA/DoD CPG, offers one possible method. The SBT is a screening instrument designed to stratify patients with non-specific LBP into low, medium, and high risk of future persistent disabling LBP (see Table 1).[5] Although initially designed to screen patients with acute LBP presenting to primary care, SBT has been implemented and validated in various clinical settings and mixed-duration LBP populations. The predictive and discriminative ability of the SBT in LBP populations is supported in the literature among primary care populations in the US[6] broadly and Veterans Health Administration (VHA) specifically[7]. Interestingly, the distribution of prognostic subgroups in the VHA primary care setting differed from the original validation study completed in the United Kingdom primary care setting[5] and published US primary care setting.[6] The distribution of SBT subgroups across different chiropractic settings has also been reported,[8,9] however the distribution has not been reported in a VHA chiropractic clinical setting. Therefore, our objective was to report the frequency of SBT prognostic subgroups in VHA chiropractic clinical settings and compare each subgroup across baseline patient-reported outcomes (PROs).

Methods

Study design

A cross-sectional chart review was conducted of Veterans who presented for an initial visit to a VHA chiroprac-

Table 1.
Keele STarT Back Scoring and Prognosis

Risk Category	Prognosis Description
Low Risk (Total Score 3 or less)	Good prognosis, improvement expected, minimal treatment with reassurance to remain active and continue to home care strategies
Medium Risk (Total Score 4 or more and Sub score 3 or less)	Good prognosis, improvement expected but residual pain likely
High Risk (Total score 4 or more and Sub score 4 or more)	Guarded prognosis, improvement likely, but residual pain expected.

tor over a 22-month period. The chiropractic service is administratively aligned under the Integrated Wellness Center (IWC), which includes clinical services under the Whole Health Program. The IWC falls under Anesthesia & Physical Medicine and Rehabilitation Service line. Chiropractic is a specialty service in this particular VHA medical center, meaning a licensed healthcare provider must place a request for services (consultation) after which an appointment is scheduled. During the 22-month period, there was a total of 4 full-time chiropractors, however only the medical records of one (CWP) of those providers reviewed had SBT scores available. The facility also had an established chiropractic clerkship program. During the 22-month period, three chiropractic clerks spent some of their time being supervised by this provider and engaged in the initial evaluation of Veterans, including the administration (via pen and paper), collection, and documentation of baseline prognostic and PRO information. The VHA electronic health record (EHR) system was used to generate a list of all Veterans and the date an initial encounter occurred with this single provider between April 15th, 2021 and January 31st, 2023. Each medical record was reviewed to identify Veterans with LBP (either as the primary concern or in combination with other concerns). Initial visits were completed in-person or virtually. For in-person visits, the medical record corresponding to the initial visit was used to extract data. When the visit occurred virtually, the medical record corresponding to the dates of the virtual and first in-person visits were used to extract data. The study was approved by the Institutional Review Boards of the VA Orlando Healthcare System. We used the Strengthening the Reporting of Observational Studies in Epidemiology guidelines to report this cross-sectional study.[10]

Setting

The chiropractic service is situated within an urban, 1a-High Complexity facility in the Integrated Wellness department, serving Veterans in the South Eastern United States. Level 1a-High Complexity is a descriptive term used by the VHA to identify facilities that possess the highest patient volume and medical risk, as well as the most research activities and clinical training programs compared to other facilities.

Participants

Veterans who presented to a VHA chiropractic clinic with low back pain and underwent SBT screening. Individuals without low back pain or who did not have SBT measures collected at baseline were excluded.

Variables

Primary outcome

The distribution of SBT subgroups: The original 9-item version of the SBT was administered via paper at initial visit and the STarT Back "total score" and "psychological sub-score" were recorded in the Veteran's EHR. These SBT scores were extracted and used to stratify participants according to their STarT Back risk group. The STarT Back scoring system converts the 0-9 total score and the 0-5 psychological sub-score into three categories: (1) low risk (a total score of ≤3), (2) medium-risk (a total score of

≥4 and a sub-score of ≤3), and (3) high risk (a total score of ≥4 and a sub-score of ≥4). SBT scores have previously shown excellent internal consistency (Cronbach's alpha = 0.79) and test-retest reliability (Cohen's kappa = 0.73).[5]

Patient Reported Variables of Interest: The VA/DoD CPG recommends routine collection and use of PROs. In this clinic, all PROs were administered to Veterans via pen and paper, collected, scored, and recorded into the medical record corresponding to the initial in-person visit. During the review of medical records, only PROs recorded in the medical records corresponding the initial visit were collected. Several different PRO measures were encountered during chart reviews. Here, we provide a brief synopsis of each measure.

"Pain average," "interference with Enjoyment of life," and "interference with General activity" (PEG) questionnaire: The ultra-brief three-item PEG questionnaire was validated in ambulatory care settings.[11] The PEG includes one severity item (average pain) and three interference items (enjoyment of life and general activity.) Both the average pain and interference items are scaled from 0-10, with response options at scale point 0 and 10, respectively, of "No pain" and "Pain as bad as you can imagine" for the severity items and "Does not interfere" and "Interferes completely" for the interference items.

Modified Oswestry Disability Index (ODI): The modified version of ODI described by Fairbank *et al*. (1980).[12–14] The ODI has 10 items that assess how LBP affects common daily activities (e.g., sitting, standing, and lifting). The ODI has a range of percentages from 0% ('no disability due to back pain') to 100% ('completely disabled due to back pain'), where higher scores indicate higher interference from LBP. The ODI has been found to have high levels of test-retest reliability [intraclass correlation ICC = 0.90], convergent validity with the Roland Morris disability questionnaire (r > 0.80) and responsiveness (effect size = 1.8) in patients receiving therapy for LBP[12,14] and is recommended as an appropriate measure of self-report of disability for patients with LBP.[15,16]

Quadruple Numeric Rating Scale (NRS): NRS Now, NRS Average, NRS Worst, NRS Least: The NRS is a segmented numeric version of the visual analog scale, where patients select a whole number (0-10 integers), that best reflects the intensity of their pain at a specific period. The anchors are 0 equals "no pain" and 10 equals "worst pain imaginable". The quadruple NRS obtains the intensity of pain across four time periods (current, and average, worst, and least over the prior seven-day period).[17]

PROMIS Short Form v1.0 – Pain Interference 6b and v1.2 – Physical Function 6b: These stand-alone six-item PROMIS Short Forms were administered individually[18,19] and not derived from a PROMIS Profile (for example PROMIS-29). The PROMIS Pain Interference 6b measures self-reported consequences of pain on relevant aspects of a person's life and includes the extent to which pain hinders engagement with social, cognitive, emotional, physical, and recreational activities. The PROMIS Physical Function 6b measures the self-reported capabilities of physical activities, including mobility and instrumental activities of daily living.[20]

Raw scores of PROMIS measures are converted to an interval-standardized T-score, using the scoring manuals available at http://assessmentcenter.net, which is calibrated on large samples of the general population to facilitate normative comparisons. T-scores are centered on a mean of 50 and standard deviation of 10. For PROMIS Physical Function 6b higher scores indicate a greater amount of the physical function. For PROMIS Pain Interference 6b higher scores indicate a greater amount of pain interference.

Additional information was collected from the EHR at the time of data extraction, including demographic characteristics, such as age on the initial visit, sex (male or female), and clinical characteristics, such as body mass index (BMI),[21] and non-age adjusted Charlson Comorbidity Index (CCI).[22,23] BMI was calculated based on height and weight values recorded in the EHR and categorized into (<18.5 kg/m2), (18.5 -<25 kg/m2), (25-<30 kg/m2), (>30.0+ kg/m2), or missing.[21] The CCI was calculated based on the presence of International Classification of Diseases-10 (ICD-10) codes appearing in their medical records and categorized into four groups (CCI = 0, CCI = 1, CCI = 2, CCI = 3 or greater).

Analysis

Descriptive statistics were calculated for demographic variables, clinical variables, and patient reported variables of interest. Frequencies and proportions were used to calculate the distribution of SBT subgroups within Veterans receiving on-site chiropractic care. When applicable, comparisons were made between the Veterans with lower back complaint who had SBT results in their EHR (in-

cluded sample) and those that did not (excluded sample). Analysis of variance was used to compare baseline patient reported variables of interest across the SBT subgroups, with an alpha level 0.05 considered significant. When groups' means were found to differ, post hoc group-wise comparisons were conducted using Tukey Honestly Significant Difference with a family-wise error at 0.05.[24] All analyses were performed using Microsoft Excel (2016),[25] R Statistical Software version 4.3.2[26] and RStudio version 2023.12.1[27] and included the R package tidyverse v3.0.[28]

Results

A total of 251 Veterans were identified during the study timeframe that completed an initial visit with LBP and had SBT data available, see Figure 1 for derivation of the sample. Of the 251 Veterans included, 51 (20.3%) scored low-risk, 107 (42.6%) medium-risk, and 93 (37.1%) high-risk. Baseline demographic and clinical characteristics are displayed in Table 2 of the entire sample and stratified by SBT subgroup. Mean age (SD) of the included sample was slightly lower than the excluded sample, 51.3 years (14.2) and 54.5 years (14.5), respectively. A greater proportion of males were represented in the included sample, 86.9%, compared with the excluded sample (72.5%). Mean BMI was nearly identical in both sample groups while the included sample had twice the number of prior lumbar surgeries. Regarding visit type, the excluded sample was more balanced between virtual and in-person visits while a minority of patients (12.4%) in the included sample were virtual visits. Mean (SD) CCI was higher in the included sample, 1.96 (2.06), compared to the excluded, 1.43 (1.92). Mean age, CCI, and BMI did not differ across SBT subgroups.

Mean patient reported variables of interest differed across SBT subgroups which are displayed in Table 3. Veterans in the high-risk SBT subgroup consistently reported worse scores across multiple PROs compared to those in the low- and medium-risk groups. For example, the PEG total score was highest in the high-risk group (mean = 21.5, SD = 4.1), followed by medium-risk (mean = 18.1, SD = 4.9), and lowest in the low-risk group (mean = 9.8, SD = 4.4). The mean difference between low- and

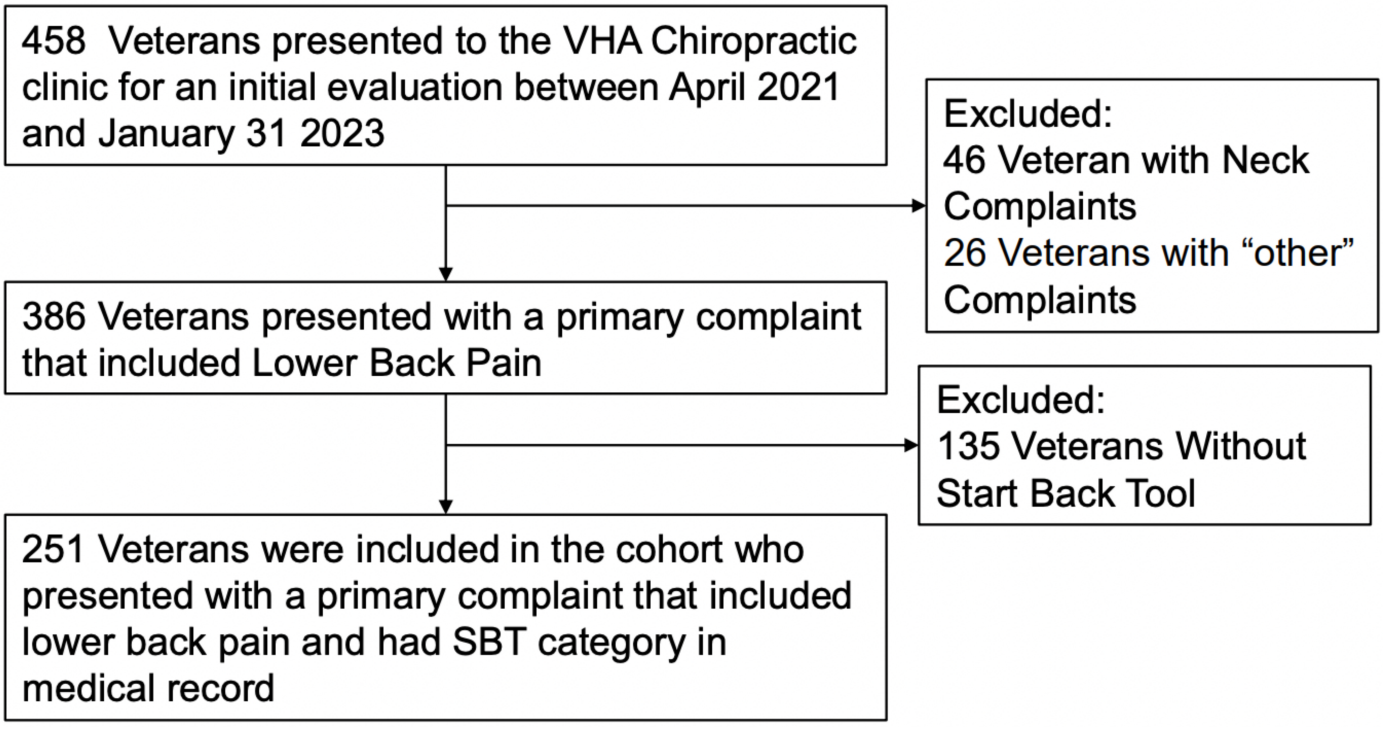

Figure 1.
Flowchart of the study sample

high-risk groups was 11.7 points (95% CI: 7.6–15.9), which was statistically significant.

Similar trends were observed across the PEG subscales. For average pain, the high-risk group reported a mean of 6.9 (SD = 1.6), compared to 5.9 (SD = 1.5) in the medium-risk and 3.8 (SD = 1.8) in the low-risk group. Interference with enjoyment of life and general activity followed the same pattern, with the high-risk group reporting the greatest interference (means = 7.2 and 7.4, respectively).

Table 2.
Sample Characteristics Sample characteristics (Overall and across SBT Subgroups)

Characteristic	Excluded Sample	Included Sample	Low Risk	Medium Risk	High Risk
	N = 207	N = 251	N = 51 (20.3%)	N = 107 (42.6%)	N = 93 (37.1%)
Age Mean (SD)	54.5 (14.5) N = 207	51.3 (14.2)[a] N = 251	52.2 (17.6) N = 51	50.8 (14.2) N=107	51.4 (12.1) N=93
Sex[z]					
Male	150 (72.5%)	218 (86.9%)	47 (21.6%)	93 (42.7%)	78 (35.7%)
Female	57 (27.5%)	33 (13.1%)	4 (12.1%)	14 (42.4%)	15 (45.5%)
Charlson Comorbidity Index Mean(SD)	1.43 (1.92) N = 206	1.96 (2.06)[a] N=246	1.82 (1.61) N=50	1.94 (1.84) N=105	2.05 (2.48) N=91
0	N = 79	N=56	N = 12	N = 22	N = 22
1	N = 65	N=77	N = 14	N = 34	N = 29
2	N = 21	N=36	N = 7	N = 17	N = 12
3+	N = 41	N=77	N = 17	N = 32	N = 28
BMI	31.3 (6.24) N = 206	31.3 (5.62) N = 250	30.5 (5.61) N=50	31.7 (5.74) N=107	31.2 (5.48) N=93
<18.5	N = 2	N = 0	N = 0	N = 0	N = 0
18.5 – < 25	N = 34	N = 26	N = 8	N = 7	N = 11
25 – < 30	N = 58	N = 92	N = 18	N = 41	N = 33
30+	N = 112	N = 132	N = 24	N = 59	N = 49
Missing	N = 1	N = 1	N = 1	N = 0	N = 0
Prior Lumbar Surgery [z]	N = 10	N= 20	N = 4	N = 10	N = 6
Type of Visit [z]					
In-person	N = 122	N = 220	N = 41	N = 95	N = 84
Virtual	N = 84	N = 31	N = 10	N = 12	N = 9

N = sample size
SD = standard deviation
[a] = included sample statistically different from excluded sample
[b] = statistically different from low risk
[c] = statistically different from medium risk
[z] = statistical comparisons across groups were not computed
BMI – Body Mass Index

Table 3.
Sample Patient Reported Outcomes

Patient Reported Outcome Measure	Excluded Sample N = 207	Included Sample N = 251	Low Risk	Medium Risk	High Risk
PEG Total	19.9 (6.0) N = 97	17.9 (6.2) N = 50	9.8 (4.4) N=10	18.1 (4.9)[b] N=19	21.5 (4.1)[b,c] N=21
PEG Sub Score Pain average	6.6 (1.6) N = 97	5.9 (1.9)[a] N = 50	3.8 (1.8) N = 10	5.9 (1.5)[b] N = 19	6.9 (1.6)[b] N = 21
PEG Sub Score interference with Enjoyment of life	6.6 (2.4) N=97	5.9 (2.3) N = 50	3.1 (1.5) N = 10	6.0 (2.0)[b] N = 19	7.2 (1.7)[b] N = 21
PEG Sub Score interference with General activity	6.7 (2.3) N = 97	6.0 (2.4) N = 50	2.9 (1.6) N=10	6.1 (1.9)[b] N=19	7.4 (1.6)[b,c] N=21
ODI (%)	41.6 (16.9) N =10	37.4 (16.3) N = 149	21.1 (9.7) N=25	34.4 (13.6)[b] N=66	47.8 (14.4)[b,c] N=58
NRS Now	5.4 (2.3) N = 53	4.7 (2.0)[a] N = 205	3.1 (1.7) N = 42	4.6 (1.7)[b] N = 85	5.7 (1.9)[b,c] N = 78
NRS Average	6.1 (1.9) N = 51	5.3 (1.6)[a] N = 204	4.2 (1.3) N = 42	5.1 (1.4)[b] N = 84	6.2 (1.5)[b,c] N = 78
NRS Worst	8.7 (1.6) N = 51	8.1 (1.6)[a] N = 204	6.9 (1.9) N = 42	7.9 (1.4)[b] N = 84	9.0 (1.2)[b,c] N = 78
NRS Least	4.1 (2.2) N = 51	2.9 (1.7)[a] N=204	1.6 (1.1) N = 42	2.9 (1.3)[b] N = 84	3.7 (1.8)[b,c] N = 78
PROMIS Physical Function	40.5 (4.0) N = 6	37.9 (5.5) N = 81	42.8 (4.8) N = 20	38.3 (3.6)[b] N = 33	34.0 (4.8)[b,c] N = 28
PROMIS Pain Interference	61.6 (5.6) N = 5	63.9 (5.7) N=81	59.6 (4.3) N=20	62.6 (4.3) N=33	68.4 (5.0)[b,c] N=28

N = sample size
SD = standard deviation
[a] = included sample statistically different from excluded sample
[b] = statistically different from low risk
[c] = statistically different from medium risk
PEG = "Pain average," "interference with Enjoyment of life," and "interference with General activity" questionnaire; ODI = Modified Oswestry Disability Index; NRS = Numeric Rating Scale

Disability, as measured by the ODI, was also significantly higher in the high-risk group (mean = 47.8%, SD = 14.4%) compared to medium-risk (mean = 34.4%, SD = 13.6%) and low-risk (mean = 21.1%, SD = 9.7%). The mean difference between high- and low-risk groups was 26.6 percentage points (95% CI: 19.1–34.2).

Across the NRS domains, the high-risk group reported the highest pain intensity at all time points. For example, NRS "now" scores were 5.7 (SD = 1.9) in the high-risk group, compared to 4.6 (SD = 1.7) in medium-risk and 3.1 (SD = 1.7) in low-risk. Similar gradients were observed for NRS average, worst, and least pain.

On the PROMIS measures, the high-risk group had the lowest physical function (mean T-score = 34.0, SD = 4.8) and highest pain interference (mean T-score = 68.4, SD = 5.0). These scores were significantly different from both the low- and medium-risk groups. For example, the mean difference in PROMIS Pain Interference between high- and low-risk groups was 8.8 points (95% CI: 5.5–12.0), and for Physical Function, the difference was also 8.8 points (95% CI: 5.7–11.8). Mean group differences in PROs and 95% confidence intervals (CI) are displayed in Table 4.

Discussion

We conducted a retrospective chart review of consecutive Veterans with low back pain who completed an initial assessment with a chiropractor and report on the relative distribution of SBT subgroups. Our findings suggest chiropractors in the VHA may encounter a distribution of SBT subgroups that includes a greater proportion of medium and high-risk subgroups compared to the low-risk subgroup. Further, we found that Veterans in the high-risk subgroup reported significantly greater pain intensity, interference with daily life, and disability compared to those in the medium- and low-risk subgroups. These differences were consistent across multiple validated PROs, including the PEG, ODI, NRS, and PROMIS measures. For example, PROMIS Pain Interference scores were nearly 9 points higher in the high-risk group compared to the low-risk group, while PROMIS Physical Function scores were nearly 9 points lower, indicating substantial differences in perceived function and pain burden. These findings support the discriminative validity of the SBT in this VHA chiropractic setting. The distribution of SBT subgroups we identified is similar with the distribution of subgroups in the VHA primary care setting[7]; where in a sample of 576 Veterans, 17.0% were classified as low

Table 4.
SBT Subgroup differences in Patient Reported Outcomes

Patient Reported Outcome Measure	Low – Medium Risk Mean Difference [95% CI]	Low – High Risk Mean Difference [95% CI]	Medium – High Risk Mean Difference [95% CI]
PEG Total	8.3 [4.0-12.5]	11.7 [7.6 – 15.9]	3.5 [0.04 – 6.9]
PEG Sub Score Pain average	2.1 [0.6 – 3.7]	3.1 [1.6 – 4.5]	0.9 [-0.3 – 2.1]
PEG Sub Score interference with Enjoyment of life	2.9 [1.2 – 4.6]	4.1 [2.4 – 5.8]	1.2 [-0.2 – 2.6]
PEG Sub Score interference with General activity	3.2 [1.6 – 4.8]	4.5 [2.9 – 6.1]	1.3 [0.02 – 2.6]
ODI (%)	13.3 [5.9 – 20.7]	26.6 [19.1 -3 4.2]	13.3 [7.7 – 19.0]
NRS Now	1.6 [0.8 – 2.3]	2.6 [1.9 – 3.4]	1.1 [.4 – 1.7]
NRS Average	0.9 [0.3 – 1.6]	2.0 [1.4 – 2.6]	1.1 [0.5 -- 1.6]
NRS Worst	1.0 [0.3 – 1.6]	2.1 [1.5 – 2.7]	1.1 [0.6 – 1.6]
NRS Least	1.3 [0.6 – 1.9]	2.1 [1.3 – 2.7]	0.8 [0.3 – 1.4]
PROMIS Physical Function	4.5 [1.6 – 7.5]	8.8 [5.7 – 11.8	4.3 [1.6 – 6.9]
PROMIS Pain Interference	2.9 [-0.2 – 6.1]	8.8 [5.5 – 12.0]	5.8 [3.0 – 8.6]

PEG = "Pain average," "interference with Enjoyment of life," and "interference with General activity" questionnaire; ODI = Modified Oswestry Disability Index; NRS = Numeric Rating Scale

risk, 35.5% as medium-risk, and 47.6% as high risk. In the primary care sample, the observed risk of persistent disabling LBP at 6-months substantially increased when comparing medium and high-risk subgroups to the low-risk subgroup and a modest but significant increase in risk when comparing the high-risk subgroup to medium-risk subgroup. Hill *et al*. developed a practical way to utilize the SBT indicators to identify appropriate care pathways based on prognostic indicators in the primary care setting that informed appropriate interventions. The proposed interventions included analgesia, advice and education for the low-risk subgroup, physiotherapy for the medium-risk subgroup, and a combination of physical and cognitive behavioral approaches for the high-risk subgroup.[5] While our study provides the relative frequencies of the SBT subgroups, the ability to predict future improvements in pain or disability was not addressed and requires further investigation.

The frequency of SBT subgroups in published cohorts of lower back pain is not uniform. Figure 2 depicts the relative frequency of SBT subgroups from 14 published samples of individuals with low back pain, [6,7,9,23,29–38] of which includes samples from US populations. One sample of patients presenting to chiropractors,[9] 2 samples presenting to physical therapy clinics,[37,38] one sample of Veterans presenting to primary care in the VHA[7] and 1 sample of patients presenting to primary care in the US.[6] Our results suggest that the prognosis of improvement from treatment may differ across clinical populations, as reflected by the distribution of SBT subgroups. Compared to published cohorts in non-VHA settings—including primary care and physical therapy clinics—the Veterans

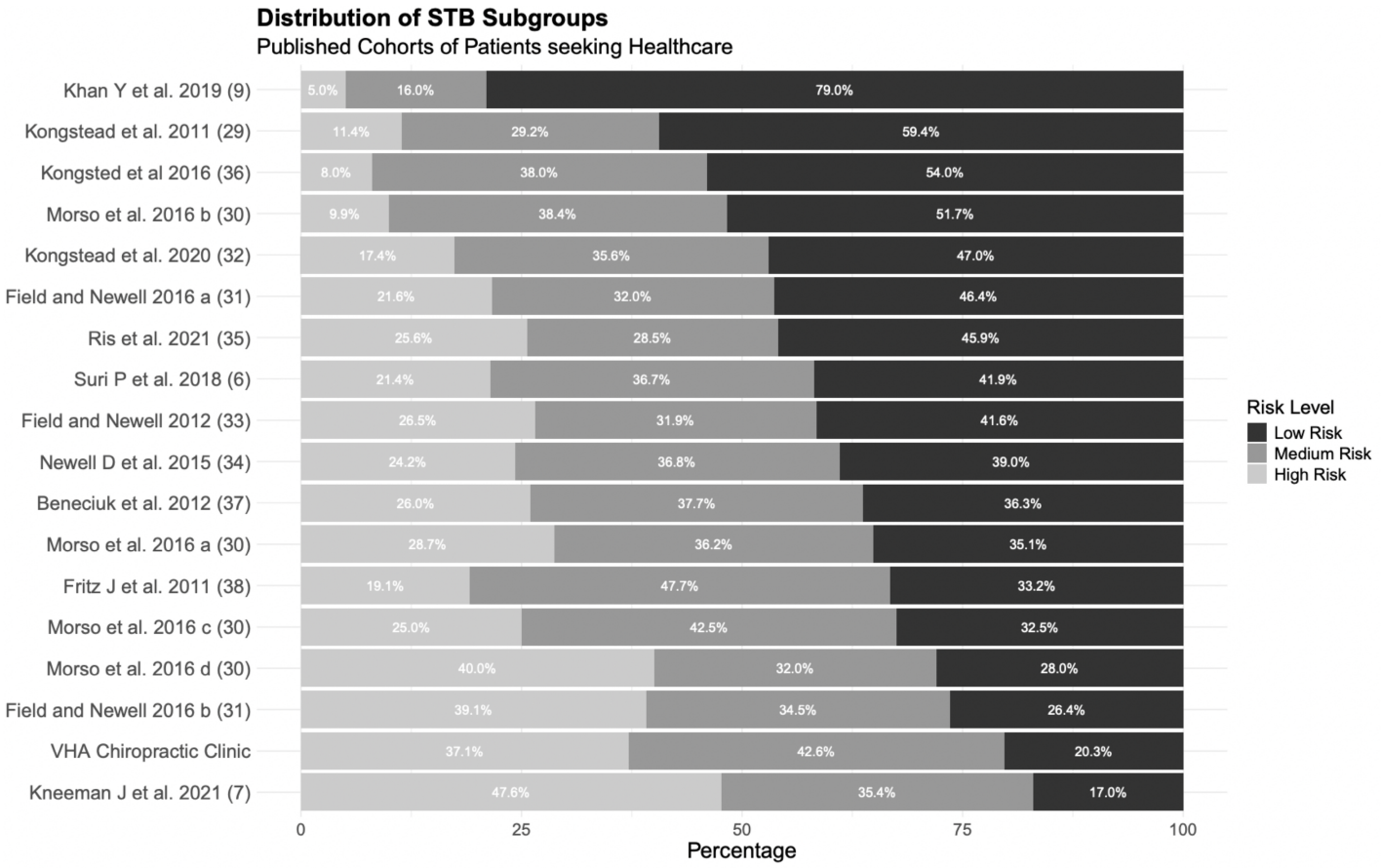

Figure 2.

Distribution of STB Subgroups. Includes current study population and published patient populations seeking healthcare

in our sample had a higher proportion of medium- and high-risk classifications (See Table 5 for further descriptions of the included samples, including general clinical setting, size, and location.). This may reflect the complex biopsychosocial profiles of Veterans seeking care in the VHA system. While the SBT has demonstrated predictive validity in some U.S. primary care populations[6] and within the VHA[7] its prognostic utility has been more limited in other settings, particularly when used outside of its original context or without accompanying stratified

Table 5.
The Distribution of *STaRT Back Prognostic Subgroups across published samples of individuals with low back pain*.

Referenced Published Sample	Sample Size	Description of Clinic Location	Country	Low Risk N (%, [95% CI])	Medium Risk N (%, [95% CI])	High risk N (%, [95% CI])
Khan Y et al. 2019[8]	496	3 Chiropractic College outpatient teaching clinics	United States	392 (79%, [75.2 – 82.5])	81 (16% [13.2 – 19.9])	23 (5% [3.0 – 6.9])
Kongstead et al. 2011[29]	475	19 Private Sector Danish Chiropractic Clinics organized under the Nordic Institute of Chiropractic and Clinical Biomechanics	Denmark	282 (59.4% [54.8 – 63.8])	139 (29.2% [25.2 – 33.6])	54 (11.4% [8.7 – 14.6])
Morso et al. 2016[30]	265	General Primary Care	Denmark	93 (35.1% [29.4 – 41.2])	96 (36.2% [30.4 – 42.3])	76 (28.7% [23.3 – 34.5])
Morso et al. 2016[30]	416	Chiropractic Practice	Denmark	215 (51.7% [46.8 – 56.6])	160 (38.4% [33.8 – 43.3])	41 (9.9% [7.2 – 13.1])
Morso et al. 2016[30]	200	Physiotherapy Clinics	Denmark	65 (32.5% [26.1 – 39.5])	85 (42.5% [35.6 – 49.7])	50 (25.0% [19.2 – 31.6])
Morso et al. 2016[30]	974	Spine Care Center	Denmark	273 (28.0% [25.2 – 31.0])	312 (32.0% [29.1 – 35.1])	389 (40.0% 36.9 – 43.1])
Ris et al. 2021[35]	2327	Danish GLA:D Back Cohort	Denmark	1069 (45.9% [43.9 – 48.0])	663 (28.5% [26.7 – 30.4])	595 (25.6% [23.8 – 27.4])
Kongstead et al. 2020[32]	2828	Danish Chiropractic LBP Cohort (ChiCo)	Denmark	1328 (47.0% [45.1 – 48.8])	1006 (35.6% [33.8 – 37.4])	494 (17.4% [16.1 – 18.9])
Field and Newell 2012[33]	404	Patients visiting one of 6 chiropractic clinics in the south of England	United Kingdom	168 (41.6% [36.7 – 46.6])	129 (31.9% [27.4 – 36.7])	107 (26.5% [22.2 – 31.1])
Newell D et al. 2015[34]	749	Patients recruited at 11 chiropractic clinics in the UK	United Kingdom	292 (39.0% [35.5 – 42.6])	277 (37.0% [33.5 – 40.6])	180 (24.0% [21.0 – 27.3])
Kongsted et al 2016[36]	765	Patients visiting one of 40 chiropractors at 17 Danish chiropractic clinics	Denmark	412 (53.9% [50.3 – 57.4])	291 (38.0% [34.6 – 41.6])	62 (8.1% [6.3 – 10.3])
Field and Newell 2016[31]	3537 (Private)	Chiropractic Clinics	United Kingdom	1639 (46.3% [44.7 – 48.0])	1133 (32.0% [30.5 – 33.6])	765 (21.6% [20.3 – 23.0])
Field and Newell 2016[31]	2591 (NHS)	Chiropractic Clinics	United Kingdom	684 (26.4% [24.7 – 28.1])	894 (34.5% [32.7 – 36.4])	1013 (39.1% [37.2 – 41.0])
Fritz J et al. 2011[38]	214	Physical Therapy Clinic	United States	71 (33.2% [26.9 – 39.9])	102 (47.7% [40.8 – 54.6])	41 (19.1% [14.1 – 25.1])
Beneciuk et al. 2012[37]	146	Physical Therapy Clinic	United States	53 (36.3% [28.5 – 44.7])	55 (37.7% [29.8 – 46.1])	38 (26.0% [19.1 – 33.9])
Kneeman J et al. 2021[7]	546	Primary Care Veterans Administration	United States	93 (17.0% [13.4 – 20.5])	193 (35.4% [31.3 – 39.5])	260 (47.6% [43.4 – 51.9])
Suri P et al. 2018[6]	1218	General Primary Care Clinics in the Group Health integrated healthcare system (MATCH Cohort)	United States	510 (41.9% [39.1 – 44.7])	447 (36.7% [34.0 – 39.5])	261 (21.4% [19.2 – 23.8])
Current Study Results	251	Chiropractic Clinic Veterans Administration	United States	51 (20.3% [15.5 – 25.8])	107 (42.6% [36.4 – 49.0])	93 (37.1% 31.0 – 43.4])

care pathways.[5–7,9,33,37,38] These contextual differences underscore the importance of evaluating the SBT's performance within specific clinical environments, such as chiropractic care in the VHA.

Our chart review found that only 65% of Veterans with LBP were administered a SBT questionnaire. Considerable potential remains to administer the questionnaire more routinely in clinical practice. In contrast, a PRO was collected in every medical record reviewed. This may speak to the known utility of these measures compared to the SBT. Notably, while the SBT was collected in only 65% of eligible Veterans, PROs were documented in every chart reviewed. This may reflect the greater clinical utility of PROs in guiding care and tracking outcomes, whereas the SBT remains primarily a prognostic tool. The consistent differences in PROs across SBT subgroups in our sample suggest that the tool may still offer value in identifying Veterans at risk for greater pain and disability, even if its predictive validity for treatment response remains to be established in this setting.

The SBT is a prognostic tool without known clinical utility in the VHA clinical setting, whereas PRO collected repeatedly helps to inform the effectiveness of care for each individual. We found divergent use of PRO; however, it is unknown why differential selections were made. While speculative, shorter measures may have been used more often when appointment time was constrained due to external factors such as patients arriving late or complex histories, while longer measures may have been used in more straightforward cases. Although it is beyond the scope of this article, further assessment of facilitators and barriers to implementation of routine collection of the SBT is an area for further exploration. While we are the first to describe the distribution of SBT subgroups in this setting, its clinical utility remains uncertain. It remains unknown if the results of questionnaire impacted clinical decision making or clinical outcomes. Our results do, however, suggest the prognosis of improvement from a treatment may be lower in Veterans with LBP presenting for care in the VHA chiropractic healthcare setting compared to non-VHA settings (see Figure 2 and Table 5).

Limitations

While the data from our sample of Veterans receiving on-station chiropractic care provides preliminary insights on the distribution of SBT subgroups, there are limitations. First, data are from an EHR that was not primarily intended for research and may be subject to the errors inherent in all clinical and administrative data, including missing or miscoding of diagnoses, procedures, and medications. In our data we found a variety of PRO measures were collected. Although every chart reviewed had PRO which is consistent with CPG, the relative frequency of any one PRO was low. Thus, unlike prospective studies, where the uniform data collection is planned, retrospective studies may be impacted by changes in clinical practice patterns. For example, in this study, the PROMIS measures were implemented over more familiar measures because they are condition agnostic.

Although the information is available in the medical charts of the VHA, this chart review did not capture several salient features often used to further describe samples such as race, ethnicity, duration of LBP, concomitant treatments, and the presence of leg pain. In the present study, the medical record corresponding to initial intake is documented in narrative format. Thus, without interpretation it was impractical to extract whether a Veteran met generally accepted definitions of LBP duration such as "acute", "sub-acute", "chronic", "recurrent", "chronic-recurrent", "flare", "exacerbation of chronic condition", or another clinical LBP trajectory. [39–43] The included sample did appear different from the excluded sample on some demographic (age) and clinical (CCI) variables as well as PROs. Considering percentage of Veterans who did not have the SBT score in the EHR, a bias may be impacting the distribution, where individuals likely to be in the "low risk" group were not administered or did not complete the SBT. Further, CCI was utilized from ICD-10 codes extrapolated during the chart review as proxy in order to assess trends between the questionnaire distribution and the magnitude of overlapping health conditions. However, this practice is not a true indicator of comorbidities. The mean CCI of our sample was less than previously published results[44], which is likely the result of not including an age adjustment that was used in the prior work. Both samples however had roughly 70% of the sample > 0 CCI. The distribution of BMI categories in our sample is similar to published results of Veterans with LBP receiving chiropractic care.[45]

Conclusion

The distribution of prognostic subgroups in Veterans

presenting to a VHA chiropractic clinic has a greater frequency of medium and high-risk patients compared to low risk. On average, Veterans in the "high-risk" group report higher pain and disability ratings at baseline compared to the "low-risk" and "medium-risk" subgroups.

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Contributions

Concept development: CWP, CJR. Design: CWP, CJR, SMS. Supervision: CWP. Data collection/processing: CWP, SMS. Analysis/interpretation: CWP, CJR, MJB. Literature search: CJR, CWP. Writing:: CJR, CWP. Critical review: CJR, SMS, MRC,MJB, AMCW.

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