ORIGINAL RESEARCH

Outcomes After Injection-Based Therapy: A Pain Outcomes Questionnaire for Veterans Univariate Analysis

Taif Mukhdomi, MD[a,b]; Travis Brown, MD[a,c]; Danielle Lovett-Carter, MD[a,e]; and Afreen Siddiqui, MD[a,d]

Background: The Pain Outcomes Questionnaire-For Veterans (POQ-VA) was developed within the Veterans Health Administration (VHA) as a brief but psychometrically sound pain outcomes instrument that assesses key domains. In routine clinical practice, it is valid and reliable for evaluating effectiveness of treatment of chronic noncancer pain in veterans. We hypothesized that POQ-VA scores would improve across multiple domains in the veteran population following injection-based interventional treatment for chronic pain.

Methods: We aggregated all available POQ-VA reports from veterans who underwent ≥ 1 interventional pain procedures between April 1, 2009 and April 1, 2019. Patients were included who had pre- and posttreatment POQ-VA results separated by ≤ 6 months (N = 112). A paired-samples *t* test was used to compare means, standard deviations, and ranges for each POQ-VA domain. Individual question responses were analyzed using a nonparametric Wilcoxon matched-pairs signed-rank test.

Results: All POQ-VA domains showed a statistically significant decrease posttreatment ($P \leq .03$). Directionally, the responses to 17 of 20 individual POQ-VA questions reflect a small but statistically significant positive treatment response ($P < .04$).

Conclusions: Most veterans undergoing injection therapy for chronic pain had statistically significant improvements in POQ-VA measures within a 6-month period. To conduct more rigorous, multivariate studies, continued and widespread use of the POQ-VA instrument is warranted.

Author affiliations can be found at the end of this article.
Correspondence: Taif Mukhdomi (tmukhdomi@gmail.com)

Fed Pract. 2022;39(4). Published online April 11. doi:10.12788/fp.0244

Chronic pain is persistent or recurring pain lasting more than 3 months past normal healing time. Primary care professionals usually refer patients experiencing chronic pain to pain specialists to better identify, treat, and manage the pain. Chronic noncancer-related pain affects more Americans than diabetes mellitus, cardiac disease, and cancer combined.[1] Veterans are no exception. The prevalence of severe pain was significantly higher in veterans compared with that of nonveterans who had back pain (21.6 vs 16.7%, respectively), jaw pain (37.5 vs 22.9%, respectively), severe headaches or migraine (26.4 vs 15.9%, respectively), and neck pain (27.7 vs 21.4%, respectively).[2] At an individual level, those who experience chronic pain can expect impaired functional capacity, reduced ability to work, sleep disturbance, reduced social interactions, and considerable psychological distress. At a societal level, the cost of treating chronic pain is exorbitant, exceeding $600 billion annually, yet treatment outcomes remain variable at best.[3] Greater efforts are needed to improve and standardize patient outcomes.

Interventional pain procedures performed under fluoroscopic or ultrasound guidance by specialist physicians have shown mixed responses in previous studies. Past systematic reviews demonstrate reductions in pain scores after lumbar or caudal epidural steroid injections (ESIs) and radiofrequency ablation of nerves supplying lumbar and thoracic facet joints.[4-7] However, one review found insufficient evidence to support injection therapy for chronic low back pain.[8] Unfortunately, the majority of the included studies evaluated outcomes using the visual analogue scale (VAS) or other limited factors, such as physical examination findings. Current biopsychosocial conceptualizations of chronic pain are beginning to recognize the complex nature of the experience of pain and highlighting the significance of multimodal management.[9] It is vital that our assessment of chronic pain, like our treatment options, be multidimensional and reflect these underpinning principles.

The Pain Outcomes Questionnaire-For Veterans (POQ-VA) was developed within the Veterans Health Administration (VHA) by Clark and colleagues in 2003. It represents a brief but psychometrically sound pain outcomes instrument that assesses all key domains and meets accreditation body standards. The POQ-VA is valid and reliable for evaluating effectiveness of treatment of chronic noncancer pain in veterans in routine clinical practice.[10] This review is the

TABLE 1 Pain Outcomes Questionnaire-for Veterans Domain Scores

Pain Impairment Measures	Points in Scale	Pretreatment, Mean (SD)	Posttreatment, Mean (SD)	Δ, %	*P* value
Pain/pain intensity	10	7.2 (2.0)	5.4 (2.7)	↓24.9	< .001
Mobility	40	24.9 (10.9)	19.6 (11.9)	↓21.5	< .001
Activities of daily living	40	11.7 (11.5)	9.0 (10.8)	↓23.3	< .001
Vitality, activity, and energy levels	30	18.2 (5.4)	16.9 (5.3)	↓7.2	.003
Negative affect, dysphoria, and associated symptoms	50	21.4 (13.3)	17.9 (13.9)	↓16.4	< .001
Fear, avoidance	20	12.4 (4.8)	11.2 (4.8)	↓9.1	.003
Total	190	94.8 (35.6)	79.2 (38.0)	↓16.5	< .001

first study to use the POQ-VA to assess the impact of interventional pain procedures on veterans with chronic noncancer pain.

The aim of this study was to perform a retrospective review of POQ-VA scores before and after injection-based interventional treatment for chronic pain to determine whether the procedure affected patient outcomes. We hypothesized that POQ-VA scores would improve across multiple domains in the veteran population postprocedure. This study was approved by the Institutional Review Board (IRB-2018-053) at the Providence Veterans Affairs Medical Center (VAMC) in Rhode Island.

METHODS

Using the Computerized Patient Record System, all adult veteran patients who had attended at least 2 appointments between April 1, 2009, and April 1, 2019 at the Providence VAMC interventional pain clinic were identified. POQ-VA reports were extracted provided the following criteria were met: (1) the veteran received an injection-based interventional treatment for chronic pain, including trigger point injections, ESIs, nerve blocks, and radiofrequency ablations; (2) the veteran completed POQ-VA both pre- and posttreatment; and (3) posttreatment POQ-VA reports were completed within 6 months of treatment. All patients who did not fit these criteria were excluded from the study.

After deidentification, 112 pre- and posttreatment POQ-VA reports were identified. All subsequent statistical analyses were conducted using Stata SE version 15. Descriptive statistics including mean, range, SD, and percent change were computed for POQ-VA domain—pain, mobility, activities of daily living (ADL), vitality, negative affect, fear, and total raw score—as well as for each POQ-VA question. Given that POQ-VA domain scores were found to be approximately normally distributed without outliers, domain scores were treated as continuous variables, and a paired samples *t* test was conducted to compare means among POQ-VA domains. Individual question responses were analyzed using nonparametric testing methods to account for the lack of normal distribution in each question, treating the range of 0 to 10 as an ordinal variable. A Wilcoxon matched-pairs signed-rank test was conducted to compare means among individual question responses before and after treatment.

RESULTS

Of 112 included patients, 102 (91%) were male and 10 (9%) were female. The mean age was 62 years (range, 35-90). Diagnosis and procedures varied due to patient symptoms varying from muscle pain, nerve pain, degenerative disc disease, and osteoarthritis.

POQ-VA scores across all domains, including total raw score, showed statistically significant improvement after treatment (Table 1). Directionally, the POQ-VA scores for all 20 questions reflect a positive treatment response and 17 had statistically significant changes ($P < .05$) (Table 2). The changes in self-perceived energy

TABLE 2 Pain Outcome Questionnaire-for Veterans Individual Question Scores (N = 221)

Question Topics	Pretreatment, Mean (SD)	Posttreatment, Mean (SD)	*P* Value
Pain	7.2 (2.0)	5.4 (2.7)	< .01
Walk	6.9 (3.0)	5.3 (3.1)	< .01
Carry	6.6 (3.2)	5.1 (3.4)	< .01
Stairs	6.9 (2.9)	5.5 (3.4)	< .01
Cane	4.5 (4.3)	3.7 (4.2)	< .01
Bathe	3.4 (3.4)	2.6 (3.2)	< .01
Dress	3.5 (3.2)	2.8 (3.1)	< .01
Bathroom	2.6 (3.1)	2.0 (2.9)	< .01
Groom	2.2 (3.0)	1.6 (2.8)	.03
Esteem	5.2 (3.6)	3.8 (3.7)	< .01
Activity	3.7 (2.5)	4.2 (2.5)	.01
Energy	4.2 (2.3)	4.5 (2.1)	.16
Strength	3.9 (2.1)	4.4 (2.2)	.01
Depression	3.7 (3.1)	3.3 (3.1)	.02
Anxiety	3.8 (3.0)	3.3 (3.2)	.04
Reinjure	6.6 (7.2)	5.5 (3.5)	.02
Safe	3.8 (2.8)	4.9 (2.8)	.09
Concentrate	3.9 (3.3)	3.1 (3.2)	< .01
Tense	4.9 (3.2)	4.4 (3.4)	.06

level, safety, and feelings of tension were not statistically significant. Esteem had the greatest magnitude decrease, falling from 5.2 preprocedure to 3.8 postprocedure ($P < .001$). Other similarly significant magnitudes of improvement were seen from pre- to postprocedure in questions pertaining to grooming (2.2 to 1.6, $P = .003$) and the ability to use the bathroom (3.4 to 2.6, $P < .001$).

DISCUSSION

The most important finding of this study was the ability of the POQ-VA to detect statistically significant positive responses to injection therapy across all domains. The largest improvements were in self-reported pain intensity, pain-related impairment in mobility and ADLs, and self-reported dysphoric effects. The single largest improvement posttreatment was a reduction in scores related to low self-esteem.

Chronic pain can be assessed in a variety of ways ranging from physical examination findings and subjective numerical ratings to extensive patient-reported questionnaires. The International Association for the Study of Pain acknowledges that pain is a complex experience and recommends assessment should be comprehensive.[11] Many patient-reported questionnaires are available to clinicians, including some that address pain in a specific body part, such as the Oswestry Low Back Pain Disability Questionnaire, or those that focus on depression or quality-of-life measures, such as the SF-36.[12,13]

One major benefit of using the POQ-VA is its potential to demonstrate benefits across multiple domains, reflecting the complex nature of chronic pain. The POQ-VA also separates domain or scale scores, allowing clinicians to identify individuals with different patterns of dysfunction across domains.[10] This separation also provides insight into which treatment options are best for chronic pain patients with predominant patterns or lower scores in certain domains. The use of a single summary score, as seen in other questionnaires such as the Roland-Morris Activity Scale, may conceal treatment-induced changes in specific outcome domains.[14] Additionally, like many other similar instruments, the POQ-VA is easy to understand and use, requires no special training, takes little time to complete, and can be completed in person or over the phone.

As chronic pain has been studied further and its complexity recognized, more instruments have been developed and modified to reflect these new elements. There is no one scale applicable to all populations. A discussion about the strengths and weaknesses of each available assessment tool is outside the scope of this review. However, to date, the POQ-VA is the only instrument that has been validated to detect change following treatment of chronic pain in an exclusively veteran population.[10] This validation emphasizes the importance of this study as it supports the use of this outcome

measure to monitor treatment of pain in VA facilities.

One of the secondary findings indicated that injection therapy improved veterans' physical activity levels and self-esteem and lowered pain scores as well as kinesiophobia and anxiety. The role of interventional procedures has been well established in the field of chronic pain, but their efficacy has been less clear. Injections are costly and not without risk, and these factors relegate them to fourth-line treatment options in most situations.[15] Several meta-analyses have demonstrated small improvements in pain scores and patient-reported questionnaires after medial branch blocks, and lumbar or caudal ESIs for chronic back pain.[5-7] However, an updated Cochrane Review concluded that there was insufficient evidence to support the use of injection therapy in subacute and chronic low back pain.[8] The review acknowledged the limited methodologic quality of the trials and could not definitively report that injection therapy did not have benefits for certain subgroups of patients. The ability of researchers to detect benefit from an intervention is intrinsically linked to how outcomes are determined. The most interesting finding of our study was the patient-reported improved self-esteem scores. Many trials included in the systematic reviews discussed used outcome measures that did not have the multidimensional scope to demonstrate such a potential benefit.

Limitations

Our relatively small sample size represents the main shortcoming of this study. Because many posttreatment questionnaires were never collected, unfortunately, much potential data was lost. Most procedures performed were corticosteroid injections for the treatment of low back pain. This represented a combination of lumbar ESI, caudal ESI, medial branch blocks, and sacroiliac joint injections. The limited numbers meant that a further regression analysis of each injection type was not possible. Since few interventions treated pain in other areas of the body, it is difficult to determine whether procedures such as hip joint injections and ilioinguinal nerve blocks provided overall benefit. In the same vein, there is an inability to comment on which injection for chronic low back pain was the most efficacious.

The veteran population, while similar to the general population experiencing chronic pain, is more likely to experience PTSD and other mental health conditions.[2] According to medical literature, no randomized controlled trials have been published examining pain interventions exclusively in veterans, so the applicability of these results needs further investigation. This study suggests there are potential benefits for the veteran population, not solely perhaps from receiving injection therapy, but to having access to an interventional pain clinic led by a pain physician within a network of other specialties. While limited by the inherent biases of a retrospective review, this study highlights the potential value in continuing to study this subgroup of patients, especially in the setting of an interdisciplinary approach.

Recent literature suggests interdisciplinary chronic pain management represents the best outcomes for patients' physical, emotional, and social health, though these kinds of focused outpatient programs have not been studied on a large scale.[16] The evolution of pain management in recent years to incorporating a biopsychosocial model has revolutionized how pain is treated and assessed, with multiple studies suggesting the greatest benefits lie in a multipronged approach.[16,17] Past studies assessing individual interventions for chronic pain tend not to show strongly positive results, further reinforcing the idea that the answer does not lie in a specific treatment. Many veterans who were included in this study possibly had received or were receiving adjunct therapies such as physical therapy, cognitive behavioral therapy, and acupuncture for pain management, as well as oral and topical medications. Unfortunately, due to the selected methodology, it was not possible for us to gather those data. In turn, we were unable to determine how much these additional factors played a role in changing patient scores, alongside injection therapy. This inability to control variables in this type of research continues to present a challenge to data interpretation, even in the highest quality of research, as acknowledged by Staal and colleagues.[8]

Future research may be best focused by expanding our knowledge of outpatient

interdisciplinary pain management programs. Some interventions may be more relevant for a particular group within a program, and this information can be useful to direct resources.[18] Future prospects will require an appropriate multidimensional assessment tool, and the POQ-VA is an example of a valid and reliable option for monitoring progress in pain management in the veteran population.

CONCLUSIONS

The POQ-VA is the only instrument to date that has been validated to detect change following treatment of chronic pain in an exclusively veteran population. Our study is the first univariate analysis since the instrument's validation in 2003. Our descriptive and inferential statistics suggest that the majority of veterans undergoing injection therapy for chronic pain had statistically significant improvements in POQ-VA measures within a 6-month period following treatment. In order to conduct more rigorous, multivariate studies, continued and more widespread use of the POQ-VA instrument is warranted.

Author affiliations

[a]Warren Alpert Medical School of Brown University, Providence, Rhode Island
[b]Weill Cornell Medical College, New York, New York
[c]Brigham and Women's Hospital, Boston, Massachusetts
[d]Providence Veterans Affairs Medical Center, Rhode Island
[e]University of Utah, Salt Lake City

Author disclosures

The authors report no actual or potential conflicts of interest or outside sources of funding with regard to this article.

Disclaimer

The opinions expressed herein are those of the authors and do not necessarily reflect those of *Federal Practitioner*, Frontline Medical Communications Inc., the US Government, or any of its agencies.

Ethics and consent

This study was approved by the Providence Veterans Affairs Medical Center Institutional Review Board (IRB-2018-053).

References

1. Johannes CB, Le TK, Zhou X, Johnston JA, Dworkin RH. The prevalence of chronic pain in United States adults: results of an Internet-based survey. *J Pain.* 2010;11(11):1230-1239. doi:10.1016/j.jpain.2010.07.002
2. Nahin RL. Severe Pain in Veterans: The effect of age and sex, and comparisons with the general population. *J Pain.* 2017;18(3):247-254. doi:10.1016/j.jpain.2016.10.021
3. Witkin LR, Farrar JT, Ashburn MA. Can assessing chronic pain outcomes data improve outcomes?. *Pain Med.* 2013;14(6):779-791. doi:10.1111/pme.12075
4. Benyamin RM, Manchikanti L, Parr AT, et al. The effectiveness of lumbar interlaminar epidural injections in managing chronic low back and lower extremity pain. *Pain Physician*. 2012;15(4):E363-E404.
5. Zhai J, Zhang L, Li M, et al. Epidural injection with or without steroid in managing chronic low-back and lower extremity pain: a meta-analysis of 10 randomized controlled trials. *Am J Ther.* 2017;24(3):e259-e269. doi:10.1097/MJT.0000000000000265
6. Parr AT, Manchikanti L, Hameed H, et al. Caudal epidural injections in the management of chronic low back pain: a systematic appraisal of the literature. *Pain Physician.* 2012;15(3):E159-E198.
7. Lee CH, Chung CK, Kim CH. The efficacy of conventional radiofrequency denervation in patients with chronic low back pain originating from the facet joints: a meta-analysis of randomized controlled trials. *Spine J.* 2017;17(11):1770-1780. doi:10.1016/j.spinee.2017.05.006
8. Staal JB, de Bie R, de Vet HC, Hildebrandt J, Nelemans P. Injection therapy for subacute and chronic low-back pain. *Cochrane Database Syst Rev.* 2008;2008(3):CD001824. Published 2008 Jul 16. doi:10.1002/14651858.CD001824.pub3
9. Gironda RJ, Clark ME. Cluster analysis of the pain outcomes questionnaire. *Pain Med.* 2008;9(7):813-823. doi:10.1111/j.1526-4637.2007.00397.x
10. Clark ME, Gironda RJ, Young RW. Development and validation of the Pain Outcomes Questionnaire-VA. *J Rehabil Res Dev.* 2003;40(5):381-395. doi:10.1682/jrrd.2003.09.0381
11. Watt-Watson J, McGillion M, Lax L, et al. Evaluating an Innovative eLearning Pain Education Interprofessional Resource: A Pre-Post Study. *Pain Med.* 2019;20(1):37-49. doi:10.1093/pm/pny105
12. Fairbank JC, Couper J, Davies JB, O'Brien JP. The Oswestry low back pain disability questionnaire. *Physiotherapy.* 1980;66(8):271-273.
13. Ware JE Jr, Sherbourne CD. The MOS 36-item short-form health survey (SF-36). I. Conceptual framework and item selection. *Med Care.* 1992;30(6):473-483.
14. Jensen MP, Strom SE, Turner JA, Romano JM. Validity of the Sickness Impact Profile Roland scale as a measure of dysfunction in chronic pain patients. *Pain*. 1992;50(2):157-162. doi:10.1016/0304-3959(92)90156-6
15. Hylands-White N, Duarte RV, Raphael JH. An overview of treatment approaches for chronic pain management. *Rheumatol Int.* 2017;37(1):29-42. doi:10.1007/s00296-016-3481-8
16. Bujak BK, Regan E, Beattie PF, Harrington S. The effectiveness of interdisciplinary intensive outpatient programs in a population with diverse chronic pain conditions: a systematic review and meta-analysis. *Pain Manag.* 2019;9(4):417-429. doi:10.2217/pmt-2018-0087
17. Guzmán J, Esmail R, Karjalainen K, Malmivaara A, Irvin E, Bombardier C. Multidisciplinary bio-psychosocial rehabilitation for chronic low back pain. *Cochrane Database Syst Rev.* 2002;(1):CD000963. doi:10.1002/14651858.CD000963
18. Wilson IR. Management of chronic pain through pain management programmes. *Br Med Bull.* 2017;124(1):55-64. doi:10.1093/bmb/ldx032