Implementation of a Regional Virtual Tumor Board: A Prospective Study Evaluating Feasibility and Provider Acceptance

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Abstract

Background: Tumor board (TB) conferences facilitate multidisciplinary cancer care and are associated with overall improved outcomes. Because of shortages of the oncology workforce and limited access to TB conferences, multidisciplinary care is not available at every institution. This pilot study assessed the feasibility and acceptance of using telemedicine to implement a virtual TB (VTB) program within a regional healthcare network. **Materials and Methods:** The VTB program was implemented through videoconference technology and electronic medical records between the Houston (TX) Veterans Affairs Medical Center (VAMC) (referral center) and the New Orleans (LA) VAMC (referring center). Feasibility was assessed as the proportion of completed VTB encounters, rate of technological failures/mishaps, and presentation duration. Validated surveys for confidence and satisfaction were administered to 36 TB participants to assess acceptance (1–5 point Likert scale). Secondary outcomes included preliminary data on VTB utilization and its effectiveness in providing access to quality cancer care within the region. **Results:** Ninety TB case presentations occurred during the study period, of which 14 (15%) were VTB cases. Although one VTB encounter had a technical mishap during presentation, all scheduled encounters were completed (100% completion rate). Case presentations took longer for VTB than for regular TB cases ($p=0.0004$). However, VTB was highly accepted with mean scores for satisfaction and confidence of 4.6. Utilization rate of VTB was 75%, and its effectiveness was equivalent to that observed for non-VTB cases.

Conclusions: Implementation of VTB is feasible and highly accepted by its participants. Future studies should focus on widespread implementation and validating the effectiveness of this model.

Key words: telemedicine, teleoncology, telesurgery, telehealth

Introduction

Multidisciplinary management of cancer is essential and associated with improved outcomes. With increasing numbers and complexity of cancer cases, access to high-quality care following this standard and efficient healthcare delivery have become critical in providing the best treatment within the constraints of limited resources. Multidisciplinary cancer conferences, known as tumor board (TB) conferences, are a forum of multidisciplinary discussion geared to facilitating this standard of care.¹ TB conferences can improve patient outcomes and satisfaction with care.¹ Furthermore, TBs have become the standard of care for selected patients and a requirement by the Commission on Cancer of the American College of Surgeons for cancer center accreditation.² However, effective TB conferences rely on a highly specialized oncology workforce, which is not available at every institution, limiting appropriate assessment and often resulting in substandard cancer care.³

The Institute of Medicine highlighted the need to implement new models to improve access to adequate oncologic care and overcome limitations derived from shortages in the oncology workforce.⁴ Models based on regional cancer networks and multidisciplinary teams improve the process of care and patient outcomes.^{5–8} Telemedicine helps overcome challenges in establishing regional networks and provides a means to improve access to care.⁹ Furthermore, videoconference technology can be used to implement TB conferences across institutions within a regional network. These so-called virtual TB (VTB) conferences have been successfully implemented in different settings, although specific contextual characteristics are critical to their success.¹⁰ The Institute of Medicine and the Department of Health and Human Services identified technical-related measures and acceptance by providers as initial barriers to the implementation of telemedicine strategies and recommended these as the primary focus of pilot projects before widespread implementation.^{11,12}

With the long-term goal of implementing a VTB program within a Veterans Healthcare Administration regional network, we designed a prospective pilot study to evaluate the feasibility of implementing a VTB between two Veterans Affairs Medical Centers (VAMCs) and to examine its acceptance from TB conference participants. A secondary

goal was to obtain preliminary data on utilization of our VTB program and its effectiveness in providing access to quality cancer care.

Materials and Methods

This was a prospective study, evaluating the implementation of a VTB program within a regional Veterans Integrated Service Network (VISN), and was approved by the Baylor College of Medicine Institution Review Board and the Michael E. DeBakey VAMC (MEDVAMC) Research & Development Committee.

SETTING

The VTB Program was implemented between the MEDVAMC (referral institution) and the New Orleans (LA) VAMC (NOLA) (referring institution), both within VISN16. VISN16 serves over 1.8 million veterans in the southeastern United States and comprises 10 VAMCs. Located in Houston, the MEDVAMC is a national cancer referral center and a Commission on Cancer of the American College of Surgeons-accredited hospital. It provides all cancer services, including chemotherapy, radiation therapy, and complex-cancer surgery. Among six subspecialty conferences, the General TB conference meets weekly and is staffed by the full spectrum of cancer care providers. NOLA is one of the largest outpatient facilities within the VISN. It can deliver outpatient chemotherapy, but the ability to provide comprehensive cancer therapy is limited by not having inpatient services or other institution-based cancer specialties.

TB IMPLEMENTATION FRAMEWORK

Regional healthcare within all VISNs is integrated through a common electronic medical record (EMR) platform. Our VTB program was implemented within the scope of the MEDVAMC General TB, primarily to avoid additional clinical burden and to use existing processes for administrative support. Leadership support was obtained from each institution, as well as from the VISN16 Regional Cancer Committee, through a memorandum of understanding where program details were outlined. High-resolution videoconference equipment was installed in each facility and linked with Internet protocol (IP) lines to allow interaction between the NOLA referring providers and the MEDVAMC TB participants during each VTB encounter. This included real-time video and audio interaction through the primary screen and the sharing of EMR data and case presentations through a secondary screen. The existing TB structure and function (e.g., case presentation, discussion and encounter documentation) were standardized to facilitate the flow of VTB presentations.

MEASURES AND OUTCOMES

The primary outcomes were feasibility of implementing the VTB program and acceptance of the VTB model. Feasibility measures included the following: (1) technical failures, defined as inability to connect the institutions; (2) technical mishaps, defined as malfunction of the equipment; (3) proportion of scheduled VTB cases completed; and (4) duration of VTB case presentations, compared with non-virtual, regular TB encounters within MEDVAMC. TB participants' acceptance was measured using validated surveys designed to examine satisfac-

tion and confidence with each VTB encounter, using a 5-point Likert scale in which higher scores represent more positive responses.¹⁰

Secondary outcomes included preliminary data on VTB program utilization and effectiveness in providing access to quality cancer care, which included examining *timely* and *appropriate* multidisciplinary evaluation of each case. Timely evaluation was defined as occurring within 2 weeks of initial consultation request. Appropriate multidisciplinary evaluation was defined as match between all *recommended* and *present* cancer specialties/services for each corresponding cancer type (as per National Comprehensive Cancer Network guidelines).¹³

DATA COLLECTION AND ANALYSIS

This pilot study took place over a 4-month period. VTB encounters were scheduled, as requested by NOLA, and presented during

Table 1. General Characteristics of Cases Presented at Tumor Board Conferences During the Study Period, by Encounter Type (n=90)

CHARACTERISTIC	ALL ENCOUNTERS (N=90)	VTB ENCOUNTERS (N=14)	REGULAR TB ENCOUNTERS (N=76)	P
Cancer type presented				0.08
Colon	15 (17%)	0 (0%)	15 (20%)	
Rectal	19 (21%)	4 (29%)	15 (20%)	
HPB	27 (30%)	4 (29%)	23 (30%)	
Esophageal/gastric	7 (8%)	0 (0%)	7 (9%)	
Sarcoma	6 (7%)	1 (7%)	5 (7%)	
Melanoma	2 (2%)	1 (7%)	1 (1%)	
Breast	1 (1%)	1 (7%)	0 (0%)	
Other	13 (14%)	3 (21%) ^a	10 (13%)	
Primary reason for presentation				0.01
Diagnosis/work-up	10 (11%)	5 (36%)	5 (7%)	
Multidisciplinary care	50 (56%)	5 (36%)	45 (60%)	
Surgical treatment	15 (17%)	4 (28%)	11 (14%)	
Chemotherapy	11 (12%)	0 (0%)	11 (14%)	
Palliative care	3 (3%)	0 (0%)	3 (4%)	
Missing data	1 (1%)	0 (0%)	1 (1%)	

^aIncluded 3 patients with tumors not typically presented in a General Tumor Board (TB) conference: lung cancer (n=1), renal cell cancer (n=1), and thymoma (n=1).

HPB, hepatobiliary; VTB, virtual tumor board.

MEDVAMC General TB conferences. TB participants at each site were prospectively enrolled. Data regarding VTB and regular TB encounters, as well as TB conference characteristics, were collected prospectively by a trained research coordinator, and surveys were administered after each corresponding VTB encounter. Statistical analyses included descriptive statistics, and comparisons were done using the chi-squared or Fisher's exact test and the Wilcoxon two-sample test, as appropriate. All descriptive and statistical analyses were performed using Statistical Analysis System version 9.1 software (SAS Institute, Cary, NC). A value of $p \leq 0.05$ was considered significant.

Results

In the study interval, 90 cases were presented in the MEDVAMC General TB; 14 (15%) were VTB encounters presented from NOLA, whereas 76 (85%) were regular cases presented from within MEDVAMC. *Table 1* lists the cancer types, as well as the primary reason for TB presentation, by encounter type. It is notable that VTB cases were more often presented to assist with services not available at NOLA ($p=0.01$).

FEASIBILITY

Table 2 lists the feasibility measures of the VTB program by encounter type. No encounters had technical failures, and only one of the VTB encounters had a mishap during presentation, due to difficulty in obtaining adequate video connection between NOLA and MEDVAMC; however, the case was successfully presented using the

audio connection through a telephone line and by sharing EMR data and the corresponding case presentation through the secondary video screen (completion rate, 100%). The mean duration for case presentation was significantly longer for VTB encounters compared with regular TB conferences (13.1 min versus 8.4 min; $p=0.0004$).

ACCEPTANCE

Thirty-six TB participants were enrolled: 11 from NOLA (30%) and 25 from MEDVAMC (70%). Participants' characteristics are outlined in *Table 3*.

Table 4 gives the summary mean scores for satisfaction and confidence with the VTB model. The overall mean score for satisfaction did not differ between NOLA (4.6) and MEDVAMC (4.6), and the mean scores for each of the domains were favorable, including those evaluating time burden of the VTB encounters. There was no statistical difference in satisfaction between site participants, except for the question assessing if the presenter and discussants were clearly audible, which was scored better by the MEDVAMC participants (4.5 versus 4.3; $p=0.03$). Similarly, mean scores for questions evaluating overall confidence with the VTB model were over 4.5 at both sites.

SECONDARY OUTCOMES

Sixteen TB conferences were available at MEDVAMC during the study period, and 12 were used for VTB encounters (75% utilization rate). Details regarding each of these conferences are listed in *Table 5*. Attendance and representation of cancer care specialties were both high (mean of 45.7 and 10.3, respectively) and were no different based on the addition of VTB encounters. Finally, the presentation of VTB cases had no impact on the efficiency of the TB meeting with equivalent number of cases discussed during each TB conference ($p=0.53$).

VTB effectiveness in regard to measures of access to quality cancer care was good (*Table 2*). The majority of VTB encounters (85%) were presented in a timely fashion; mean time from consult request to presentation was 7.6 days for VTB encounters, and there was no difference when comparing these measures with those for non-virtual cases. All 14 cases accomplished appropriate multidisciplinary evaluation during the VTB encounter (100%). These included cases that required the presence of specialties not typically present during the MEDVAMC General TB conference but for which advanced planning allowed for appropriate evaluation during the encounter. Specifically, thoracic surgery and pulmonary medicine were invited to the conference, in which VTB cases with lung cancer and with thymoma were discussed, and urology attended the presentation of a VTB case with renal cell carcinoma. Similarly, ophthalmology was present during a

Table 2. Feasibility and Effectiveness of the Virtual Tumor Board Program, by Virtual Tumor Board and Regular/Local (Non-virtual) Tumor Board Encounters ($n=90$)

MEASURE	ALL ENCOUNTERS ($N=90$)	VTB ENCOUNTERS ($N=14$)	REGULAR TB ENCOUNTERS ($N=76$)	P
Feasibility				
Technical failure	0 (0%)	0 (0%)	0 (0%)	—
Technical mishaps	1 (1.1%)	1 (7%)	0 (0%)	0.15
Scheduled cases completed	90 (100%)	14 (100%)	76 (100%)	—
Mean (SD) duration of case presentation (min)	9.2 (4.4)	13.1 (3.9)	8.4 (4.1)	0.0004
Effectiveness				
Mean (SD) time from consult request to case presentation (days)	7.5 (7.2)	7.6 (5)	7.5 (7.6)	0.95
TB cases with timely evaluation ^a	80 (89%)	12 (85%)	68 (89%)	0.65
Cases accomplishing appropriate multidisciplinary assessment	90 (100%)	14 (100%)	76 (100%)	—

^aTimely evaluation was defined as tumor board (TB) case presentation within 14 days of consult request. SD, standard deviation; VTB, virtual tumor board.

Table 3. Baseline Characteristics of Tumor Board Participants Enrolled for Evaluation of Acceptance of Virtual Tumor Board Model, by Participants at the Referring and Referral Institutions (n=36)

CHARACTERISTIC	ALL PARTICIPANTS (N=36)	NOLA PARTICIPANTS (N=11)	MEDVAMC PARTICIPANTS (N=25)	P
Gender				
Male	19 (53%)	6 (55%)	13 (52%)	1.00
Female	17 (47%)	5 (45%)	12 (48%)	
Age (years)				
<35	3 (8%)	1 (9%)	2 (8%)	0.65
35–50	18 (50%)	4 (36%)	14 (56%)	
>50	15 (42%)	6 (55%)	9 (36%)	
Cancer care specialty/service				
Medical oncology	8 (22%)	2 (18%)	6 (24%)	0.40
Radiation oncology	5 (14%)	2 (18%)	3 (12%)	
General surgery	1 (3%)	0 (0%)	1 (4%)	
Surgical oncology ± HPB	5 (14%)	0 (0%)	5 (20%)	
Gastroenterology	1 (3%)	0 (0%)	1 (4%)	
Interventional radiology	1 (3%)	0 (0%)	1 (4%)	
Radiology	3 (8%)	1 (9%)	2 (8%)	
Pathology	2 (6%)	0 (0%)	2 (8%)	
Nuclear medicine	1 (3%)	0 (0%)	1 (4%)	
Internal medicine/pulmonary	1 (3%)	1 (9%)	0 (0%)	
Cancer registrar	4 (11%)	3 (27%)	1 (4%)	
Other	4 (11%)	2 (18%)	2 (8%)	
Institutional appointment				
Staff physician	27 (75%)	5 (46%)	22 (88%)	0.01
Extended practitioners (NP/PA)	3 (8%)	1 (9%)	2 (8%)	
Administrative	4 (11%)	3 (27%)	1 (4%)	
Other	2 (6%)	2 (18%)	0 (0%)	
Years in practice/service				
<5	9 (25%)	3 (27%)	6 (24%)	0.95
5–10	9 (25%)	2 (18%)	7 (28%)	
11–15	0 (0%)	0 (0%)	0 (0%)	
16–20	5 (14%)	2 (18%)	3 (12%)	
>20	13 (36%)	4 (36%)	9 (36%)	

The referring institution was the New Orleans (LA) Veterans Affairs Medical Center (NOLA), and the referral institution was the Michael E. DeBakey Veterans Affairs Medical Center (MEDVAMC) (Houston, TX).

HPB, hepatobiliary; NP, nurse practitioner; PA, physician's assistant.

VTB case involving a patient with ocular melanoma to fulfill appropriate multidisciplinary evaluation.

Discussion

The primary goal of this study was to evaluate whether the implementation of a VTB program within a regional network in the Veterans Healthcare Administration system would be attainable. We found that implementation is feasible and highly accepted by providers across tested sites. Additionally, we showed a high utilization rate, and preliminary effectiveness data revealed timely and appropriate multidisciplinary evaluation with the program.

Several studies have reported successful implementation of telemedicine models of care,^{6,10,14–17}; however, many lack predefined definitions of success or data on the program's potential for sustainability or maintenance.¹⁸ Our study focused on evaluating predefined measures of technical feasibility and acceptance, two critical components for future dissemination and sustainability. Feasibility was examined within an established EMR platform and with use of Veterans Affairs videoconference equipment linked through IP lines; no technical failures were revealed, and the completion rate was 100% of cases. These results are similar to those reported by prior studies evaluating the technical aspects of VTB encounters.^{19–21} Specifically, Hunter et al.²⁰ found that both Integrated Services Digital Network (ISDN)-based and an IP-based tele-oncology programs are feasible; however, feasibility was measured subjectively without a defined quantitative measure. IP-based programs were favored given its universal availability, although its cost was twice that of the ISDN-based program.²⁰ Although costs were less relevant to our program, given our use of an established Veterans Affairs infrastructure, this must be considered when establishing programs in different settings as these are the first implementation barrier. Lastly, our study found that VTB presentations took significantly longer than non-virtual presentations. This did not have an impact on the efficiency of TB meetings (equivalent number of cases presented), nor was it a relevant issue for participants; however, we believe further standardization of procedures, increased familiarity, and education of participants will likely improve the process and help facilitate future dissemination.²²

A key feature of our study was its focus on providers' acceptance of the VTB program. Although we implemented our program within existing practices, its success was dependent on the dedication and "buy-in" of TB participants. Implementation is more likely to be effective if participants see value in VTB, despite the time and effort that are required.²³ Based on results of validated

Table 4. Acceptance of Virtual Tumor Board Encounter, Measured by Satisfaction and Confidence with Encounter Type, by Participants in Referring and Referral Institutions (*n*=36)

DOMAIN, QUESTION	MEAN (SD) LIKERT SCALE SCORE ^a			P
	ALL (N=36)	NOLA (N= 11)	MEDVAMC (N= 25)	
Satisfaction with encounter				
Format				
The presenter and discussants were clearly visible.	4.6 (0.7)	4.4 (0.9)	4.7 (0.5)	0.4
Slides and visual aids were clearly visible.	4.7 (0.6)	4.6 (0.7)	4.7 (0.5)	0.3
The presenter and discussants were clearly audible.	4.5 (0.8)	4.3 (0.9)	4.5 (0.8)	0.03
Interaction with the presenter and discussants was possible.	4.7 (0.5)	4.6 (0.5)	4.7 (0.5)	0.7
Content/time				
The presentation time was sufficient.	4.7 (0.5)	4.6 (0.5)	4.7 (0.5)	0.5
The discussion time was sufficient.	4.7 (0.5)	4.6 (0.5)	4.7 (0.5)	0.5
The topic discussed was relevant to my practice.	4.6 (0.6)	4.7 (0.5)	4.6 (0.6)	0.5
Presenters/discussants				
The presentation and discussion of the case were clear.	4.6 (0.5)	4.6 (0.6)	4.7 (0.5)	0.7
The discussants demonstrated thorough knowledge of the topic.	4.6 (0.5)	4.6 (0.5)	4.7 (0.5)	0.7
The presenter and discussant established good rapport with the audience.	4.6 (0.6)	4.5 (0.7)	4.6 (0.5)	0.3
The presenter and discussants stimulated critical thinking.	4.6 (0.5)	4.6 (0.5)	4.6 (0.5)	0.7
The presenter and discussants encouraged questions and participation.	4.6 (0.5)	4.6 (0.5)	4.6 (0.5)	0.6
Outcome				
The information revealed is not accessible elsewhere.	4.4 (0.8)	4.4 (0.8)	4.3 (0.8)	0.8
The discussion provided useful tips for my practice.	4.3 (0.8)	4.5 (0.5)	4.3 (0.8)	0.1
The discussion caused reflection on my practice.	4.3 (0.9)	4.5 (0.6)	4.2 (0.9)	0.3
This event will change my current practice.	3.8 (1.1)	4.1 (1.1)	3.8 (1.1)	0.07
Overall				
I was, overall, satisfied with the encounter.	4.6 (0.5)	4.6 (0.5)	4.6 (0.5)	0.6
Confidence with encounter				
I feel that the discussion of the case and decision-making were appropriately shared by participants.	4.6 (0.5)	4.6 (0.5)	4.6 (0.5)	0.5
Consensus as to the next step in caring for the patient was reached by all parties involved.	4.6 (0.5)	4.5 (0.5)	4.6 (0.5)	0.3
I am confident that the decision reached was in the best interest of the patient.	4.6 (0.5)	4.6 (0.5)	4.6 (0.5)	0.5

The referring institution was the New Orleans (LA) Veterans Affairs Medical Center (NOLA), and the referral institution was the Michael E. DeBakey Veterans Affairs Medical Center (MEDVAMC) (Houston, TX).

^aData are mean (standard deviation) values on a Likert scale score of 1–5. A higher score represents a more positive response.

questionnaires on satisfaction and confidence, the VTb was largely accepted by participants, with positive scores for satisfaction and confidence and essentially no meaningful differences compared with the regular TB. Our results encompass the perceptions of two institutions and a wide range of personnel who perform an array of functions/

roles in cancer care. Thus, our results are generalizable to all cancer care providers and extend the knowledge reported in prior studies.^{10,17} A pilot study by Gagliardi et al.¹⁰ reported that 75% of participants were satisfied with the overall VTb encounter, including its discussion and format. A cluster randomized trial comparing VTb

Table 5. Multidisciplinary Tumor Board Conference Characteristics During the Study Period, Classified by Type of Encounters Presented (*n* = 16)

TB CONFERENCE CHARACTERISTIC	ALL (<i>N</i> = 16)	VTB ENCOUNTERS (<i>N</i> = 12) ^a	REGULAR TB ENCOUNTERS ONLY (<i>N</i> = 4)	<i>P</i>
Number of attendees	45.7 (6.2)	46.4 (6.7)	43.5 (4.4)	0.46
Number of cancer care specialties/services present	10.3 (0.9)	10.3 (1)	10.3 (0.5)	0.94
Number of total cases presented	5.6 (1.5)	5.5 (1.3)	6 (2.2)	0.53
Number of VTB cases presented	0.9 (0.6)	1.2 (0.4)	0	0.0009
Number of non-VTB cases presented	4.8 (1.7)	4.3 (1.4)	6 (2.2)	0.17

Data are mean (standard deviation) values.

^aIncludes virtual tumor board (VTB) and non-VTB cases presented during the same conference.

TB, tumor board.

with non-virtual encounters found that participants were satisfied and confident with VTB.¹⁷ Additionally, our results shed light on the impact of virtual-case presentation during conferences. Although the use of VTB did not change practices for all, the discussion provided education and nurtured collaboration among geographically dispersed colleagues. With the inclusion of VTB, TB meetings remained dynamic and encouraged active participation. Our experience support the proposal that VTBs promote collegial interactions and a convenient avenue for delivering continued medical education, thus providing the foundation for regional cancer networks.^{14,20} Other VTB programs have resulted in improved communication, leading to learning opportunities and enhanced skills for providers through interaction with colleagues.¹⁰

Preliminary data on the utilization and effectiveness of VTB further support a successful first step in implementation and provide evidence for the next step in the framework for evaluating telemedicine applications: the dissemination phase.^{11,12} Our pilot study revealed the potential of VTB to provide access to high-quality cancer care. The VTB program provided the opportunity for expert review of health information so that individualized care can be made for patients seeking cancer treatment. All VTB cases successfully obtained multidisciplinary evaluation, even those that required the presence of specialties not normally present during General TB. Because of advanced planning, these “special” cases had appropriate multidisciplinary evaluation and evidence-based planning. We also learned the potential for the VTB to improve efficiency in the process of care. It has been noted the majority of recommendations during TB conferences are incorporated into the patient’s treatment plan.²⁴ We noted that during VTB encounters, an extensive treatment plan that included evaluation and diagnostic procedures was arranged and scheduled through the EMR platform. This process facilitated and expedited care coordination, allowing for further evaluation and treatment while avoiding delay. Overall, the VTB program provided a true multidisciplinary opportunity for timely evaluation and evidence-based treatment without impacting the efficiency of TB conferences, while facilitating the process of care.

Limitations should be noted. Our results represent the experience of two VAMCs. In this environment, we were able to integrate VTB procedures within existing processes. Therefore, our results may not be generalizable to non-Veterans Affairs settings. The implementation and sustainability of VTB are unique to specific health-care characteristics and hence require a process through which different aspects of this application are continuously evaluated, allowing for adjustments before widespread implementation. Additional issues to be considered for implementation in non-Veterans Affairs settings include privileging, credentialing, and costs. Despite this limitation, we believe that a closed-healthcare system, such as that of the Department of Veterans Affairs, provides the opportunity to focus on technological feasibility and providers’ acceptance, and that with absence of noise from confounders, we are able to investigate the crucial components prior to widespread implementation.

Conclusions

In conclusion, VTB implementation was feasible within established processes and highly accepted. Additionally, we present preliminary data on clinical effectiveness and utilization that favor VTB use. The VTB program serves as an avenue to build regional networks that improve quality of cancer care and streamline the evaluation and treatment process. Further research is required to confirm findings on a larger scale, and future data will provide evidence for subsequent widespread implementation. Our group is currently implementing the VTB program VISN-wide, with experienced and adequately structured referral centers providing support to smaller institutions. Overall, this pilot study presents encouraging results and should prompt further study into implementing VTB models within and outside the Veterans Affairs system.

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Disclosure Statement

No competing financial interests exist.

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