

# Mixed-Methods Evaluation of Primary Care Continuing Education on Pre-treatment Counseling of Men with Age Associated Testosterone Deficiency

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## ABSTRACT

**Background:** Clinical contacts regarding testosterone deficiency (TD) are increasing, necessitating continuing medical education (CME) activities to address primary care practitioner (PCP) gaps in pre-treatment counseling for untreated TD in men  $\geq 45$  years.

**Methods:** This mixed-methods study of PCP participation in two live/enduring educational webcasts (Webcast 1 and Webcast 2) was designed to improve communication skills and competence/performance related to TD and testosterone replacement therapy (TRT). All participants requesting credit provided pre- and post-activity data. Select physician participants also participated in two follow-up interviews. Participants and comparison PCP peers completed follow-up surveys.

**Results:** Trend analyses and quantitative data show that CME participation improved counseling on TD, TRT benefits, risks, and formulation pros/cons. Across measures, self-selecting participants had significantly lower self-assessed, pre-activity counseling rates than comparison PCPs did; all 4 narrowed in Webcast 2 (WC2) follow-up. For Webcast 1 (WC1), rates of counseling on TRT options were suboptimal, whereas follow-up rates of counseling on transfer risk exceeded rates of WC2 participants and comparison peers; rates of counseling on treatment expectations exceeded WC2 participant rates. PCPs typically employed implicit strategies to assess patient understanding and satisfaction. Most shared TRT decision-making; others led patients to preferred formulations, although all groups showed gaps in selecting appropriate formulations. CME improved interviewee confidence.

**Conclusions:** A greater perception of both continuing educational need and greater treatment confidence may reduce self-reported performance in counseling on treatment options. Improved competence was demonstrated but indicated a remaining need for PCP education on TRT formulations, counseling methods, and managing barriers. Interviews helped elucidate variables influencing pre-treatment counseling. Follow-up interviews reinforced content and promoted reflection on patient-counseling practices.

## INTRODUCTION

Age associated testosterone deficiency (TD) syndrome affects approximately 38.7% of men  $\geq 45$  years [1,2]. The pathophysiology of hypogonadism can impair the function of multiple organs [3]. Commonly associated signs and symptoms are fatigue, sleep disturbances, weight gain or adiposity,

reduced libido, erectile dysfunction, osteoporosis, loss of muscle mass and strength, depressed mood, increased irritability, and difficulty concentrating [1,4-7]. As men in an aging population experience progressive loss of serum testosterone, primary care practitioners (PCPs) will see increased numbers of patients with TD-related symptoms

[1,3,4,7,8]. The current standard treatment for TD is testosterone replacement therapy (TRT) which relieves symptoms and improves overall health, energy and quality of life [3,4,5,9,10,11]. Safe and effective use of TRT requires thorough pre-treatment assessment and ongoing monitoring to mitigate potential risks [4,9,12].

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A recent study showed that PCPs ordered testosterone tests in 58% of men > 40 years [13], suggesting that PCPs are assessing and managing the majority of age associated TD. Despite these statistics, PCPs have shown gaps in counseling on TD and in applying practice guidelines on treatment selection and monitoring [4,6,14-17]. The combination of changing practice guidelines, newer therapeutic formulations, and a heightened public awareness of the effects of TD pathophysiology on quality of life underscores the need for effective education for practitioners who manage these patients [9]. TD is also a topic in which shared decision making and patient counseling to alleviate potential concerns and set realistic expectations for therapy are particularly valuable aspects of assessment and treatment [3,4,7,17].

Given the current focus on quality patient-centered care, PCPs with varying approaches to care must make decisions about whether and how to treat patients with TD syndrome [18]. This study examines whether PCP participation in CME/CE webcasts is associated with changes in competence and performance in providing patient-focused pre-treatment counseling on TD-related symptoms and clinical effects, expectations for therapy, safety during TRT and the individualized selection of TRT formulation.

## METHODS

A mixed-methods approach examined the content of clinician-patient communication, skills and patterns. Quantitative analyses supported the qualitative analyses with respect to data on knowledge, competence, performance and ongoing practice challenges which in turn affect counseling patterns.

The study used a pre- and post- and comparison-group design for each of two activities. PCPs could elect to participate in both activities. Participating and comparison PCPs were not limited from completing non-initiative CME. Webcast 1 (WC1) was a 60-minute, live, multimedia case-based activity with moderated discussion and scientific content slides, plus a 30 minute

interactive question and answer session. The 90 minute program was available as enduring material. Webcast 2 (WC2) was a 30 minute, enduring multimedia activity with expert discussion of TD and TRT evidence and Endocrine Society guidelines [9]. Both offered *AMA PRA Category I Credit*<sup>TM</sup>.

## Participant and Comparison Groups Sampling and Incentives

PCP was defined as a generalist with discipline of physician (MD or DO degree), physician assistant (PA) or nurse practitioner and other advanced practice nurses (collectively, NP). Eligible participants were currently seeing patients with TD and had opted into the study via participation in a webcast. Participants were recruited via the educational provider's website or via electronic mail, with 10,787 PCPs in its database. Follow-up 11-month survey participation required a minimum of 50 days since any activity completion. A comparison group, including all PCPs in this database, was invited to complete the same quantitative follow-up survey (<http://www.SurveyMonkey.com>). The same demographic inclusion criteria were used for the comparison group, which was audited for nonparticipation.

Post-activity interviews were limited to U.S. physicians who affirmed having an MD or DO degree and practiced in primary care, and who currently had patients taking TRT that they had prescribed. Two rounds of interviews in this subgroup were planned for 4 and 10 months after WC1. Successive invitations (offering honoraria, below) starting 3 months after WC1 premiere were sent via electronic mail to all eligible physicians who had participated in WC1 at least 50 days earlier, requesting online sign-up for interviews (<http://www.SurveyMonkey.com>). Physician interviews were arranged in order of sign-up response and recruitment ended when analysis of the qualitative data received reached thematic saturation (i.e. – no new analytic themes were identified). Follow-up participants were first offered no

incentives but later were offered Amazon.com gift cards of \$65 or less. The first 50 eligible respondents in the comparison group were offered \$10 cards. Interview honoraria were \$300 and \$200 for rounds 1 and 2, respectively. Incentives were not offered for activity participation or completion of the required pre/post instruments.

## Instruments and Procedures

Mixed methods included direct-to-clinician tests, surveys, and semi-structured interview discussion guides with parallel survey questioning and probing as needed on core questions about CME content, guidelines and individual and peer practice approaches. Follow-up round 1 telephone interviews gathered in-depth narrative regarding main performance issues and underlying knowledge and competence gaps queried in the pre-survey or later in the follow-up survey. Round 2 interviews explored themes associated with counseling related behaviors and PCP assessment of patient understanding and satisfaction with care. Because reflective thinking about internal practices discussed in self-assessment literature was required to answer interview questions, particularly in round 2, methods gathering self-assessed, quantitative performance data were deemed appropriate among available options [19-23]. Table 1 summarizes instrument excerpts whose results are within study scope.

## Data Analysis

Interviews were audio recorded and transcribed verbatim. Transcripts were analyzed using constant comparative method and analysis software (NVivo 10, QSR International). To support investigator triangulation [24], different qualitative researchers (who did not conduct interviews) completed each analysis. Because recruitment for round 1 interviews continued to data saturation, the time elapsed between each physician's earliest participation in either of the two activities and the first interview, and the time elapsed between the two interviews were analyzed as possible variables.



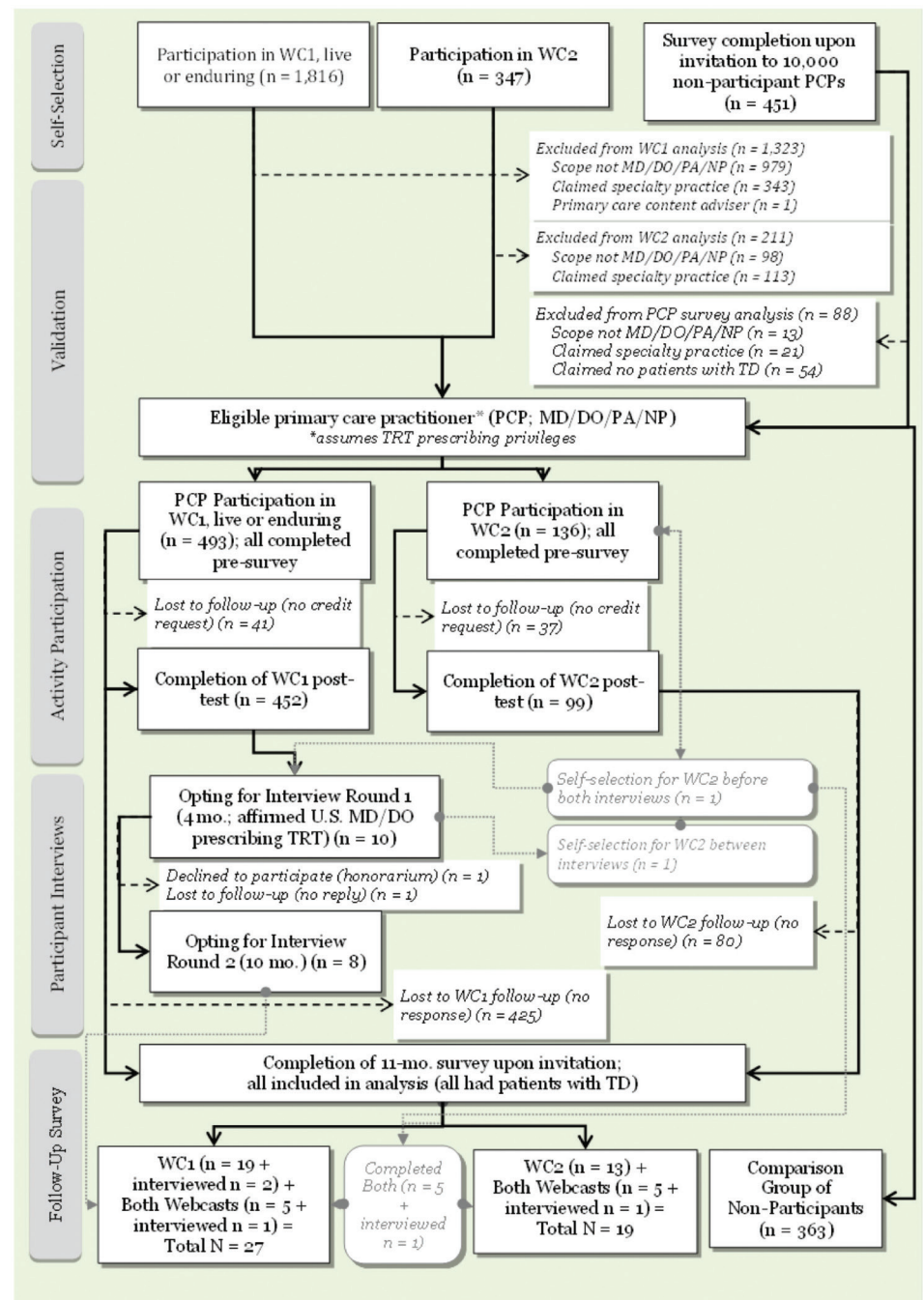
Quantitative analyses were conducted on pooled data from clinicians meeting inclusion criteria for each tool. Immediate pre/post data were cut before activity expiration to create a minimum 50 day window between participation and follow-up surveying. Seeking triangulation, a third researcher analyzed quantitative data for differences between expected and observed frequencies by two-tailed Fisher's exact test of a 2x2 contingency table (using Microsoft Excel 2010 for data preparation and GraphPad QuickCalcs online, at <http://graphpad.com/quickcalcs/contingency1/>). Performance self-ratings were gathered in 0% plus 4 quartiles of patient percentages with whom the clinician carried out the behavior. The 51% cutpoint was favored over the 76% cutpoint as a self-reported reflection of recent routine practice behaviors.

## RESULTS

Figure 1. illustrates participation and retention in intervention and study groups. Respondents self-identified as physicians, PAs, or NPs in Family Medicine, General Internal Medicine, General Practice or Preventive Medicine Round 1 interviews reached thematic data-saturation with 10 physicians; two were lost to round 2 follow-up.

### Overall Performance-Level Findings

Quantitative findings for both activities show improved knowledge, competence, and performance for measured clinical tasks requiring counseling skills. Before CME, participants had significantly lower rates of performing four counseling measures than PCPs in the comparison group (Figure 2. All were  $p < .001$ ). This suggests that participants self-selected for education after identifying their care gaps, although such self-selection is debated [25,26]. For WC2, PCPs self-reported performance on communicating three core messages to over half of their patients significantly improved; for two of these, WC2s post-educational performance rates closed the gap with the

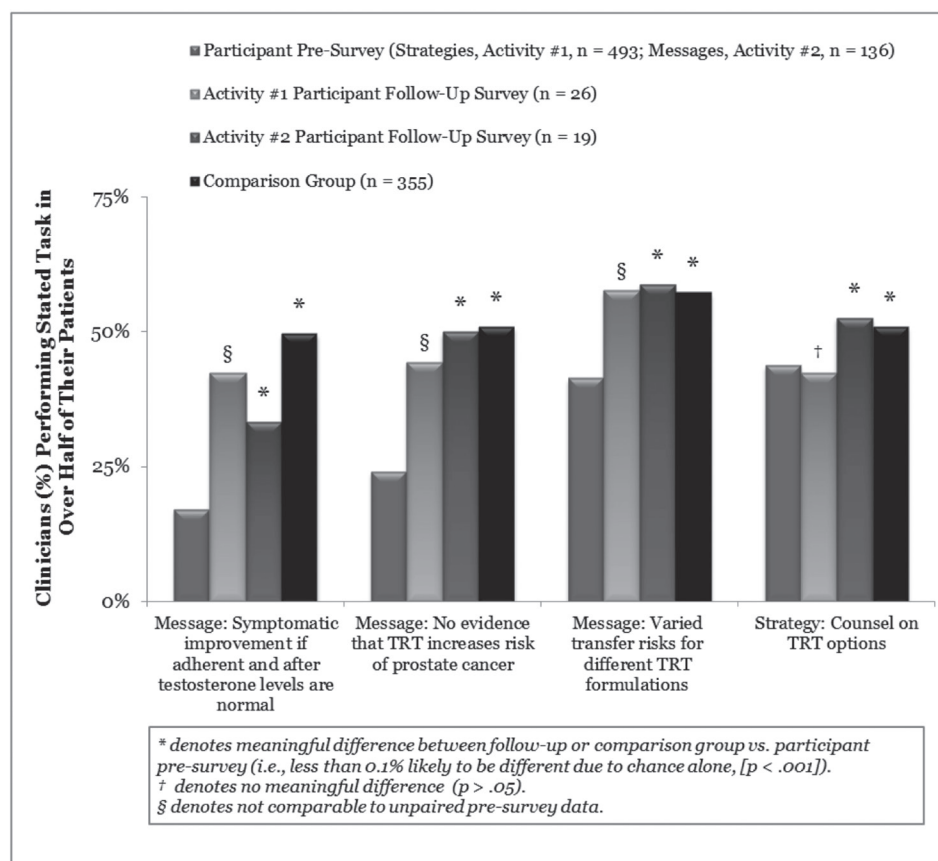


**Figure 1.** Flow diagram of clinician responses to evaluation tools in participant and comparison groups for Webcast 1 (WC1), Webcast 2 (WC2), and Both Webcasts, with and without interim interviewing.

comparison group, if not with the goal. WC1 participant follow-up data and comparison group data were also statistically the same for one of the three counseling messages. For the fourth measure – providing counseling on TRT options – WC2

participants significantly improved performance, and follow-up data eliminated past differences between their baseline rates and comparison group rates. Core counseling messages and therapeutic options offered to men with TD were consistent with the





**Figure 2.** Primary care practitioners' self-assessed performance rates in carrying out the stated clinical strategy or counseling on the specific message in  $\geq 51\%$  of patients with testosterone deficiency (TD), since participating or in the previous 3 months – before versus  $\leq 11$  months after, participating in continuing medical education.

content of the educational activities.

Qualitative findings support these results, revealing the largely conscientious behavior of PCPs post-CME in presenting pros and cons of TRT, treatment expectations, risks and benefits of treatment, plans for monitoring efficacy and safety, and in sharing decision making on the best formulation for each patient's needs.

Taken together, quantitative and qualitative findings on self-reported gaps and barriers provided insight into the reasons behind lack of full implementation. For the behaviors that affected rates of delivering the three messages – counseling on options, monitoring for efficacy and monitoring for adherence – surveyed WC1 participants claimed they had ongoing educational needs or confidence issues, while the comparison

group claimed barriers to and disagreement with these practices. Differences between WC2 participants and the comparison group were less stark and more balanced between groups and between gaps and barriers. When interviewees discussed the low pre-activity counseling rates of PCPs, they appeared to see themselves as more aware of the need for counseling than their peers were and that they were already diligent in providing quality counseling.

Interviewees described the impact of the educational intervention in terms of updated attitudes toward TD pathophysiology and treatment, the use of new strategies and messages for patients considering TRT, more proactive management of treatment expectations, greater confidence in handling patient concerns about safety, and improved

reflection on both treatment practices and the patient experience with TD.

### Counseling on TRT Benefits and Risks

Interviewees were highly supportive of the efficacy of TRT in helping patients feel better, although a case scenario involving a new TD diagnosis showed that some were more enthusiastic than others – 9 of 10 favored treating TD. They also improved their competence in providing evidence-based counseling on TD health effects, and TRT benefits and risks. Most were familiar with the general and specific health risks related to TD that would continue without treatment and endorsed clinical workups for suspected or confirmed TD. Nine of ten interviewees stated that they believe that TRT promotes weight loss and improves quality of life, sexual health and energy or endurance. Several also mentioned benefits including cardioprotection, lower cholesterol levels, energy supporting a healthier lifestyle, and improved mental clarity, mental health or mood, sleep, bone strength and muscle mass.

These results are consistent with WC1 participants' quantitatively high rates of telling patients to expect symptomatic improvement if they adhered to TRT and testosterone levels returned to normal. WC2 rates significantly improved on delivering this message, from 17.2% pre-survey to 33.3% follow-up (n = 193 and n = 19, respectively;  $p < .0001$ ). Despite near doubling, follow-up performance did not reach the comparison level of 49.7% (n = 355;  $p < .001$ ). A lack of experience with efficacy monitoring may explain some PCPs' suboptimal performance in counseling on what to expect from TRT. Reasons given were varied: 71.4% of participants versus 46.9% of comparison PCPs claimed ongoing educational need or confidence issues; 28.6% of participants versus 46.2% of comparison PCPs claimed barriers; and 4.2% of comparison PCPs disagreed with monitoring efficacy. Adherence monitoring had similar challenges but more polarized distributions, e.g., 100% of participants claimed needs for additional education or

**Table 2. Primary care practitioners' top factors behind lack of counseling patients on options for testosterone replacement therapy, by study group, at 11-month follow-up versus comparison group.**

Factor	Practitioners (%) Claiming Factor as "Top Reason" Behind Lack of Counseling on Therapeutic Options		
	Webcast 1 Participants (n = 9)	Webcast 2 Participants (n = 12)	Comparison Group (n = 169)
Educational Need	55.6	25.0	43.2
Confidence	11.1	25.0	14.8
Disagreement	0.0	0.0	5.9
Barriers: Practice, System, or Patient	22.2	33.3	33.7
Other	11.1	16.7	2.4

confidence, and 8.7% of the comparison group disagreed with adherence-monitoring.

Interviewees' risk counseling included having patients return for hematocrit monitoring in 3-6 months, which applied a 15.6 point, pre/post knowledge improvement for WC1 (74.0% -89.6%; pre-test, n = 493; post-test, n = 452;  $p < .0001$ ). Interviewees illustrated their understanding of prostate monitoring by describing patient schedules for PSA testing and digital rectal examinations. Ancillary to this, WC1 participants also improved performance of the digital rectal examination, from 31.0% at pre-survey to 52.0% at follow-up ( $p < .0001$ ), which surpassed the comparison group's performance rate of 46.8% ( $p < .03$ ). Patient concerns about cancer risk were addressed in a case vignette in the post-tests, in which 94.0% of WC1 participants (n = 452) and 85.7% of WC2 participants (n = 99) would have told patients, "TRT does not cause the development of prostate cancer" [15].

Improved performance rates in delivering this message are consistent with competence results for both activities: WC2 performance more than doubled, increasing by 107.5% ( $p < .0001$ ) to match that of the comparison group. WC1 performance was nearly as high. One interviewee reported that since participating, he is less focused on previously misunderstood cancer risk as a treatment-related safety concern and more on enabling collaborative treatment decisions.

### Counseling on TRT Options and Formulations

WC2 participants improved rates of providing counseling on therapeutic options, whereas WC1 participants did not. WC2 participant follow-up rates were higher than at baseline and matched comparison group rates. WC1 participants showed suboptimal follow-up rates of counseling on therapeutic options, i.e., they did not reach the rates of WC2 participants or those of the comparison group. The WC1 and WC2 groups gave different explanations for a lack of performance (see Table 2). WC1 participants claimed a great ongoing educational need, while WC2 participants and the comparison group were about 50% more likely to claim barriers. Neither of the WC1 and WC2 participants disagreed with the practice of counseling on TRT options, whereas 5.9% of the comparison PCPs disagreed. Finally, a greater perception of continuing educational need combined with greater treatment confidence may reduce self-reported performance in counseling on treatment options.

Qualitative data contradict the quantitative lack of performance change of WC1 participants in counseling on TRT options. Themes of increased treatment confidence among interviewees were prevalent, particularly in advising on TRT options and formulations. These differences suggest existing subgroup differences or differences created by interviewing as an additional

educational intervention. The quantitative question's broad phrasing – offering "all evidence-based TRT options" – also may not have captured clinical approaches that were revealed in the qualitative data, so more focused survey questions should be used in future research. Group differences could also have influenced self-report; PCPs in the comparison group may have lacked sufficient attitudinal investment in accurate self-reporting, or lacked knowledge of available therapeutic options and overestimated their rates of thorough counseling. Both issues could have led participants to be more self-critical because of the recruitment and interviewing evidence that researchers were truly interested in their practices, countering widespread evidence of clinicians' survey fatigue [27].

Interviewees recognized that the optimal formulation to support TRT adherence would suit patient preference. Despite acknowledging individualized treatment, several interviewees indicated a strong preference for specific options, and it was clear that these PCPs would likely steer their patients toward the preferred treatments. The most noted reasons for practitioner preferences (see Table 3) were cost, titration issues, and lack of efficacy due to adherence problems, especially among physicians caring for 75 or more patients per month.

Dosing convenience for the patient and potential risk for passive reabsorption of topical testosterone on close contact minimally

**Table 3. Responses from eight physician interviews: Physician-reported barriers affecting physician preferences and/or the patient experience with select<sup>a</sup> formulations of testosterone replacement therapy.**

Injectable Formulations	Topical Creams or Gels	Transdermal Patch
• Patient fear of needles	• Passive reabsorption, or risk to children or (pregnant) women	• Skin irritation
• Sense of invasiveness	• Inaccurate dosing [vs. injections]; “titration issue”	
• Need for referral (in some cases)	• Insurance challenges; lack of coverage vs. injections	
• Monthly office visits	• Adherence; challenging for the “non-compliant”	

<sup>a</sup> Other formulations mentioned included pellets, oral tablets/capsules and compounded products.

affected choice, which contradicts the quantitative finding that WC1 participants had no statistical difference versus the comparison group in overall rates of counseling on risks of transfer. Performance data for the WC1 and WC2 groups were more promising for one aspect of selecting a formulation: WC2 participants significantly increased delivery of safety messaging about transfer risk by 42.0% (or 41.4% baseline versus follow-up 58.8%;  $p < .0001$ ). WC1 participants also had high rates of safety messaging, matching the performance of both WC2 participants and comparison peers at follow-up. Counseling on transfer risk was the only measure in which both WC participant groups had no gaps versus the comparison group on follow-up. This was also the counseling message that had the highest baseline and follow-up rates, so perhaps implementation was less challenging or less education was needed on transfer risk than on the other core counseling concerns.

Other competency data on treatment selection were less promising; a case vignette issued post- and follow-up showed that all participant and comparison groups continue to have suboptimal competence in selecting TRT formulation per factors of close contact, cost, dosing frequency and guideline recommendations [7]. Specifically, the WC1 interviewees would provide 12.1% more accurate counseling than comparison PCPs for a patient’s individual situation. WC2 participants chose more wisely, selecting the best rationale for a particular formulation 36.8% of the time. The best rationale was chosen by only 66.7% of participants

in the WC2 post-test, and far less often in follow-up for both activities.

Overall, despite treatment-selection gaps among many PCPs and pre-existing formulation preferences among some, most interviewees counseled on the pros and cons of various TRT formulations – e.g., “Usually my decision is based on both the patient and mine [sic].... It’s a team effort”.

### Patient-Centered Care and Communication Style

Due to the lack of access to patients, the patient’s TD experience was examined through the lens of the physicians’ understanding of treatment issues, perspectives and approaches. Qualitative findings showed that while some interviewees led the treatment conversation with patients, most shared the decision-making and used a predominantly cooperative and supportive communication style. Supportive physicians worked at consensus building with patients by having an open discussion about the physiological effects of TD, the pros and cons of treatment, treatment expectations, potential TRT-related side effects and TRT formulations. As evidence of practice change and better collaboration due to CME, one physician noted, “I spend more time [than before CME] explaining to patients the difference and the virtues of the different [formulations] ...I’ll let them participate in the decision more in terms of which method of treatment, because there are big cost implications.” In contrast, physicians who led conversations offered one or few choices to patients, rather than shared

decision making, and saw themselves as taking charge of treatment. For example, a pre-established trust allowed one physician to “take command” (clinic time also influenced communication style).

Qualitative data suggest that while physicians request patient input on treating TD, they may not be explicitly checking whether their patients fully understand the reasons for and implications of treatment, or whether they are satisfied with therapeutic recommendations and explanations. As with evidence from other studies that physicians rarely assess patient understanding of clinical situations [28], most physicians in this study relied on implicit markers of patient satisfaction and understanding. Proxy indicators of satisfaction were patient adherence to refills, appointments and monitoring schedules, as well as patient nonverbal communication and perceived patient excitement or enthusiasm about treatment. Others merely assumed patient satisfaction or understanding, although nearly half acknowledged that patients did not clearly communicate their level of satisfaction.

Taking a more optimal approach, several physicians reported using explicit methods for checking in with patients to ensure that they understood what to expect and were satisfied with physician explanations about treatment. These physicians asked direct questions, requested feedback, and even used a demonstration kit to clarify patients’ understanding of treatment options. These methods may well reflect WC1 content that encouraged communication with patients about treatment expectations [4].

There was high variability in both communication style and methods for verifying patient understanding and satisfaction, and this suggests that counseling may not be the highest priority for PCPs who manage patients with TD. Alternatively, gaps may exist in physicians' understanding of counseling and what this concept means in practice. Responses to questions about patient satisfaction and understanding included information about what PCPs tell patients, rather than the approaches they use to verify patient satisfaction and understanding. While the provision of quality information is a key component of communicating with patients in order to support their participation in decision-making [29], this tendency to talk about what they tell patients suggests that physicians view counseling as a one-way channel, with didactic provision of information that physicians assume patients should receive and act on. PCPs do not necessarily view counseling as part of their clinical practice and data suggest a future need for education about strategies for effective counseling. Physicians who thought their patients understood rationales behind pre-treatment counseling messages did so because they believed they had given an effective explanation and because patients were able to point to treatment indicators associated with TD of which they were previously unaware.

### Interviews as Interventions

Post-activity interviews serially reinforced messages and stimulated PCP reflection to support quality improvement in these counseling areas: treatment goals, options, realistic expectations monitoring plans, and pros and cons of various TRT formulations to suit individual needs [3,7,19,22,23,30]. Interviews required both reflection and the formulation of counseling ideas into spoken language, which would improve clinical competence and may lower physicians' perceived obstacles to change.

PCPs noted in Round 2 that the serial interviewing itself had merit as a

learning reinforcement tactic that helped them choose effective daily strategies for TD management and newly consider their practices to understand the patient experience.

### Limitations

The greatest limitation for the quantitative arm was limited pre-survey space that prevented asking all performance questions in both activities (Table 1). Each activity's data were anticipated to serve as proxy for the other. Unfortunately, three of the four performance measures were significantly different between subgroups of WC2-only vs. both-activity participants ( $p < .05$ ), so WC2 pre-survey results on messages could not be generalized to serve as a proxy pre-survey for WC1 participants. In contrast, pre-survey results of PCPs in WC1 on the strategy of pre-treatment counseling on options could serve as proxy pre-survey data for PCPs participating in WC2.

Other limitations of the study derive from variable participation (1 versus 2 activities) and the timing of interviews versus participation in the optional but available WC2. WC1 could be considered two activities because it was first a live activity and enduring within one day of the live activity. The live audience had the opportunity to submit questions to faculty and receive immediate answers to those questions, whereas the enduring activity merely replayed the live activity's Q&A session. WC1 results were not analyzed by format participation because most participants in the live format and all participants in the enduring format witnessed faculty answers to others' questions. Having enduring activities allowed variable timing between participation and surveying or interviewing (50 days to approximately 11 months).

The gender of the participants or the comparison group was not considered in the evaluation. This could be a possible limitation of the study that should be included in future analysis – i.e., female clinicians may have self-selected the CME activity because they were not confident counseling their

male patients about TD and/or TRT.

The follow-up quantitative survey has minor contamination from three PCPs who would have had unique reinforcement of top messages and recommended practices through interim interviewing. It is unknown whether their responses were typical. Quantitative analysis was not controlled for one survey respondent's participation in 2 activities and 1 interview, nor was qualitative analysis for one interviewed PCP who completed WC2 between interviews. Two-activity participants in our samples were also included in analysis of each activity because effectiveness-comparison of formats is beyond the current research scope and any participant or comparison group PCP could participate in both initiative as well as other CME activities. Analysis to determine whether the six PCPs who completed both activities answered typically for the group.

Self-report of clinical and counseling behaviors is subject to PCPs' recollection and accurate portrayal of recent practice. Variation in rates across groups and measures also suggest clinicians' attempts to appropriately evaluate their performance in answering the follow-up survey. Small sample sizes in the quantitative follow-up surveys increase the influence of any errors in self-reported data that would not appear in objective performance evaluation. Statistically significant changes and differences across groups were seen in many measures, so samples may have been adequate. One design goal was to have sufficient follow-up survey responses to allow participants in both activities separate standing as a study group, but this did not materialize despite persistence in recruiting the 99 PCPs who completed the WC2 post-test. Self-reported PCP data would ideally have been corroborated by patient-level chart or patient-reported survey data, and this lack of access also prevented the desired but unavailable assessment of patients' perspective on TD care. Nevertheless, examining the patient's experience through additional interviews to gather physicians' understanding of TD



patient care was valuable. New insights into PCP approaches to patient counseling will improve future initiatives with patient-level outcomes instruments.

## CONCLUSIONS

Age-associated testosterone deficiency reduces health and quality of life for increasing numbers of patients seeking primary care. PCPs participating in education activities in this study improved their understanding of the health risks of under treating TD, specific safety monitoring requirements for men taking TRT, and the available formulations and treatment options for men with different lifestyles and social circumstances. They also improved their competence in counseling on 1) TD health effects, 2) evidence-based information on TRT benefits and its widely discussed risks, and 3) TRT formulations with varying medical pros and cons, including lifestyle and cost barriers. Quantitative data indicated that the short, focused WC2 on best practices in TRT brought participants' performance in line with compared peers. Qualitative data suggested competent diligent counseling for the longer, more interactive WC1; supporting WC1 survey data showed comparable or better performance to WC2 in delivering 2 of 3 counseling messages. PCPs in the comparison group had higher performance in counseling on all four measures than the target, pre-activity PCP audience, indicating participants' narrowing of this gap through education.

Complex in nature, interpersonal and communication skills are critical components of TD treatment and compose one of six core competencies for desirable physician attributes identified by the Accreditation Council for Graduate Medical Education (ACGME) [31]. The Institute of Medicine encourages practitioners to tailor decision-making approaches to individual patients, but patients' communication behaviors do not reliably predict their preferences for shared decision-making [32,33]. Shared decision-making is the foundation of patient centered care and requires finding

a communication style that suits and benefits both clinician and patient, but effective communication skills have understudied factors and elude definition and prescription of mechanics and techniques [18,34].

Competence in the essential skills required for effective patient communication can improve outcomes for patients and PCPs – as much as having clinical knowledge and procedural skill can – and the art of communication can be developed throughout the clinical career [34]. Having little communications evidence to turn to, select PCPs in this study on counseling practices may have improved their professional competency by answering interview questions about their practices in assessing the patient experience, as “patients seek relationships in which they experience trust, the right amount of autonomy, caring, and expertise” [18]. To enhance such relationships in discussing TD, clinicians providing pre-treatment counseling on TD pathophysiology, TRT benefits and risks, therapeutic formulations, and monitoring plans must be able to understand the experience of patients who are considering TRT. This study leaves unanswered questions that warrant future investigations into patients' understanding of TD and TRT, as well as their satisfaction with past TD care. Future research should investigate patient-reported outcomes and juxtapose data with PCP self-assessments for consideration against the current reflections about approaches to elicit patient feedback about TD care.

Participating PCPs noted that interviews helped change practice through content reinforcement and reflection on practices and patients. Ultimately, interviewed PCPs appreciated opportunities to reflect on the patient's experience with TD and TRT and application of this information toward improving patient-centered care for this condition. Sargeant and colleagues identify reflection – along with mindfulness, openness and curiosity – as one capacity for self-assessment, which itself is a complex, formative activity that “draws upon both external

and internal data, standards, and resources to inform and make decisions about one's performance” building on Boud [20,22]. Interview queries about PCPs' patterns for assessing their patients' understanding of TD care and obligate consideration of internal data encourage mindful practice and provide clinician data for health care educators studying self-assessment [21].

Clinical education providers and researchers can gain several insights into planning and executing mixed-methods analyses of CME activities from this study. Several pearls regarding interviewing – any interviews with practicing clinicians to investigate practice patterns and educational outcomes also reinforce key educational messages, and thereby influence sustained practice improvement. If two follow-up interviews are conducted in the same cohort of clinicians, the second should not repeat past questions but rather explore quantitative patterns or expand into previously unexplored aspects of clinician practices or decision-making. When asking clinicians to describe the patient experience with a condition, query with phrasing about “practice patterns” the clinician uses to determine the patient's experience or response to care; gather data on explicit versus implicit approaches and evidence of supportive, sharing versus clinician-led practices. More globally, mixed-methods research improves researchers' understanding of clinical decision-making, communication skills, attitudes, and other competencies underlying the practice data identified in quantitative surveys; it can also be applied to educational format-effectiveness research.

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## DISCLOSURES

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