

# Development of a Voice Disorder Work Productivity Inventory Utilizing Cognitive Interviewing Technique

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**Objectives/Hypothesis:** Voice disorders have been shown to impair workplace productivity primarily by reduced efficiency while at work (presenteeism) versus increased days missed (absenteeism). Work productivity measures such as the Work Productivity and Activity Impairment (WPAI) Questionnaire or the World Health Organization Health - Work Performance Questionnaire (HPQ) can be customized to a specific disease but do not fully capture impaired work productivity associated with voice disorders. The purpose of this study was to develop a novel questionnaire to evaluate work productivity in patients with voice disorders.

**Study Design:** Descriptive

**Methods:** At a tertiary medical center, patients with gainful employment and with chronic voice disorders were given the WPAI, HPQ, and 20 voice-related statements (VRS-20). Cognitive interviews were conducted and recorded with all patients.

**Results:** Ten patients (7 females, 3 males) completed the questionnaires and subsequent cognitive interviews. One patient had spasmodic dysphonia, 6 had benign vocal fold lesions, and 3 had vocal fold motion disorders. The median VHI-10 was 18 (9-40). Themes that emerged during interviews include: avoiding oral communication/telephone, use of voice associated with strain/fatigue, frustration and stress at work, and workplace integrity.

**Conclusions:** In cognitive interviews, participants felt the VRS-20 captured the impact of their voice disorder at work better than the WPAI and HPQ. Participants also felt some statements were more important than others.

**Key Words:** Voice disorders, work Productivity, presenteeism, cognitive interviews.

**Level of Evidence:** 5.

## INTRODUCTION

With the voice being an essential tool for over 25% of the occupations in the United States,<sup>1</sup> it stands to reason that a voice disorder will have a significant impact on work productivity.<sup>2</sup> Like many chronic medical conditions,<sup>3</sup> voice disorders impair productivity by reducing efficiency at work, as opposed to causing workers to miss or be absent from work. In clinical outcomes research, presenteeism refers to the cost of decreased on-the-job productivity, increased errors, or failure to meet quality standards of work due to illness. Presenteeism is especially salient for chronic health conditions in

which workers may not be ill enough to suffer absenteeism. Presenteeism has been shown to account for the majority of the productivity loss for many common conditions such as back pain,<sup>4</sup> migraine headaches,<sup>5</sup> and depression.<sup>6</sup> While absenteeism is easy to define and measure, measuring presenteeism is more nuanced. Productivity impairment in both quantity and quality of work are often intangible and difficult to ascribe numeral values.

General work productivity inventories are available which can be tailored to a specific disease process, such as the Work Productivity Activity Impairment (WPAI) or World Health Organization Health Productivity Questionnaire (HPQ).<sup>7,8</sup> These instruments ask the participants to estimate a percentage decrease in their productivity, or compare their level of productivity to their contemporaries and yield an attractive, although arbitrarily devised, quantified measure of presenteeism.

Our group has previously shown in a cross-sectional analysis that individuals with spasmodic dysphonia report a significant presenteeism effect.<sup>2</sup> Furthermore, through a qualitative study on patients with spasmodic dysphonia we developed a battery of voice-related statements to qualitatively assess the specific ways in which dysphonia affected them at work.<sup>9</sup> This preliminary work was focused on individuals with spasmodic dysphonia, but we think that these same concerns would apply to individuals with dysphonia from varied etiologies. The purpose of this study is to perform cognitive interviews on a varied voice disorder population to set the foundation for development of a voice-specific work productivity

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TABLE 1.

Demographics, occupation, diagnosis, Voice Handicap Index – 10 (VHI-10) responses, total scores on VRS-20, percentage the voice specifically effected productivity on WPAI and world HPQ question 6, “How would you rate your overall job performance on the days you worked (0-10) in the past 4 weeks?” VRS-20 = 20 voice related statements; WPAI = work productivity and activity inventory; HPQ = World Health Organization Health Productivity Questionnaire

Participant	Age/Sex	Occupation	Diagnosis	VHI-10	VRS-20	WPAI	HPQ6
P01	59 F	Cashier	Unilateral vocal fold paralysis	40	68	70%	5
P02	42 F	Teacher	Vocal fold polyp	17	46	70%	2
P03	26 F	Nanny	Recurrent respiratory papilloma	12	38	35%	10
P04	63 F	Office worker	Vocal fold cyst	18	42	40%	7
P05	47 M	Physician	Unilateral vocal fold paralysis	34	65	30%	6
P06	58 F	Social worker	Chronic laryngitis	20	21	20%	8
P07	25 F	Rowing coach	Vocal fold polyp	35	36	70%	8.5
P08	47 F	Accountant	Bamboo nodules	18	26	30%	4
P09	42 F	Office worker	Spasmodic dysphonia	13	40	30%	9
P10	42 M	Office manager	Unilateral vocal fold paresis	9	44	50%	8

Participant Demographics and Questionnaire Scores.

inventory we are calling Work Hoarse. We hypothesize that patients with chronic voice disorders will find that some 20 previously delineated<sup>9</sup> voice-related statements (VRS-20) are a better measure of voice-related presentism than the WPAI or the HPQ.

**MATERIALS AND METHODS**

Approval for the study was obtained from the Institutional Review Board, who reviewed the study design, informed consent process, study incentives and data collection process. Adult participants (>18 years old) were identified through new patient visits at a multidisciplinary laryngology clinic. Additional inclusion criteria included gainful employment, English literacy, and being diagnosed with a voice disorder. To aid in generalizability

of the questionnaire we specifically offered participation to a varied group of pathologies.

Participants were first given a paper questionnaire to complete. Each questionnaire contained 3 elements: Work Productivity and Activity Impairment (WPAI), the World Health Organization Health Productivity Questionnaire (HPQ),<sup>8</sup> and 20 voice-related statements (VRS-20) (Appendix 1). The WPAI is a templated questionnaire to assess work productivity related to a specific disease or condition.<sup>10,11</sup> In this study, the WPAI was made specific for voice disorders by substituting “voice” for “PROBLEM” (Appendix 1). The 20 voice-related statements have been previously described by the author and studied in relation to spasmodic dysphonia.<sup>9</sup> Additional questions were included in the packet to obtain demographic information and guide the cognitive interviews.

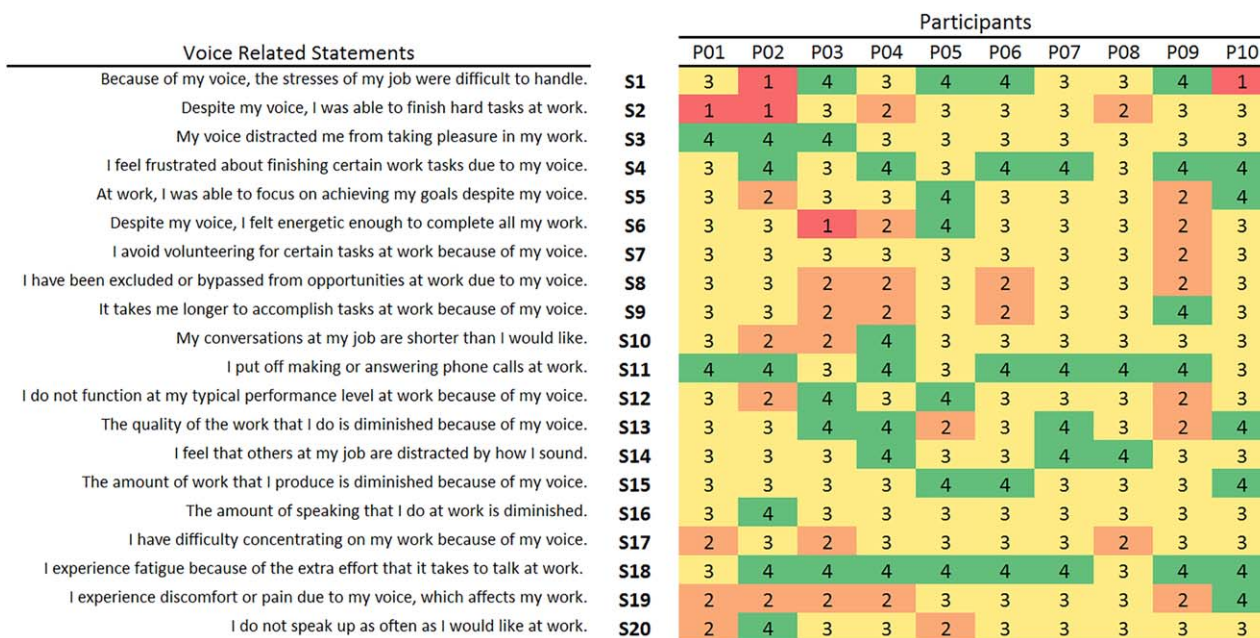


Fig. 1. List of each voice-related statement and its respective participant stratification. A value of 1-4 was assigned based on participant responses, where 1 or 2 was reserved for negative responses to questions or when the question was not properly understood. 3 was used for neutral responses and 4 was used for positive responses or if the question was noted by the participant to be on of their top 5 preferred questions.

Following completion of the paper survey, a cognitive interview was completed by one of the authors and audio recorded for later review. Standardized cognitive interviewing techniques, as reviewed by Collins,<sup>12</sup> were employed to assess participant understanding, perception of clarity, perception of relevance to their condition's impact on work productivity, and appropriateness of available scales. On review of each interview, salient and recurrent themes from the participants were noted and the participants' impressions of the VRS-20, WPAI, and WHO-HPQ scales were noted. To stratify the VRS, a value of 1-4 was assigned based on participant responses, where 1 or 2 was reserved for negative responses to questions or when the question was not properly understood. Three was used for neutral responses and 4 was used for positive responses or if the question was noted by the participant to be one of their top 5 preferred questions.

## RESULTS

Ten patients completed the surveys and cognitive interviews. Age, gender, occupation, diagnosis, total VRS-20 scores, VHI-10, WPAI percent reduction in productivity, and HPQ are listed in Table 1. Covariances between VHI, WPAI, and VRS-20, and HPQ scores were calculated but all 6 combinations of covariance did not reach statistical significance.

From the cognitive interviews, favorable and unfavorable responses from the participants about the VRS-20 were recorded and shown in Figure 1. Participants favored S1, S4, S11, and S18. In particular, the theme of fatigue related to voice use seemed to resonate with participants as seen in the thematic quotes in Table 2. When looking at fatigue-themed questions, participants liked S18 "I experience fatigue because of the extra effort that it takes to talk at work" better than S6 "Despite my voice, I felt energetic enough to complete all my work." Another important theme that emerged included avoidance of the telephone or changing modes of communication. As seen in Table 2, many participants had personal anecdotes or opinions related to S11 "I put off making or answering phone calls at work." Questions S1 and S4 reflected more general concepts of handling stress at work and frustration, which were less frequently noted in the interviews, however these VRS were often part of the participants' top 5 VRS selections.

Participants had negative comments or opinions about S2, S6, S8, S17, and S19. When discussing questions that the participants viewed negatively, many participants felt some of the statements questioned their integrity to complete their responsibilities at work or the quality with which they completed those responsibilities (Table 2). Statements S2 and S6 in particular included phrases "finish hard tasks" and "complete all my work." Some participants felt these statements were insinuating they were not completing what was expected of them and thus questioning their integrity. Additionally, integrity influenced decisions between statements that referred to the same theme but were phrased differently. For instance, the theme of distractions at work, some participants felt that S17 "I have difficulty concentrating on my work because of my voice," again called into question their integrity and ability to commit and focus on the job. Compared to the neutral reaction S14, "I feel

that others at my job are distracted by how I sound," where the distraction is depersonalized and moved away from the participant. For S8 and S19 objections revolved around a perceived lack applicability to their work situation. Statement S8 "I have been excluded or bypassed from opportunities at work due to my voice" did not resonate positively with many patients and 4 out of 10 participants said it was not applicable to their jobs or productivity at their job. Five of the 10 participants did not like S19 citing the word "pain," contained in S19, was too strong a descriptor and did not apply to their experience with their voice and work.

All participants understood the VRS-20 statements. All participants correctly identified the reverse polarity questions S2, S5, and S6 that contain "Despite my voice..." One participant, P01 missed the timeframe that the survey was in reference to which was described in the opening stem. None of the participants felt the VRS-20 was too long even at the full 20 statements.

Some participants felt the WPAI was straightforward to complete but others had difficulty assigning a numerical value to their productivity impairment. P01 felt the opening stem was confusing and the fact that it did not account for hours she was not assigned because of her voice. P10 is salaried and had difficulty quantifying how much work he lost because he does not "punch a clock."

For the HPQ P01, P03, and P04, P08 found the stem of the questions and the questions itself confusing and laborious to read and answer. "[The HPQ] was confusing, I had to read it a couple of times to see what they were asking," remarked P03. P03 and P10 had particular difficulty comparing themselves to others performing their job. When asked, P02, P04, P06, P07, and P08 preferred the WPAI to the HPQ.

## DISCUSSION

To date there is no validated questionnaire to assess the impact of voice disorders on work productivity and specifically presenteeism. From a collection of 20 previously developed voice-related statements, using cognitive interviewing methods, participants identified pertinent statements and others which were less important in describing the impact of their voice on work productivity. Additionally, themes of fatigue, avoidance of telephone communication, and integrity at work were identified as important.

This information will help determine the final Work Hoarse questionnaire. Despite no participants citing the survey form being too long, attempting to eliminate unnecessary questions in further analysis is prudent. The 10 participants in this study have demonstrated interest and motivation to participate in the study suggesting an increased attention span and tolerance. They are also completing the form in isolation from the usual and increasing burden of visit questionnaires. In the practical setting, where this survey is potentially filled out following a demographics, medication, and multiple additional symptom questionnaires, some patients may not have the time nor inclination to complete a 20-item questionnaire.

TABLE 2.  
Direct Participant Quotes Sorted by Theme.

Participant	Quote
<b>Fatigue at work</b>	
P03	"[S18] is a really good question because it's definitely 'Fairly Often' when [my voice] is pretty bad."
P04	"Except for fatigue [my voice] didn't really affect how much I got done."
P05	"I was pretty much exhausted at the end of the day, I had to decrease my office schedule."
P06	"I'm putting in more effort to get my words out, so I get fatigued from it."
P07	"When I have lost my voice but I'm still trying to produce the same volume, I feel like I have to put in an extreme amount of effort to press my voice out of my body. So, it's really exhausting by the end of the day."
P07	"It's too much effort to talk [at work] so I try to make it very brief."
P09	"I didn't even know it could make you tired. Sometimes when my voice is bad, at the end of the day I'm exhausted because of the effort it took to talk . . . all day."
P10	"For me the issue is more about the endurance and less about the quality."
<b>Telephone avoidance and changing modes of communication</b>	
P01	"Now I just, don't [answer the phone], and you know, we have the intercom to call for help. A lot of times I page, and people can't hear me, so I have to ask the cashier next to me to make the page for me."
P03	"[S11] is a really good question, because when my voice is really bad I do put off answering, or calling people."
P04	"I did that fairly often, I [would] ask people to email me or cover the phones for me."
P05	". . .in the office setting, older patients couldn't hear me. . . I would have to have one of my nurses come into the room and speak up for me."
P07	"[It can be] very frustrating trying to get someone to understand me on the phone, so I just completely avoid it."
P08	"I put off answering [phone calls], because I know I'm going to sound squeaky. . . With our phones you can see who it is, so I'll send them an IM (instant message). I'll communicate with them in a different way."
P09	"I just adapt; I do a lot through email. . . [when my voice is bad] I would rather email them than make a phone call."
P10	"I don't often pick up the phone and call someone at work; I'm almost always sending them an email or walking down the hall and having a face to face conversation."
<b>Frustration/stress at work because of Voice</b>	
P01	"It's take me a little extra effort . . . to figure out what [the customers] want."
P03	"I feel like people pay attention to my voice instead of the message I am trying to communicate."
P07	"Even though I do finish the tasks at hand at work, often times I feel that I could have said more or done more in regards to talking to a particular athlete. . . and that's frustrating to walk away from realizing I could have said more."
P09	"My job is pretty stressful, [more so] when you are worrying about what are other people thinking about my voice."
P10	"[When I would be] providing narration for cultural video. . . and I know I'm going to be sitting down and talking for an hour and just feeling a little bit of dread, a little bit of frustration around 'is my voice going to hold out?'"
<b>Integrity</b>	
P02	". . .it's not about your voice so much it's about your work ethic. [It's about] who you are. There are people that will complete the task despite the obstacle, and there are some who will say 'who cares?'"
P02	"Whenever you have 'complete my work' [like S6], that to me is an integrity issue, where is 18 is saying 'hey how is it affecting you?' . . . 18 is like, what are you changing at your job so that you can do it well."
P06	"The amount of work that I produce is diminished by my voice, and that one I put 'Never,' because I don't let it. I'm a very tenacious person and I've survived a lot things, so for me I just keep going."
P07	"Regardless of where my voice sat, I was always able accomplish the work I had set out to do."
P09	"I don't feel like the quality of work is affected. . . . And it just makes things more difficult, you just end up adapting."
P10	"A lot of my longer term goals are not tied to my short term voice use."

Results from this study are congruent with a previous evaluation performed by the senior author of VRS-20 statements with respect to spasmodic dysphonia alone.<sup>9</sup> Both S18, fatigue, and S11, telephone avoidance, made the top 4 statements in that study, and S2, S6, S17, and S19 were in the bottom 6, indicating some consistency of participant statements preferences.

Although not the intention of this study, a small sample size likely limited evaluation of covariance between the VRS-20 scores, WPAI, HPQ, and VHI-10. Additional limitations of the study relate to interview standardization. The interviews were structured to proceed along the questionnaire, but different interviewers probed for comparison questions at different

times during the interview, which yielded non-standardized comparisons between VRS statements and also between the instruments themselves. The addition of a structured survey about the proposed survey instruments (VRS-20, WPAI, and HPQ) may have provided for more robust statistical analysis of participant preference.

## CONCLUSION

1. WPAI and VRS are both useful for patients with a wide breadth of dysphonia.
2. Patients felt the VRS captures all the important elements of the impact of their dysphonia at work, although some statements were more important than others.
3. Patients felt that the VRS was useful in addition to the WPAI

## BIBLIOGRAPHY

1. Titze IR, Lemke J, Montequin D. Populations in the U.S. workforce who rely on voice as a primary tool of trade: a preliminary report. *J Voice* 1997;11:254–259.
2. Meyer TK, Hu A, Hillel AD. Voice disorders in the workplace: productivity in spasmodic dysphonia and the impact of botulinum toxin. *The Laryngoscope* 2013;123(Suppl 6):S1–S14.
3. Schultz AB, Chen CY, Edington DW. The cost and impact of health conditions on presenteeism to employers: a review of the literature. *Pharmacoeconomics* 2009;27:365–378.
4. Hansson M, Boström C, Harms-Ringdahl K. Sickness absence and sickness attendance—what people with neck or back pain think. *Soc Sci Med* 2006; 62:2183–2195.
5. Burton WN, Conti DJ, Chen CY, Schultz AB, Edington DW. The economic burden of lost productivity due to migraine headache: a specific worksite analysis. *J Occup Environ Med* 2002;44:523–529.
6. Beck A, Crain AL, Solberg LI, et al. Severity of depression and magnitude of productivity loss. *Ann Fam Med* 2011 9:305–311.
7. Reilly MC, Zbrozek AS, Dukes EM. The validity and reproducibility of a work productivity and activity impairment instrument. *Pharmacoeconomics* 1993;4:353–365.
8. Kessler RC, Barber C, Beck A, et al. The World Health Organization Health and Work Performance Questionnaire (HPQ). *J Occup Environ Med* 2003;45:156–174.
9. Isetti D, Meyer T. Workplace productivity and voice disorders: a cognitive interviewing study on presenteeism in individuals with spasmodic dysphonia. *J Voice* 2014;28:700–710.
10. Reilly MC, Gooch KL, Wong RL, Kupper H, van der Heijde D. Validity, reliability and responsiveness of the Work Productivity and Activity Impairment Questionnaire in ankylosing spondylitis. *Rheumatology (Oxford)* 2010;49:812–819.
11. Reilly MC, Lavin PT, Kahler KH, Pariser DM. Validation of the Dermatology Life Quality Index and the Work Productivity and Activity Impairment-Chronic Hand Dermatitis questionnaire in chronic hand dermatitis. *J Am Acad Dermatol* 2003;48:128–130.
12. Collins D. Pretesting survey instruments: an overview of cognitive methods. *Qual Life Res* 2003;12:229–238.