Dysphonia Risk Screening Protocol for Musical Theatre Actors: a preliminary study

ABSTRACT

**Purpose:** To propose the Dysphonia Risk Screening Protocol for Musical Theatre Actors (DRSP-MTA), to verify its applicability in association with the General Dysphonia Risk Screening Protocol (G-DRSP), to correlate the final scores of both, and to compare the total risk score, and to compare the risk of dysphonia measured in musical theater actors with and without vocal complaint. **Methods:** An observational cross-sectional study with 34 musical theater actors, adults, of both genders, with and without vocal complaints and regardless of whether they are professionals or students. The questionnaires were applied individually. Statistical analysis made it possible to verify the correlation between the dysphonia risk scores and to compare the groups with and without vocal complaint. **Results:** Most of the participants were male, young adults, professional actors and without vocal complaint. There was a high risk of dysphonia, evidenced by the application of G-DRSP, with means scores compatible with values found in individuals with dysphonia, and reinforced by the indices found with DRSP-MTA application. There was a moderate and directly proportional correlation between the two questionnaire scores; and a correlation of both with the total risk score. Higher G-DRSP scores were observed in the vocal complaint group. **Conclusion:** DRSP-MTA was feasible and easy to apply and was positively correlated with the total score and G-DRSP score. A high risk of dysphonia was evidenced in individuals with vocal complaints. Although the specific DRSP-MTA score did not differentiate musical theatre actors with and without vocal complaints, the G-DRSP score and the total risk score performed such differentiation.
INTRODUCTION

The use of standardized and validated protocols favors speech therapy practice as it facilitates the comparison of results between different services and allows the realization of studies that direct and improve procedures, which contributes to evidence-based practice and provides better quality of care to the patient(1-3).

The instrument for the initial voice investigation called General Dysphonia Risk Screening Protocol (G-DRSP), with the calculation of scores, showed high sensitivity to differentiate groups with and without dysphonia and demonstrated effectiveness in the voice clinic(4). The same instrument was applied to individuals with different laryngeal diagnoses and its score was positively correlated with the degree of vocal alteration(5).

The G-DRSP has its applicability indicated to individuals of any age group, gender and regardless of the professional use of the voice, allowing the study of the multiplicity of factors involved in the development of dysphonia(6). The proposal is to analyze general factors related to the voice, being necessary to complement it with specific instruments according to the age group and profession. The Specific Teachers Dysphonia Risk Screening Protocol (Specific-DRSP), for example, demonstrated that its score, associated with the G-DRSP score, supports the differentiation between groups with and without vocal disorders, in addition to providing relevant qualitative data for the evaluation and planning of speech-language therapy assistance with this particular professional category(7).

One variable that can be extracted by applying the G-DRSP associated with a specific dysphonia risk screening protocol is the total dysphonia risk score. This score is represented by the simple sum of the General-DRSP score and the Specific-DRSP score. Theoretically, this total score makes it possible to quantify the risk of dysphonia in a manner consistent with the reality of the individual assessed, as it allows a single measurement, both of the general risks, to which the entire population may be exposed regardless of age and profession, as well as the specific risks related to different age groups or professions.

Concerning the voice of musical theater actors, there are many specificities to be considered. They are a special group within the vocal elite due to the need to sing, act and dance(8), and are considered more susceptible to the development of vocal problems(9). In the speech-language assessment of these professionals, in addition to aspects related to vocal production, it is necessary to understand the specific demands of each character, the possible adverse conditions concerning the environment, the preparation of the actor and the musical style of the production. It is important to consider the wide range of musical styles that exist in this scenario and the differences among them(10-11). Besides, the structure of musical theater production that can involve grand scenarios and long choreographies stands out, which requires precise control of both vocal techniques (laryngeal adjustments, vocal tract and respiratory support) and expressive techniques(7).

The need to combine projected singing and athletic dance, which is the basis of musical theater, in a journey of many rehearsals and presentations, presupposes physiological effects that need to be better known not only for the aesthetics of the musical but mainly for the well-being of the artist and his/her career longevity(12).

However, data on vocal habits and symptoms and voice quality in this population are still limited(7).

A specific investigation instrument to be used with musical theater actors will contribute to a deeper understanding of the risks and aspects that may interfere with their vocal performance.

The present study aimed to propose the Dysphonia Risk Screening Protocol for Musical Theater Actors (DRSP-MTA), verify its applicability, correlate its specific score to the score of the General Dysphonia Risk Screening Protocol (G-DRSP) and with the total risk of dysphonia score and, finally, to compare the risk of dysphonia measured in musical theater actors with and without voice complaints.

METHODS

Observational cross-sectional study approved by the Ethics Committee of the “Faculdade de Medicina da Universidade de São Paulo” (nº 0560/10).

The convenience sample consisted of 44 musical theater actors aged between 18 and 47 years old (average 25.7 years old; ± 6.08), of which 28 were men (17 professionals and 11 students) and 16 were women (8 professionals and 8 students).

Initially, each participant was asked: “Do you have any complaints related to your voice?”. Seventeen (39%) responded affirmatively and 27 (70%) reported not having a vocal complaint. Thus, two groups were established: with vocal complaints (WVC) and without vocal complaints (WOVC).

The WVC group was composed of: ten male participants (58.8%) and seven female (41.2%), eleven students (64.7%) and six professionals (35.3%), totalizing 17 individuals (average 23.7 years old ± 4.01); the WOVC group was composed of eighteen male participants (66.7%) and nine female (33.3%) being eight students (29.6%) and nineteen professionals (70.4%) totaling 27 participants (average age of 27 years ± 6.86).

All individuals filled out the Free and Informed Consent Form and answered the G-DRSP(6) and the DRSP-MTA, the latter being elaborated for the present study (Appendix A). The questionnaires were applied by the same researcher, individually, in a quiet place and at the convenience of the participants.

For the preparation of the DRSP-MTA, a comprehensive review of the literature on the subject was carried out and two pilot applications were made for the necessary adjustments. Pilot application data was not included in this study.

Both G-DRSP and DRSP-MTA allow the calculation of partial scores and a total score. The G-DRSP score can vary from zero to 131 points and the DRSP-MTA score from zero to 166 points. In both, the more negative the response, the higher the score and the greater the risk. For the G-DRSP, the cut-off score for high risk of dysphonia was defined, 22.75 for adult men and 29.25 for adult women(4).

The DRSP-MTA is composed of 28 questions, of which four are qualitative and 24 scored in subscores (presenting sub-items), they are: the career moment, performance in other professions, artistic training, singing class, dance class, physical preparation,
rehearsals, use of the microphone, environmental conditions, self-reported breathing type, difficulties in maintaining vocal quality, function in production, vocal quality before artistic practice, vocal quality after artistic practice, stress, vocal warm-up and cooling, daily vocal use, smoking, drinking alcohol, using drugs, using a dental prosthesis, specific issues for women, signs and symptoms.

For this study, the two total scores were considered, in addition to creating a final risk score for dysphonia (RS) from the simple sum between them (G-DRSP + DRSP-MTA; range from zero to 298).

Data analysis was descriptive and inferential. To define the statistical analysis, the Kolmogorov-Smirnov normality test was applied. To analyze the correlation between the final scores of the two instruments applied, Pearson’s Correlation test was used, with an interpretation of the correlation coefficient based on Dancey and Reidy(12), who point to a weak correlation with a coefficient from 0.1 to 0.3, moderate from 0.4 to 0.6 and strong from 0.7 to 1. Student’s t-test was used to compare the scores between the WVC and WOVC groups. The level of significance was set at 5%.

RESULTS

In the sample of 44 actors, averages of 40.58 (± 15.48) were observed in the G-DRSP, 58.39 (± 15.80) in the DRSP-MTA and 98.98 (± 26.86) in the total score. The values obtained in each group were: WVC = 51.12 (± 17.26) in G-DRSP, 60.82 (± 17.38) in DRSP-MTA and 111.95 (± 30.38) in the total score (G-DRSP + DRSP-MTA); WOVC = 33.95 (± 9.74) in G-DRSP, 56.86 (± 14.85) in DRSP-MTA and 90.82 (± 21.13) in the RS.

The DRSP-MTA score showed a moderate positive correlation with the G-DRSP score, both in the WVC and WOVC groups. It was also positively correlated with the RS in both groups, with a strong correlation in both the WOVC and WVC groups, the same occurred with the G-DRSP score, which showed a positive and strong correlation with the RS in both groups (Table 1).

The RS and the G-DRSP score differentiated musical theater actors with and without vocal complaints, identifying higher averages in the WVC group for both scores (Table 2).

DISCUSSION

When considering the cutoff points for low and high risk of reference dysphonia(6), there was a high risk of dysphonia in musical theater actors complaining of voice changes. Also, the G-DRSP score values observed are close to the average found in individuals with dysphonia(6). Laryngological findings(7), high vocal load(8) and the results of the present study reinforce the need for research with this population, identifying and describing their needs and risks, both in students and professionals; besides, explaining the need for specific training programs(13).

Musical theater actors have a high vocal demand and also a high demand for vocal quality(14). Thus, vocal changes, even if mild, can have a strong impact on their careers. Excellence in performing specific vocal adjustments for each character and in each artistic production is required of them; both adjustments concerning the glottic source and related to the vocal tract and breathing(15). Besides, there is a high vocal load composed of the volume of weekly presentations, rehearsals and choreographies, which are often complex and associated with the use of voice(7).

Any problem, whether vocal, physical, or emotional, can compromise the actor’s performance and result in difficulties for him to establish himself in the job market(7,8,10).

Regardless of the presence or absence of vocal complaints, the average scores obtained with the application of the screening protocols indicated a high risk of dysphonia(6). The average value obtained in the G-DRSP, in addition to being above the cutoff point for high risk of dysphonia(6), is close to the average found in individuals who presented dysphonia(4). Laryngological findings(7), high vocal load(8) and the results of the present study reinforce the need for research with this population, identifying and describing their needs and risks, both in students and professionals; besides, explaining the need for specific training programs(13).

In this context, the DRSP-MTA was innovative in its proposal and, in addition to bringing quantitative questions, it offers qualitative data relevant to the screening of the risk of dysphonia in musical theater actors.

The positive correlations between the DRSP-MTA and G-DRSP scores, both in the group with vocal complaints and in the group without complaints, reinforce the importance of associating both questionnaires in the investigation of the risk of dysphonia in this population(6). The more present the general risks the more present the specific risks mentioned by the musical theater actor. This evidence is also reinforced by the positive correlations observed between the total score and the G-DRSP and DRSP-MTA scores, also observed in both groups (WVC and WOVC).

The presence of vocal complaints was determinant for a higher risk of dysphonia, as evidenced by the G-DRSP and the total score. The subscores available in this questionnaire may be analyzed in the future to detail this difference. Previous research has shown the questionnaire efficiency in differentiating individuals with and without dysphonia(4).

The DRSP-MTA score did not differentiate the WVC and WOVC groups. Questioning the actor about complaints related to the voice can give rise to several interpretations, as for some it may reflect difficulties in specific adjustments of speech and singing(7). For others, it may be related to the presence of changes in vocal quality, for example. The finding of the present research may be indicative that, in this case, the vocal complaint would be more related to general aspects such as vocal signs and symptoms, comorbidities and previous vocal changes, which can be explored in the continuity of the study on this theme.

Another study(7) found a high prevalence of negative vocal signs and symptoms in 31 musical theater students, such as vocal fatigue, dry throat and vocal tract discomfort, but which were not associated with the presence of vocal disorders. Even so, a high occurrence of laryngological changes was found, such as inflammatory lesions, which may also explain, at least in part, some of the referred signs and symptoms(7). The symptom most mentioned in another study was also vocal fatigue, in this case not always considered by the actors as something negative, but a consequence of excessive effort/dedication(10). They also...
indicated breathiness, difficulty in reaching high notes and discomfort in the throat. The need for specific training was highlighted in a study that demonstrated breathing difficulties when singing and dancing occur simultaneously in the musical theater, which can lead to overload, discomfort and loss of aesthetic quality. Musical theater actors with vocal complaints had a higher RS than those without vocal complaints, general and specific risks. This finding confirms the hypothesis of the applicability of this variable and indicates the need for studies that encompass it. Among the actors with vocal complaints, many were students. Some authors believe that professional actors have a better command of vocal techniques for singing in musical theater and therefore would have a slightly lower risk than students. On the other hand, professionals may be involved in more exhaustive theatrical productions in terms of required performance, the number of rehearsals and presentations and inadequate environment, which can also interfere with adequate rest time and little dedication to aspects of vocal well-being such as vocal warm-up and cool-down practices.

Another important aspect to be considered in this population is the presence of comorbidities that can interfere with the voice. A study with musical theater students found a high prevalence of anxiety or stress. The other data collected with the application of the two questionnaires involve the survey of signs and symptoms, routine and work environment, tests and presentations, in addition to those related to hydration, smoking, and comorbidities, among others. And all will be analyzed in the continuity of this study, in association with voice assessment data, to broaden the analysis, including regarding the relationship between complaints of dysphonia and the presence of vocal disorders, and possible associations between the presence of complaints and/or dysphonia, general and specific risk scores and laryngeal changes.

CONCLUSION

The preliminary results of the present study indicate that the proposed DRSP-MTA enabled the qualitative and quantitative

| Table 2. Comparison between groups with and without vocal complaints concerning the questionnaire scores |
| --- |
| Groups | Scores | With vocal complaint | Without vocal complaint | p-value |
| --- | --- | --- | --- | --- |
| DRSP-MTA | Average | 60.82 | 56.86 | 0.424 |
| | Standard deviation | 17.38 | 14.85 | 0.001* |
| | n | 17 | 17 | |
| G-DRSP | Average | 51.12 | 33.95 | 0.000* |
| | Standard deviation | 17.26 | 9.74 | |
| | n | 17 | 27 | |
| Total | Average | 111.95 | 90.82 | 0.009* |
| | Standard deviation | 30.38 | 21.13 | |
| | n | 17 | 27 | |

Student t-test *Statistically significant
Caption: DRSP-MTA = Dysphonia Risk Screening Protocol for Musical Theater Actors; G-DRSP = General Dysphonia Risk Screening Protocol
survey of specific information about performance in the musical theater, being easy to apply and interpret with this population.

The actors had a high risk of dysphonia by G-DRSP and DRSP-MTA and there was a correlation between the scores of the two questionnaires, suggesting the associated application of both.

The G-DRSP score and the total score were higher among those with vocal complaints. In the group with vocal complaints, there was a significant presence of students.

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Author contributions

LCP was responsible for the conception and design of the study, selection of participants, collection, analysis and interpretation of data, writing and revision of the manuscript and approval of the final version; MSZ was responsible for the conception and design of the study, participation in data analysis, participation in the writing of the manuscript, review of the manuscript and approval of the final version; KN was responsible for the conception and design of the study, participation in data analysis, review of the manuscript and approval of the final version.
Appendix A. Dysphonic Risk Screening Protocol Specific for Musical Theatre Actors (DRSP-MTA)

Patient's name: ________________________

Artistic name: ________________________

Gender: M ( ) F ( )

RG: ___________ BD: ______ / ______ Age: ______

1. Time of artistic performance in the Musical Theater:
   ( ) Professional ( ) Non-professional
   ( ) Professional theater
   ( ) Professional arts organization
   ( ) Professional arts company
   ( ) Professional arts group
   ( ) Professional arts collective

2. At what point are you in relation to work as an actor/actress:
   ( ) Rehearsal; which plays?
   ( ) Season/Running; which plays?
   ( ) Season and rehearsals; which plays?
   ( ) Rehearsals only; which plays?
   ( ) Not acting or in preparation for any production

3. Which category best fits:
   ( ) Professional ( ) Non-professional
   ( ) Professional, but carries out other activities
   ( ) Professional/Student: income is dependent on artistic performance, but in the last year studied in the area
   ( ) Student/Professional ( ) Keeps studying in the area and participates in professional productions receiving remuneration, but income does not depend on artistic performance
   ( ) Student ( ) Did not participate in paid productions

4. Do you work in another profession(s)? (note: if the answer is "no", skip to question #5)
   ( ) No ( ) Yes; which one(s)?

5. Artistic Education:
   ( ) General arts education ( ) Musical training ( ) Vocational training ( ) Dance, Singing, Etc.

5.1 During your education, did you have studies and/or guidance on how healthy voice production occurs?
   ( ) Yes ( ) No
   What about vocal well-being?
   ( ) Yes ( ) No

6. Recall of these guidelines:

Do you follow these guidelines? ( ) Yes ( ) No
   Consider inappropriate guidelines and are followed ( ) Appropriate and adequate guidelines, but do not follow them ( ) Inadequate guidelines, but follow them ( ) No guidelines

6.1 Vocal classification:
   ( ) Bass ( ) Baritone ( ) Tenor ( ) Contralto ( ) Mezzo-soprano
   ( ) Soprano ( ) Can't describe ( ) Other:

6.2 Most recently used type of singing (last 6 months):
   ( ) Pop ( ) Jazz ( ) Blues ( ) Classical ( ) Opera ( ) Other:

7. School:
   ( ) Italian ( ) English ( ) French ( ) Other:

8. Do you or did you take singing lessons? ( ) Yes ( ) No
   If yes, which style(s) studied? Describe those who were the professionals who accompanied you and for how long:

9. Do you or did you take a dance class? ( ) Yes ( ) No
   If yes, which style(s) studied:

10. Do you or did you take physical preparation? ( ) Yes ( ) No
    If yes, what physical activities:

11. Describe which professionals accompanied you and for how long:

Do you notice that someone's posture interferes with voice production? ( ) Yes ( ) No

Do you notice that there is an increase in body tension? ( ) Yes ( ) No

Do you notice that there is a change in vocal production? ( ) Yes ( ) No

Do you notice little change? ( ) Yes ( ) No

Do you notice big change? ( ) Yes ( ) No

Describe which professionals accompanied you and for how long:

Consider 0=no change, 1=notice little change, 2=notice big change
12. Rehearsals:
  ( ) yes ( ) no; location and who runs the rehearsals:

  (consider 1=directed by a voice professional; 2=rehearsal not directed by a voice professional; 3=not rehearsed)

12.1. Describe frequency and number of hours:

  (consider: 1=up to 2 hours of use/day, 2=between 2h01 and 5h00, 3=more than 5h01 and 8h00 of use/day)

13. Do you use a microphone or other vocal amplification feature during rehearsals?
  ( ) yes ( ) sometimes; describe:

13.1. Do you use a microphone or other vocal amplification feature during presentations?
  ( ) yes ( ) sometimes; please describe:

13.2. If you use it in any of the situations, did you have guidance or training on how to use the equipment?
  ( ) no ( ) yes; which one?

14. Environmental conditions during performance:
  ( ) there is internal/external noise (2) ( ) dust (2)
  ( ) air conditioning (2)
  ( ) dry ice (2) ( ) very large location (1) ( ) very hot environment (1)
  ( ) very cold environment (1) ( ) environment does not have efficient ventilation (2)
  ( ) other:

15. Respiratory type:
  ( ) costodiaphragmatic ( ) inferior ( ) mixed ( ) superior
  ( ) does not know how to describe (must be checked by the evaluator):

16. As for vocal psychodynamics in the theater, you recently had to modulate your voice to convey:
  ( ) excitement ( ) sadness ( ) anger ( ) fragility ( ) whisper
  ( ) scream ( ) fear ( ) insality ( ) animal sounds ( ) tiredness
  ( ) drunk ( ) older age ( ) younger age
  ( ) other; which:

17. Show difficulties to maintain:
  . the same vocal quality from the beginning to the end of the presentation/rehearsal (daily)? ( ) never ( ) sometimes ( ) always; if you checked “sometimes” or “always”, describe:

18. What is your role in production?
  ( ) PROTAGONIST - responsible for a heavy role in the plot (2)
  ( ) ENSEMBLE - only member of the stage choir (1)
  ( ) SWING - replaces characters in the ensemble (2)
  ( ) DANCE CAPTAIN - dancer responsible for maintaining the choreographies. (0)
  ( ) COVER - has a shorter role and replaces other main actors in their roles (1)
  ( ) ALTERNATE - alternates a role (usually minor) (1)
  ( ) SECONDARY CHARACTER (1)
  ( ) IT SINGER - a singer who does not enter the scene (0)
  ( ) STANDIN - does not have a role in the piece, but can enter if necessary (1)

Note: If the participant is in more than one production, the score of the functions must be added

19. Regarding vocal quality, indicate on the scale below, with a vertical line, how much your voice displeases you before daily artistic practice:

| Stops | Displeases |
|-------|------------|

20. Regarding vocal quality, indicate on the scale below, with a vertical line, how much your voice displeases you after artistic practice:

| Stops | Displeases |
|-------|------------|

21. Regarding the possible stress caused by the production routine (rehearsals, presentations, etc.), indicate on the scale below, with a vertical line, how stressful your routine is:

| Nothing Stressful | Very Stressful |
|-------------------|---------------|

22. Do you perform voice warm up and/or cool down?
  ( ) no ( ) yes; WARM UP ( ) yes; COOL DOWN ( ) yes; BOTH

23. Average voice usage time per day:

23.1. Working days: work hours and use your voice for ______ hours (consider 1=up to 2hs of use/day, 2=between 2h01 and 5h00, 3=more than 5h01 and 5hs of use/day)

23.2. Weekends: work hours and use your voice for ______ hours (consider 1=up to 2hs of use/day, 2=between 2h01 and 5h00, 3=more than 5h01 and 5hs of use/day)

23.3. Do you take breaks that allow the voice to rest? ( ) no ( ) yes (consider 0=yes; 1=no)

If yes, describe the average time of breaks and the frequency at which they occur:
| Question |
|----------|
| 24. Regarding smoking: |
| ( ) never smoked |
| ( ) smoked/smokes only during performance/rehearsals; describe the frequency and duration |
| ( ) is a former smoker; describe how long you smoked; how long you have stopped; average number of cigarettes you smoked per day: |
| ( ) is a smoker; describe how long you have been smoking; average number of cigarettes per day: |
| (consider 0=non-smokers or ex-smokers for 10 years or more; 1=ex-smoker for less than 10 years; 2= smoking on stage or rehearsals; 3=smoker) |
| 25. Do you drink alcohol? |
| ( ) no ( ) yes; describe: type of drink, quantity and frequency: |
| (consider 0=no, 1=yes) |
| 26. Do you use drugs? |
| ( ) no ( ) yes; describe type, quantity and frequency: |
| (consider 0=no, 1=yes) |
| 27. Do you wear dental prosthesis? |
| ( ) no ( ) yes; describe how long (consider whether to wear and not wear): |
| ( ) do you have any complaints regarding the wear of this prosthesis? ( ) no ( ) yes; describe: |
| (consider 0=do not wear and do not need; 1=wear and complain about wearing; 2=need to wear, but do not wear) |
| 28. Only for women: |
| ( ) do you have symptoms of premenstrual tension? ( ) no ( ) yes; if yes, describe: |
| ( ) are you pregnant? ( ) no ( ) yes; if yes, time of pregnancy: |
| ( ) are you in menopause? ( ) no ( ) yes; if yes, how long ago: |
| ( ) has hormonal problems? ( ) no ( ) yes; if yes, describe: |
| (consider for each item: 0=no, 1=yes) |
| 29. Check the frequency in which the items below occur: |
| (indicate: 3 - daily/always; 2 - weekly/almost always; 1 - monthly/sometimes; 0 - never) |
| (3) (2) (1) (0) Frustration due to vocal production |
| (3) (2) (1) (0) Loss of control of breathing pattern during the habitual speech |
| (3) (2) (1) (0) Loss of control of breathing pattern during the singing |
| (3) (2) (1) (0) Loss of control of breathing pattern during the performance |
| (3) (2) (1) (0) Loss of control of breathing pattern during the dance |
| (3) (2) (1) (0) Loss of technical control of the singing voice |
| (3) (2) (1) (0) Loss of vocal dynamics control |
| (3) (2) (1) (0) Loss of vocal frequency control |
| (3) (2) (1) (0) Vocal fatigue after heating |
| (3) (2) (1) (0) Vocal fatigue after presentation |
| (3) (2) (1) (0) Need to be absent from presentation/rehearsal due to voice |
| (3) (2) (1) (0) Tuning out of control |
| (3) (2) (1) (0) Aphonia |

30. Other relevant comments

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**SCORE DRSP-MTA:**

**TOTAL SCORE (G-DRSP + DRSP-MTA):**

Date: ____/____/____

Speech-Language Therapist: ___________________________