





## RESEARCH REPORT

# Outcomes of a first point of contact speech language therapy clinic for patients requiring vocal cord check pre and post thyroid/parathyroid surgery

Jennifer Davis<sup>1,2</sup>  | Elizabeth C. Ward<sup>3,4</sup>  | Marnie Seabrook<sup>1</sup> | Justin Gundara<sup>5,6,7</sup>  | Bernard C. S. Whitfield<sup>5,6</sup> 

<sup>1</sup>Speech Pathology Department, Logan Hospital, Metro South Hospital and Health Service, Brisbane, QLD, Australia

<sup>2</sup>Australian Catholic University, School of Allied Health, Brisbane, QLD, Australia

<sup>3</sup>The University of Queensland, School of Health and Rehabilitation Sciences, Brisbane, QLD, Australia

<sup>4</sup>Centre of Functioning and Health Research, Metro South Hospital and Health Service, Brisbane, QLD, Australia

<sup>5</sup>Griffith University, School of Medicine and Dentistry, Gold Coast, QLD, Australia

<sup>6</sup>Department of Surgery, Logan Hospital, Metro South Hospital and Health Service, Brisbane, QLD, Australia

<sup>7</sup>Department of Surgery, Redland Hospital, Metro South Hospital and Health Service, Brisbane, QLD, Australia

## Correspondence

Jennifer Davis, Logan Hospital, Queensland Health. Cnr Armstrong and Loganlea Roads Meadowbrook QLD 4131, Australia.

Email: [jennifer.davis3@health.qld.gov.au](mailto:jennifer.davis3@health.qld.gov.au)

Elizabeth Ward, The University of Queensland, School of Health and Rehabilitation Sciences, Brisbane, QLD, Australia.

Email: [liz.ward@uq.edu.au](mailto:liz.ward@uq.edu.au).

## Funding information

Metro South Research Support Scheme

## Abstract

**Introduction:** Speech Language Therapy First Point of Contact Clinic (SLT-FPOCC) models can assist assessment of low-risk patient populations referred to ear, nose and throat (ENT) services. To further improve ENT waitlist management and compliance with best-practice care, consideration of other low-risk populations that could be safely managed through this service model is needed. The aims of this paper are to evaluate the clinical and service outcomes of completing vocal cord check (VCC) assessments for patients' pre and post thyroid/parathyroid surgery within an SLT-FPOCC model and examine consumer perceptions.

**Methods & Procedures:** The service followed existing SLT-FPOCC procedures, with ENT triaging referrals, then SLT completing pre- and postoperative VCC assessment (interview, perceptual assessment, flexible nasendoscopy), with assessment data later reviewed by ENT to diagnose laryngeal pathology. Clinical and service outcomes were collected prospectively. Patients completed an anonymous post-service satisfaction survey.

**Results:** Of the first 100 patients referred for preoperative VCCs, SLT assessment identified 42 with dysphonia and 30 reporting dysphagia, while ENT confirmed 9 with significant preoperative anatomical findings. Eighty-three

This is an open access article under the terms of the [Creative Commons Attribution-NonCommercial License](https://creativecommons.org/licenses/by-nc/4.0/), which permits use, distribution and reproduction in any medium, provided the original work is properly cited and is not used for commercial purposes.

© 2023 The Authors. *International Journal of Language & Communication Disorders* published by John Wiley & Sons Ltd on behalf of Royal College of Speech and Language Therapists.



underwent surgery, with 63 (95 nerves at surgical risk) returning for a postoperative VCC. Postoperative VCC identified three temporary neuropraxias (3.2%) and three unilateral vocal fold paresis (3.2%). Patients were highly satisfied with the service. All 163 pre-/postoperative VCCs were completed with no adverse events.

**Conclusion & Implications:** The current data support SLT-FPOCC service expansion to include pre and post thyroid/parathyroid surgery VCC checks, with positive consumer perception. The model supports delivery of best practice management (i.e., pre- and postoperative VCC) for patients receiving surgery for thyroid/parathyroid dysfunction, and associated efficiencies for ENT services.

#### KEYWORDS

advanced scope of practice, ENT, first point of contact clinic, parathyroid, speech-language therapy, thyroid, vocal cord check

#### WHAT THIS PAPER ADDS

##### *What is already known*

- Assessment of laryngeal function via flexible nasoendoscopy is recommended best practice for patients pre and postthyroid/parathyroid surgery, as recurrent laryngeal nerve injury is a low incidence (<10%), yet well-recognised risk of these surgeries. Traditionally, general surgeons refer presurgical patients to ear, nose and throat (ENT) for vocal cord check (VCC) assessment. However, with access to specialist outpatient services under increasing pressure, there is growing support for utilisation of other health professionals, such as speech-language therapists working in first point of contact (FPOCC) models, to assist with the administration of pre- and postsurgical assessments of such low-risk populations.

##### *What this study adds*

- This work expands on the emerging body of evidence for speech language therapy (SLT) led FPOCC models within ENT outpatient services, providing clinical and service outcomes to support the safety of a new model designed to administer VCCs for patients pre and post thyroid/parathyroid surgery. Adopting a similar model to a prior published SLT-led FPOCC model, the trained SLT completes the pre- and postsurgical VCC including flexible nasoendoscopy and videostroboscopy, with images and clinical information then presented to ENT for diagnosis and management planning. This study also provides the first data on consumer perceptions of this type of service model.

##### *Clinical implications of this study*

- Data on 100 consecutive presurgical patients revealed positive service findings, supporting the safety of this model. Nature and incidence of clinical findings pre and post surgery were consistent with previously published studies using

traditional models of care (i.e., ENT completing the flexible nasendoscopy). Consumer perception was positive. This model enables delivery of pre-and postsurgical assessments for patients receiving thyroid/parathyroid surgery, consistent with best practice care, and reduces burden on ENT services. In total 163 ENT appointments were avoided with this model, with positive implications for ENT waitlist management.

## INTRODUCTION

Instrumental assessment of laryngeal function both pre- and postoperatively is recommended for all patients undergoing thyroid and parathyroid surgery (Randolph & Kamani, 2006). The presence or absence of a perceptual dysphonia does not confirm or exclude abnormal vocal fold function. As such, pre- and postoperative direct laryngeal assessment is recognised internationally as best practice management for this patient group (Chandrasekhar et al, 2013; Kay-Rivest et al, 2015; Sinclair et al, 2016).

Preoperative laryngeal assessment in the thyroid/parathyroid population is used to inform surgical planning. It allows identification of any preoperative laryngeal issues, including the rare, but life-threatening situation of a preexisting contralateral recurrent laryngeal nerve (RLN) injury. Should the ipsilateral RLN be compromised even temporarily as a later consequence of thyroid or parathyroid surgery, the resulting bilateral RLN injury can result in airway obstruction and require tracheostomy (Higgins et al., 2011).

Postoperative laryngeal assessment in this population is also critical to ensure any surgical complications, including temporary or permanent injury to the recurrent laryngeal nerve or external branch of the superior laryngeal nerve, are identified. However, it is recognised that postoperative complications are often low in frequency, reported as occurring in only 1% to 8% of patients (Hermann et al., 2002; Jeannon et al., 2009; Steurer et al., 2002), often leading to a low level of clinical compliance with postoperative laryngeal assessment. However, failure to complete routine vocal fold assessment postoperatively can lead to an underestimation of laryngeal complications (Heikkinen et al., 2019) and contribute to delays referring patients into conservative management via speech-language therapy (SLT) rehabilitation, surgical management by ear, nose and throat (ENT), or a combination of both.

For these reasons, patients under the management of a general surgeon for thyroid/parathyroid dysfunction should be referred to ENT services for vocal fold assessment prior to and optimally also following surgery

(Randolph, 2010). However, considering that pre- and post-complications typically occur in only a small percentage of patients (Hermann et al., 2002), it is acknowledged that this population is at a low risk of presenting with pathology. As such, rather than increasing the clinical load for existing ENT services, this low-risk clinical cohort could be managed under an alternate clinical model for low-risk cohorts, such as an SLT-led, first point of contact clinic (SLT-FPOCC) model (Payten et al., 2020; Seabrook et al, 2019; Schwarz et al, 2021; Payten et al., 2022; Occomore-Kent et al., 2021).

Recent studies have demonstrated the advantages of using SLT-FPOCC models to assist waitlist management of low-risk outpatient ENT services (Payten et al, 2020; Schwarz et al, 2021; Seabrook et al, 2019). In published SLT-FPOCC models, low-risk patients are typically referred to the SLT-FPOCC service by ENT. The speech-language therapist then completes a multidimensional voice +/- swallow assessment including video-recorded flexible nasoendoscopy (+/-videostroboscopy), and the information is then reviewed after the clinic with an ENT (Schwarz et al, 2021; Seabrook et al, 2019). Speech language therapists are skilled in the assessment and interpretation of laryngeal function in relation to voice and swallow functions, and in Australia can complete flexible nasoendoscopy with local training and facility endorsement. Although the speech-language therapist's clinical impression and expertise contribute to the diagnostic workup, final diagnosis of any laryngeal pathology/anatomical variations is made by ENT post clinic on review of the assessment data. This type of model ensures that the assessment process is still completed by a skilled, qualified professional (the speech-language therapist); however, ENT time is required only to triage referrals into the clinic and then to review the assessment findings and provide the diagnosis, thus freeing up time for ENT to manage more complex cases.

Data published on the first 2 years of an SLT-FPOCC model for managing low-risk referrals (Category 2 or 3 referrals, with referral information indicating suspected dysphagia or dysphonia) from an ENT outpatient waitlist

in a public health service revealed that the implemented SLT-FPOCC model was safe and effective for managing non-urgent/low-risk ENT outpatients (Seabrook et al., 2019). That study also revealed a reduction in the ENT outpatient service waiting list following implementation of the model (Seabrook et al., 2019). A subsequent paper that reported data from 5 years of the same service re-confirmed these findings and also confirmed a low re-referral rate (Schwarz et al., 2021). Positive service outcomes have also been verified by similar FPOCC models running in other clinical services (Payten et al., 2020; Occomore-Kent et al., 2021).

It is the aim of this study to evaluate the clinical and service outcomes of completing vocal cord check (VCC) assessments for patients pre and post thyroid/parathyroid surgery within a SLT-FPOCC model and to examine consumer perceptions. The current study is the first to examine SLT involvement within a VCC clinic model for patients undergoing thyroid/parathyroid surgery. The introduction of this VCC model provides an opportunity for clinical services to increase their compliance with best practice recommendations and implement routine screening of all thyroid/parathyroid patients both before and after surgery using SLT services, without additional burden to existing ENT services. The outcomes from this study will contribute to the growing body of literature regarding the safety and suitability of SLT-FPOCC models for managing low-risk patient populations referred to ENT services.

## MATERIALS AND METHODS

This study was conducted within a single hospital in Queensland, Australia, and involved thyroid/parathyroid patients managed within the low-risk ENT SLT-FPOCC model described previously in the literature (Schwarz et al., 2021; Seabrook et al., 2019). Data were collected using a prospective cohort study design. The study was conducted with full local ethical and governance approvals.

### Participant recruitment

Data from the first 100 consecutive adult patients referred to the SLT-FPOCC service for a VCC assessment prior to potential surgical management of thyroid or parathyroid issues were collected. Recruitment occurred over a total period of 24 months; however, during this time the service was closed for 13 weeks due to heightened levels of COVID-19 in the community. Internal referrals for patients requiring a VCC prior to thyroid or parathyroid surgery

were sent to the ENT service from the general surgical teams of the public hospital setting. The ENT specialist then referred all patients requiring a VCC prior to thyroid or parathyroid surgery, regardless of reason for surgery, to the SLT-FPOCC service for assessment.

### Preoperative VCC assessment

All patients requiring a preoperative VCC were seen in the SLT-FPOCC VCC clinic by a speech language therapist credentialed to deliver the SLT-FPOCC model as detailed previously in Seabrook et al (2019) and credentialed for the administration of Co-Phenylcaine Forte nasal spray (Schwarz et al., 2018). Patients were booked into the SLT-FPOCC in 30 min appointments. Patients identified as having potential to receive surgical management of the thyroid or parathyroid were seen within 1–12 weeks of referral, depending on the scheduling of surgery.

Within the VCC clinic, the speech-language therapist completed the case history, collected clinician and patient-reported voice and swallowing outcomes measures and performed flexible nasendoscopic evaluation (FNE) and videostroboscopy. The outcome measures collected for each session included the GRBAS (grade, roughness, breathiness, asthenia, strain; Hirano, 1981), the Voice Related Quality of Life (V-RQOL) (Hogikyan & Sethuraman, 1999) and the Eating Assessment Tool (EAT-10) (Belafsky et al., 2008). The V-RQOL and EAT-10 were both completed by the patient while in the waiting room immediately prior to the appointment. The V-RQOL is a patient-reported quality of life tool used specifically for voice disorders (Hogikyan & Sethuraman, 1999). It consists of 10 questions rated on a scale of 1 (not a problem) to 5 (problem is as bad as it can be) and total scores can then be classified as excellent (10–15), very good (16–20), good (score 21–25) fair (26–30) and poor (31–50) (Hogikyan & Sethuraman, 1999). The EAT-10 is a validated 10-item questionnaire used to identify subjective symptoms of dysphagia. Patients rated each statement on a scale of 0 (no problem) to 4 (severe problem) (Belafsky et al., 2008), where a total score of 3 or more indicates risk of an abnormal swallow. The GRBAS is a perceptual assessment of voice quality and was completed by the speech-language therapist during the session. This scale consists of five numerical ratings that include overall Grade, severity of Roughness, severity of Breathiness, severity of Asthenia (not used in this clinic) and severity of Strain, rated on a scale of 0–3. GRBAS ratings were made during the session based on a live speech sample (reading of the Rainbow Passage).

Following collection of the outcome measures, the speech-language therapist administered Co-Phenylcaine Forte nasal spray as per protocol (Schwarz et al., 2018) for all



eligible patients for patient comfort. They then completed the FNE, capturing images of the nasopharynx, pharynx and larynx, and then videostroboscopy of the vocal folds during phonation. Functional tasks completed in the FNE protocol included repeat alternating “sniff in and vocalisation” (to observe full adduction and abduction of the vocal folds), prolonged vocalisation during stroboscopy (to assess glottal closure patterns, mucosal wave and amplitude) and functional speech tasks (to view voicing patterns during speech). This procedure took around 2 minutes to complete. All images were saved digitally for later ENT review.

During the VCC sessions, if any patients were identified by the speech-language therapist as presenting with voice change (grade scores of 2 or more on GRBAS) and/or potential dysphagia (scores  $\geq 3$  on EAT-10) they were provided education at the time of the appointment and then referred to SLT services and/or further assessment (e.g., videofluoroscopic swallow study) if appropriate. Due to timing restrictions of the clinic, and the use of Co-Phenylcaine Forte nasal spray during the FNE, it was deemed not appropriate to extend the FNE during the VCC check appointment to complete swallowing trials. In instances where any issues were suspected on FNE (e.g., suspected anatomical differences noted by the speech language therapist), ENT was contacted to consult with the patient at the time of the appointment if available. For all other patients, the VCC session was completed by the speech-language therapist and then the session data was reviewed by the speech-language therapist and ENT together at a time later in the day. As described in prior publications (Schwarz et al., 2021; Seabrook et al., 2019), the SLT-FPOCC service was co-located within the ENT service to allow easy access to ENT consultation as required.

Following the SLT-FPOCC VCC clinic, data from between 1 and 6 patients, depending on clinic bookings, were reviewed with the ENT in the one meeting (maximum of one 30 min session). On average, the time taken by ENT to review each patient’s data and provide diagnostic decision was less than 5 min per patient. For the purposes of the current research, the ENT’s diagnostic decisions regarding their assessment of vocal fold function (e.g., neuropraxia—temporary mild loss of motor function; paresis—partial paralysis with weak or abnormal motion; or paralysis indicating complete or severe loss/absent motion), any other diagnostic observations/decisions, and their rating of the severity/extent of any detected issues on function (i.e., mild or significant), was collected verbatim from their diagnostic report.

After ENT review, the speech language therapist then completed the medical chart entry containing clinical details and outcomes from the session. Patient letters detailing clinical findings were written by the speech-

language therapist, co-signed by both SLT and ENT, and sent to the referring general surgeon with copies filed in the medical records. All patient data were recorded in a database maintained by SLT and the administration officer responsible for the VCC clinic. Reporting of any clinical incidents per service requirements would have occurred centrally through the hospital’s risk reporting procedures.

## Postoperative VCC assessment

For those patients who underwent surgery, a postoperative VCC appointment was planned for 2–4 weeks post surgery (note: at some periods COVID-19 closures affected these time frames). This appointment included the same assessment items and reporting requirements as the preoperative VCC assessment. Of note, the few patients who presented with any postoperative complications (e.g., unilateral vocal fold paresis) returned to the SLT-FPOCC service for a third or fourth VCC review, as per ENT recommendations; however, only the clinical data from the preoperative assessment and initial postoperative assessment of these patients are included within this paper.

## Categorisation of surgery and nerves at risk

For the purposes of this research, the primary general surgeon on the research team (J.G.) reviewed all patient information relating to surgery performed and classified each patient as receiving either single side or bilateral surgery, and if one or two nerves were at risk for the undertaken surgery. In addition, postoperative histology, as reported by the treating surgical team, was collated from the medical records by the lead author (J.D.).

## Patient satisfaction

All patients who completed a pre- or post-VCC session were given the opportunity to complete an anonymous, paper-based satisfaction survey following their appointment. This included seven questions that examined how the service met their needs, their satisfaction and overall perceptions of the quality of the service. Each question was rated on a scale of 1 to 4 (1 = poor, 4 = excellent). There were also two free text questions asking patients to recommend any improvements for the service and any other comments about their experience. The survey was provided to patients by the administration officer at the clinic reception and was collected by the administration officer following completion.



TABLE 1 Demographics,  $N = 100$ .

	Demographics	Number
<b>Gender</b>	Male	28
	Female	72
<b>Age (years)</b>	Range 18–81	53 (average)
<b>Smoking status</b>	Smoker	21
	Ex-smoker	37
	Non-smoker	42
<b>Indication for surgery</b>	Multinodular goitre	36
	Primary hyperparathyroidism	27
	Nodule	23
	Graves' disease	8
	Papillary thyroid carcinoma	3
	Secondary hyperparathyroidism	3
<b>Surgery performed</b>	Total thyroidectomy	23
	Hemithyroidectomy	32
	Parathyroidectomy—single side	6
	Parathyroidectomy—bilateral	10
	Bilateral neck exploration + other	9
	Isthmusectomy	3
	Did not proceed to surgery	17
	<b>Hospital where surgery was performed (<math>n = 83</math>)</b>	Same setting as location of VCC clinic
At other public hospital	22	
At other private hospital	19	
<b>Nerves at risk (of patients who underwent postoperative VCC, <math>n = 63</math>)</b>	1 Recurrent laryngeal nerve	31
	2 Recurrent laryngeal nerves	32

Abbreviation: VCC, vocal cord check.

## RESULTS

### Demographics

Demographics of the first 100 referred patients are presented in Table 1. The cohort was predominantly female with a mean age of 53 years. The primary indication for surgery was multinodular goitre (36%), with three patients identified with a preoperative thyroid malignancy. Of the 100 patients to attend for a preoperative VCC, 83 patients went on to have surgery performed. Surgery was not completed for the other 17 for various reasons including identified laryngeal pathology on preoperative VCC ( $n = 2$ ), 2 sought private surgical alternatives, 3 were medically unstable and required other management and 10 were

still awaiting surgery at time of data analysis. Of note, only half of the patients who underwent surgery ( $n = 42$ ) received their surgery in the same hospital as the VCC clinic, with the others managed in other hospitals. Of the 83 who had surgery, 63 (76%) returned for a postoperative assessment. Of the 20 (24%) who did not return for re-assessment, 2 had postoperative review conducted by ENT, 3 were contacted and declined and 15 (18%) were lost to follow-up.

### Adverse events

There were no recorded adverse events within pre- or postoperative VCC procedures conducted by SLT services.

**TABLE 2** Results of preoperative ( $N = 100^*$ ) and postoperative ( $N = 63$ ) outcome measures.

Parameter	Outcome measure	Rating	Preoperative (n, %)	Postoperative (n, %)
Voice assessment	GRBAS	WNL (G0)	58, 58%	39, 62%
		Mild (G1)	26, 26%	17, 27%
		Moderate-severe (G2–G3)	16, 16%	7, 11%
	V-RQOL*	Excellent (score 10–15)	85, 86%	53, 84%
		Very good (score 16–20)	9, 9%	6, 10%
		Good (score 21–25)	1, 1%	1, 2%
		Fair (score 26–30)	2, 2%	2, 3%
		Poor (31–50)	2, 2%	1, 2%
Swallowing	EAT-10*	Normal (score of <3)	70, 71%	46, 73%
		Abnormal (score of $\geq 3$ )	29, 29%	17, 27%

\*= Only 99 responses for V-RQOL and EAT-10.

Abbreviations: EAT-10, Eating Assessment Tool-10; GRBAS, grade, roughness, breathiness, asthenia, strain; V-RQOL, Voice Related Quality of Life; WNL, within normal limits.

## Preoperative VCC findings

Clinician rating of voice function using the GRBAS scale identified 58 patients as having a normal voice, 26 with a mild dysphonia and 16 a moderate-severe dysphonia pre surgery (Table 2). Of the 100 patients, 99 patients completed both the V-RQOL and EAT-10 (1 patient declined). In contrast to the clinician ratings, patients' self-assessment of their voice revealed only four rated their voice as either 'fair' or 'poor'.

On the EAT-10, 70 patients reported normal swallowing behaviours, with 29 scoring outside the normal range. Of these 29, 10 received a score greater than 15, indicating higher aspiration risk (Cheney et al., 2015). Six of the 10 presented with a multinodular goitre, two had preoperative fine needle aspirate findings suggestive of malignancy and one had a confirmed vocal fold paresis ipsilateral to the side of surgery. For all 29 patients, SLT services provided management for their dysphagic symptoms within the VCC appointment, usually via education +/- safe swallow strategies, including occasional texture avoidance for especially problematic textures (e.g., large pieces of meat).

ENT review of the preoperative FNE confirmed significant anatomical abnormalities in 9 patients (1 preoperative vocal fold paresis ipsilateral to planned unilateral surgery), minor incidental findings in 17 (most commonly reflux related changes) and 74 with nil abnormalities detected (Table 3). Of the nine patients with significant findings diagnosed by ENT, six required referral into ENT for ongoing review and intervention of which two did not proceed to surgery based on preoperative FNE findings.

## Surgery and nerves at risk

Of the 63 patients who underwent surgery and attended for a post-operative VCC, 31 had received a single side surgery

and 32 bilateral surgeries resulting in either one or both recurrent laryngeal nerves at risk (Table 1), resulting in a total of 95 nerves at risk. Postoperative histology for these 63 patients revealed 51 benign samples, 6 papillary thyroid carcinoma, 3 minimally invasive follicular thyroid carcinoma and histology was unable to be accessed for 3 patients.

## Postoperative VCC findings

Of the 63 patients who completed a postoperative VCC, GRBAS ratings classified 62% as having a normal voice, 27% with mild dysphonia and 11% with a moderate-severe dysphonia (Table 2). Patient-reported voice function ratings revealed that 84% felt their voice was 'excellent' and only 5% rated their voice as either 'fair' or 'poor'. Patient reported swallow functioning (EAT-10) revealed 46 were within the normal range and 17 patients scored outside the normal range. Of the 17, 2 patients scored over 15 suggestive of increased aspiration risk. Of these 2, 1 had an unchanged score from preoperative findings. The other patient had no preoperative issues, but, was experiencing short-term difficulties due to intubation trauma as identified by ENT.

ENT review of the postoperative FNE data identified six new significant postoperative changes, including three temporary vocal fold neuropraxias and three vocal fold pareses (Table 3). The remaining 16% of findings were minor, with only four related to surgery (transient intubation injury). Of the three patients diagnosed with postoperative vocal fold paresis, two underwent medialisation procedures by ENT in the months following surgery. The other patient's vocal fold was positioned in a medial position, allowing contact and complete glottal closure of the vocal folds during contralateral vocal fold adduction, resulting in no functional changes to voice or

**TABLE 3** Results of preoperative ( $N = 100$ ) and postoperative ( $N = 63$ ) flexible nasendoscopic evaluation (FNE) as per ENT assessment.

FNE assessment	Categories*	(n, %)	Findings*
<b>Preoperative (<math>N = 100</math>)</b>			
	Nil abnormalities detected	74 (74%)	–
	Minor findings	17 (17%)	Laryngopharyngeal reflux ( $n = 8$ ), mucus retention cyst ( $n = 2$ ), mucocele and Reinke's oedema ( $n = 1$ ), prominent right false vocal fold during phonation ( $n = 1$ ), medialised right-sided carotid artery ( $n = 1$ ), Warthin's tumour ( $n = 1$ ), tonsil hypertrophy ( $n = 1$ ), generalised erythema ( $n = 1$ ), inflamed nasal cavity tissue ( $n = 1$ )
	Significant anatomical findings	9 (9%)	Vocal fold paresis ipsilateral to side of planned surgery ( $n = 1$ ), restricted abduction of left vocal fold ( $n = 1$ ), vocal fold cyst ( $n = 1$ ), bilateral gross oedema post arytenoids ( $n = 1$ ), left ventricular fullness ( $n = 1$ ), fullness of anterior free edge of right vocal fold ( $n = 1$ ), anterior ventricular cyst/encysted laryngocele ( $n = 1$ ), vocal fold leukoplakic lesion ( $n = 1$ ), left nasal polyp and large tonsils ( $n = 1$ )
<b>Postoperative (<math>N = 63</math>)</b>			
	Nil abnormalities detected	46 (73%)	–
	Minor findings unrelated to surgery	6 (10%)	Laryngopharyngeal reflux ( $n = 5$ ) Mucocele and Reinke's oedema ( $n = 1$ )
	Minor findings related to surgery	4 (6%)	Intubation trauma ( $n = 4$ )
	Significant anatomical findings unrelated to surgery	1 (2%)	Preexisting vocal fold paresis ipsilateral to side of surgery ( $n = 1$ )
	Significant anatomical findings related to surgery	6 (10%)	Unilateral vocal fold neuropraxia that resolved within 6 months ( $n = 3$ ) Unilateral vocal fold paresis ( $n = 3$ )

\*= Categories and diagnostic findings as determined by ENT.

Abbreviation: ENT, ear, nose and throat.

swallow. Following postoperative VCC, five patients were referred to the onsite outpatient SLT clinic for ongoing management (two vocal fold paresis, one neuropraxia, one intubation trauma and one chronic dysphonia identified preoperatively).

## Patient satisfaction

There was a total of 94 completed surveys returned by patients following either their preoperative or postoperative VCC assessment (58% response rate). Patient reported satisfaction was high with 97% - 100% indicating they were very satisfied across all questions (Table 4). Additional free text responses were received from 51% of the returned surveys. There were nil negative comments. All comments either related to the nature of the service, for example, "Excellent service and lovely helpful staff" or perceptions of the staff involved, for example, "the speech language therapist was very thorough with explanation of proce-

dures..." and "...[I] felt safe, comfortable and everything was explained well".

## DISCUSSION

The SLT-FPOCC model enabled patients to receive instrumental assessment of laryngeal function both pre and post thyroid/parathyroid surgery as recommended by best practice guidelines (Chandrasekhar et al, 2013; Kay-Rivest et al, 2015; Sinclair et al, 2016). The clinic was successfully implemented, with the speech-language therapist working within approved scope of practice and both referral and diagnostic decisions still made by ENT. No adverse events were recorded across the 163 (pre + post) VCC assessments conducted. The VCC procedure confirmed significant laryngeal issues preoperatively in 9% of patients, and postoperatively neurogenic changes were identified in 3% of at-risk nerves. As such, this model enabled voice and/or swallowing issues that were present either pre- or



**TABLE 4 Patient Satisfaction (n = 94).**

	Unsatisfied/neutral (n, %)	Satisfied (n, %)	Very satisfied (n, %)
How well has our service met your needs?	0 (0%)	1 (1%)	93 (99%)
Did you feel you were managed in a caring and professional manner in your appointment today?	0 (0%)	1 (1%)	93 (99%)
Did you find the information and services that you received today helpful for managing your current condition?	0 (0%)	0 (0%)	94 (100%)
If you were to seek help again for the same issue, would you come back to this service?	0 (0%)	0 (0%)	94 (100%)
If a friend were in need of a similar help, would you recommend this service to him or her?	0 (0%)	1 (1%)	93 (99%)
How satisfied were you with the length of time you had to wait between when you were first referred to this service and your appointment here today?	0 (0%)	3 (3%)	91 (97%)
How would you rate the overall quality of the speech-language therapy service you have received today?	0 (0%)	0 (0%)	94 (100%)

postoperatively to be identified and appropriately managed without increasing the clinical burden on ENT services. Overall, the model delivered on its intended purpose and was well received by patients.

Laryngeal assessment as part of routine preoperative investigation prior to thyroid surgery typically identifies low numbers of preoperative vocal mobility findings. Research involving almost 2000 preoperative patients identified a 1.3% incidence rate of vocal cord paresis (Curley & Timms, 1989), consistent with the current study findings of 1% having preoperative vocal fold paresis (ipsilateral to the side of surgery). More recent publications have also detailed the nature of structural abnormalities identified in preoperative laryngeal assessment, with 14.7% of preoperative laryngeal assessment identifying structural laryngeal pathology (Burckardt et al., 2021). In the current cohort, 9% of patients were found to have significant anatomical abnormalities and 17% minor anatomical findings, which is consistent with this prior research. Preoperative identification of significant anatomical findings resulted in two patients not progressing to surgery based on FNE findings, further highlighting the importance of preoperative laryngeal assessment.

Postoperatively, studies have reported figures between 1% and 8% of patients presenting with temporary or permanent recurrent laryngeal nerve injury post surgery (Hermann et al., 2002; Jeannon et al., 2009; Steurer et al., 2002). As such the current findings of 3% with vocal fold paresis and 3% with temporary vocal fold neuropraxia

post surgery fall within this expected range. Only half the patients (three of the six) with impacted nerve function postoperatively rated themselves as having a perceptually different voice, and none required modified diet or fluids. Without routine postoperative flexible nasoendoscopy, these neuropraxias and paralysis would most likely not have been identified, due to lack of voice or swallow change.

Dysphonia is a well-recognised postoperative risk for patients undergoing thyroid surgery in particular; however, there remains some disagreement within the literature regarding the prevalence of pre- and postoperative vocal dysfunction. An early systematic review detailed significant variability in both assessment protocols and vocal fold paresis rates following thyroid and parathyroid surgery (Jeannon et al., 2009). However, as stated by Vina Baptista et al. (2021), this lack of agreement may be related to whether a dysphonia is viewed purely relating to vocal fold mobility or immobility, or if broader functional outcomes are considered. In the SLT-led FPOCC model studied in this research, the speech-language therapist completes a thorough voice assessment including patient reported measures, clinician perceptual assessment and instrumental assessment, allowing for identification and management if any change, either anatomically or functionally, is observed between pre and post surgery. In particular, the use of videostroboscopy in addition to FNE in this clinical model provides enhanced sensitivity to the diagnostic process, enabling identification of mucosal wave changes and subtle paresis, thus reducing the chance

of misinterpreting other causative factors for dysphonia (Steurer et al., 2002).

From the preoperative assessment battery, GRBAS ratings revealed 26% of patients with a mild dysphonia and 16% of patients with a moderate-severe dysphonia. This was not unexpected considering the proportion of patients in the cohort with a history of smoking and reflux changes (as diagnosed by ENT) (Viana Baptista et al., 2021). In contrast to the clinician ratings, patients' self-assessment of their voice revealed only four patients (4%) rated their voice as either 'fair' or 'poor'. This mismatch between clinician severity rating and patient perception of their own voice is not unexpected as previous research has found that clinicians ratings often do not correspond with a patient's own perception and rating of their voice (Lee et al., 2005; Pernambuco et al., 2015; Sapir et al., 1986). This known mismatch further supports the importance of including speech-language therapist voice evaluations in the pre- and postoperative laryngeal assessment battery to ensure that existing functional voice deficits are appropriately detected.

Postoperative VCC assessment supported the identification of any postoperative voice complications and facilitated a streamlined patient access to outpatient voice therapy services. Postoperatively, 27% of patients were rated by the speech-language therapist as having a mild dysphonia and 11% a moderate-severe dysphonia. Again, a mismatch between patient-reported and clinician-reported data was observed, with 50% of patients with postoperative neurogenic changes (permanent or temporary) reporting no functional change to their voice, which has been reported in other studies (Steurer et al., 2002). The three patients with functional voice implications identified from their postoperative vocal cord hypofunction were all referred directly into outpatient voice therapy and ENT from their postoperative VCC. The importance of early voice assessment and intervention by SLT and ENT has been historically recognised as an important tool in the vocal recovery of patients with a postoperative dysphonia (Dhillon et al., 2018; Friedman et al., 2010; Kark et al., 1984). Early surgical intervention by ENT, most commonly temporary injection medialisation, optimises vocal cord position to allow phonation and may encourage synkinetic reinnervation, rather than relying on true reinnervation (Friedman et al., 2010). This streamlined pathway to access early voice therapy and surgical intervention if indicated, promotes timely access to treatment which has been demonstrated to enhance voice outcomes (Mattioli et al., 2011; Mattioli et al., 2015). Additionally, early commencement of voice therapy has also been shown to have positive impacts on vocal recovery (El-Banna & Youssef, 2015).

Dysphagia is a common complaint of patients with thyroid disease, though few studies have studied this sequela

prospectively (Greenblat et al., 2009; Sabaretnam et al., 2012; Viana Baptista et al., 2021). In the current cohort, 29 patients were identified with swallowing problems on the EAT-10 preoperatively, which is consistent with previous reports (Viana Baptista et al., 2021). Ten of these experienced more significant swallowing issues, and most (6/10) were noted to have a diagnosis of multinodular goitre. Previous literature has noted that patients with multinodular goitre are the most prevalent group of patients with thyroid conditions seen in surgical outpatient thyroid clinics (Chambers & Bhattacharyya, 2013) and that swallowing difficulties are a common consequence of this condition (Sorensen et al., 2014). As this subgroup of patients in-particular should have their swallow as well as voice function screened prior to surgery, attending a SLT-FPOCC model enables both these functions to be assessed for SLT in a time-efficient manner. Postoperatively, most patients reported that their dysphagia symptoms largely resolved, consistent with previous studies (Sabaretnam et al., 2012). While 17 patients still scored higher than 3/10 on the EAT-10 post surgery, most reported that they experienced a change in the 'sensation' of swallowing, rather than changed function. Hence, no patients required modified fluids or diet modifications postoperatively.

In the current study, patients were highly positive about the nature of the service and how the service met their needs. Although prior studies of SLT-FPOCC ENT models have not explored patient perceptions, the positive patient response observed in this study is consistent with data from FPOCC models implemented in other practice areas/disciplines (Mutsekwa et al., 2022). Of note, most of the open-ended comments provided related to positive perceptions of the care and professionalism of the treating clinician. Recent research has shown that elements of care delivery, including manner and communication skills, are most highly valued by patients (Mutsekwa et al., 2022). Overall, the survey findings suggest that the SLT-FPOCC model was a well-received alternative to traditional ENT-only service and provided high-quality healthcare in a manner valued by patients.

Although completion of VCCs pre and post thyroid surgery is now recognised in multiple international practice guidelines (Chandrasekhar et al., 2013; Kay-Rivest et al., 2015; Sinclair et al., 2016), in many services, adoption of these practices is not yet being fully achieved (Burckardt et al., 2021). This model may help services to achieve best practice care in services where ENT capacity is limited or there is insufficient staffing to support services for low-risk populations. In total, postoperative appointments were attended by 76% of patients who underwent surgery, bringing the local service more closely in line with best practice recommendations for patients undergoing thyroid/parathyroid surgery (Randolph & Kamani, 2006;



Sinclair et al., 2016). However, the logistical problems associated with ensuring that patients return for the postoperative assessment is acknowledged. Within this study, a proportion of patients (18%) were lost to follow-up after surgery. This unexpectedly large number of patients lost to follow-up may have been affected by the diverse locations of surgery—as only 42 of the 83 patients had surgery at the hospital where the SLT-FPOCC model is located. The learnings from the current study indicate that establishing a method of identifying when surgery has occurred is imperative in increasing postoperative attendance.

Consistent with previous studies on ENT SLT-FPOCC clinics, no adverse patient outcomes were reported in this study (Schwarz et al, 2021; Seabrook et al, 2019). Although no formal time or economic analyses were conducted regarding ENT time, the clinic avoided 163 ENT appointments, and ENT time was reduced to only a few minutes per patient to conduct the initial triage and make their diagnostic decision. Hence, this paper contributes to previous studies that support that these types of FPOCC models can be used safely within low-risk populations, improve service delivery and reduce burden on ENT outpatient services and waitlists (Occomore-Kent et al, 2021; Payten et al, 2020; Schwarz et al, 2021; Seabrook et al, 2019).

It is also acknowledged that the introduction of clinical models such as this will increase demands on local SLT services. There are additional costs associated with training staff for this type of clinical service. Then there are staffing/resourcing issues associated with the ongoing management of the caseload. In addition, there are other potential service impacts that need to be considered, such as an increased rate of patients referred from the VCC clinic to SLT services for further assessment and management of voice and swallowing issues. Departments need to consider their healthcare models, local service demands, and the availability of any additional funding/reimbursement schemes to fully determine the financial viability of introducing this type of clinical service.

## Limitations

This study reports on the early findings from a new SLT-led FPOCC model of care. A small sample size preoperatively (100 patients) and smaller sample size postoperatively (63 patients) means that these findings may not be representative of larger scale cohorts, and so larger cohorts with long-term monitoring data from other sites implementing similar models are needed to further validate the model. Also, due to the small sample size, the authors did not analyse data based on sub-classifications of disease (benign thyroid disease vs. malignant thyroid disease

vs. primary hyperparathyroidism), despite known differences in postoperative rates of RLN injury (Steurer et al, 2002). As previously discussed, there were challenges experienced scheduling postoperative assessments. These largely related to non-urgent outpatient clinic closures from COVID and the impacts of some patients receiving surgery at other locations, hampering identification of if, and when, surgery had been performed. Additionally, patient motivation to attend a postoperative appointment may also be lower in patients with no postoperative concerns, meaning that postoperative dysphonia and significant postoperative findings may be over-represented in this study's data due to a potential sampling bias. Long-term outcomes were not monitored in this study; however, patients with dysphonia or dysphagia were referred to outpatient SLT services for ongoing follow-up. Regarding patient perceptions, post-appointment survey completion was anonymous and optional, and as only 58% of patients returned completed surveys, the data cannot be assumed to be representative of all patients' perceptions/experiences. Finally, the authors did not collect formal data on time savings for ENT, thus time saving for ENT can only be inferred from the current data but not quantified. Similarly, the increased role of SLT services associated with providing VCC checks, and the impacts on services created by subsequent referrals from this clinical to SLT have not been collected or costed. Hence no data on cost benefits could be determined. This should be incorporated in future studies.

## CONCLUSION

The SLT-FPOCC model helped to deliver best practice care, supporting VCC assessments pre and post thyroid and parathyroid surgery, with no reported adverse events. Preoperative assessment helped to identify a small proportion of patients who could not progress to surgery. Postoperative FNE identified abnormal vocal fold function in a small percentage of patients, 50% of whom did not report postoperative voice changes and may not have been previously identified. Those patients who did experience postoperative voice change were referred directly into outpatient SLT services for ongoing care. Patient-reported data indicates high consumer satisfaction with the service model. Larger cohort data from services implemented in other settings is now needed to further validate this model.

## ACKNOWLEDGEMENTS

We would like to thank the Logan Hospital General Surgical teams for embracing this new model of care and allowing their patients to receive care within this new service. We wish to acknowledge the staff within the Logan Hospital Integrated ENT Service, including ENT

Consultants, Registrars and Residents, administration staff, nursing staff and speech pathologist Jane Smith for their practical support of this service. We also acknowledge Dr Maria Schwarz, Dr Ryan Adams and Jodie Howden for their contributions to early stages of project design and the funding application. Finally, we would like to sincerely thank all participants. Funding for this study was received from the Metro South Research Support Scheme 2020, Metro South Study, Education and Research Trust Account (SERTA). Funding was used to backfill clinical time for the project lead (J.D.) to complete the project work. No author received any personal financial benefit from this research.

Open access publishing facilitated by The University of Queensland, as part of the Wiley - The University of Queensland agreement via the Council of Australian University Librarians.

## CONFLICT OF INTEREST DISCLOSURE

The authors have no conflicts of interest to declare.

## DATA AVAILABILITY STATEMENT


The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

## PERMISSION TO REPRODUCE MATERIAL

Not applicable for this manuscript.

## ORCID

Jennifer Davis  <https://orcid.org/0009-0004-8735-9688>

Elizabeth C. Ward  <https://orcid.org/0000-0002-2680-8978>

Justin Gundara  <https://orcid.org/0000-0003-1699-1665>

Bernard C. S. Whitfield  <https://orcid.org/0009-0004-8478-7257>

## REFERENCES

- Belafsky, P.C., Mouadeb, D.A., Rees, C.J., Pryor, J.C., Postma, G.N., Allen, J. & Leonard, R.J. (2008) Validity and reliability of the eating assessment tool (EAT-10). *Annals of Otolaryngology & Rhinology & Laryngology*, 117(12), 919–924. <https://doi.org/10.1177/000348940811701210>
- Burckardt, E.S., Baird, B.J., Van Stan, J.H. & Burns, J.A. (2021) Endoscopic laryngeal findings in patients undergoing thyroid and parathyroid surgery. *Journal of Laryngology and Otolaryngology*, 135(3), 264–268. <https://doi.org/10.1017/S0022215121000529>
- Chambers, K.J. & Bhattacharyya, N. (2013) The Increasing role of otolaryngology in the management of surgical thyroid disorders. *The Laryngoscope*, 123(12), 3239–3242. <https://doi.org/10.1002/lary.24065>
- Chandrasekhar, S.S., Randolph, G.W., Seidman, M.D., Rosenfeld, R.M., Angelos, P., Barkmeier-Kraemer, J., ... Robertson, P.J. (2013) Clinical practice guideline: improving voice outcomes after thyroid surgery. *Otolaryngology–head and neck surgery : official journal of American Academy of Otolaryngology-Head and Neck Surgery*, 148(6, Suppl), S1–37. <https://doi.org/10.1177/0194599813487301>
- Cheney, D.M., Siddiqui, M.T., Litts, J.K., Kuhn, M.A. & Belafsky, P.C. (2015) The ability of the 10-item eating assessment tool (EAT-10) to predict aspiration risk in persons with dysphagia. *Annals of Otolaryngology, Rhinology & Laryngology*, 124(5), 351–354. <https://doi.org/10.1177/0003489414558107>
- Curley, J.W.A. & Timms, M.S. (1989) Incidence of abnormality in routine 'vocal cord checks. *Journal of Laryngology and Otolaryngology*, 103(11), 1057–1058. <https://doi.org/10.1017/S0022215100110977>
- Dhillon, V.K., Rettig, E., Noureldine, S.I., Genther, D.J., Hassoon, A., Al Khadem, M.G., ... Tufano, R.P. (2018) The incidence of vocal fold motion impairment after primary thyroid and parathyroid surgery for a single high-volume academic surgeon determined by pre- and immediate post-operative fiberoptic laryngoscopy. *International Journal of Surgery*, 56, 73–78. <https://doi.org/10.1016/j.ijssu.2018.06.014>
- El-Banna, M. & Youssef, G. (2015) Early voice therapy in patients with unilateral vocal fold paralysis. *Folia phoniatrica et logopaedica*, 66(6), 237–243. <https://doi.org/10.1159/000369167>
- Friedman, A.D., Burns, J.A., Heaton, J.T. & Zeitels, S.M. (2010) Early versus late injection medialization for unilateral vocal cord paralysis. *Laryngoscope*, 120(10), 2042–2046. <https://doi.org/10.1002/lary.21097>
- Greenblatt, D.Y., Sippel, R., Levenson, G., Frydman, J., Schaefer, S. & Chen, H. (2009) Thyroid resection improves perception of swallowing function in patients with thyroid disease. *World Journal of Surgery*, 33(2), 255–260. <https://doi.org/10.1007/s00268-008-9837-9>
- Heikkinen, M., Mäkinen, K., Penttilä, E., Qvarnström, M., Kempainen, T., Löppönen, H., & Kärkkäinen, J.M. (2019) Incidence, risk factors, and natural outcome of vocal fold paresis in 920 thyroid operations with routine pre- and postoperative laryngoscopic evaluation. *World Journal of Surgery*, 43(9), 2228–2234. <https://doi.org/10.1007/s00268-019-05021-y>
- Hermann, M., Alk, G., Roka, R., Glaser, K. & Freissmuth, M. (2002) Laryngeal recurrent nerve injury in surgery for benign thyroid diseases: effect of nerve dissection and impact of individual surgeon in more than 27,000 nerves at risk. *Annals of Surgery*, 235(2), 261–268. <https://doi.org/10.1097/00000658-200202000-00015>
- Higgins, T.S., Gupta, R., Ketcham, A.S., Sataloff, R.T., Wadsworth, J.T. & Sinacori, J.T. (2011) Recurrent laryngeal nerve monitoring versus identification alone on post-thyroidectomy true vocal fold palsy: a meta-analysis. *The Laryngoscope*, 121(5), 1009–1017. <https://doi.org/10.1002/lary.21578>
- Hirano, M. (1981) Clinical examination of voice. *The Journal of the Acoustical Society of America*, 80. <https://doi.org/10.1121/1.393788>
- Hogikyan, N.D. & Sethuraman, G. (1999) Validation of an instrument to measure voice-related quality of life (V-RQOL). *Journal of Voice*, 13(4), 557–569. [https://doi.org/10.1016/S0892-1997\(99\)80010-1](https://doi.org/10.1016/S0892-1997(99)80010-1)
- Jeannon, J.P., Orabi, A.A., Bruch, G.A., Abdalsalam, H.A. & Simo, R. (2009) Diagnosis of recurrent laryngeal nerve palsy after thyroidectomy: a systematic review. *International Journal of Clinical Practice*, 63(4), 624–629. <https://doi.org/10.1111/j.1742-1241.2008.01875.x>



- Kark, A.E., Kissin, M.W., Auerbach, R. & Meikle, M. (1984) Voice changes after thyroidectomy: role of the external laryngeal nerve. *British Medical Journal*, 289(6456), 1412–1415. <https://doi.org/10.1136/bmj.289.6456.1412>
- Kay-Rivest, E., Mitmaker, E., Payne, R.J., Hier, M.P., Mlynarek, A.M., Young, J., & Forest, V.-I. (2015) Preoperative vocal cord paralysis and its association with malignant thyroid disease and other pathological features. *Journal of otolaryngology-head and neck surgery*, 44(1), 35–35. <https://doi.org/10.1186/s40463-015-0087-1>
- Lee, M., Drinnan, M. & Carding, P. (2005) The reliability and validity of patient self-rating of their own voice quality. *Clinical Otolaryngology*, 30(4), 357–361. <https://doi.org/10.1111/j.1365-2273.2005.01022.x>
- Mattioli, F., Bergamini, G., Alicandri-Ciuffelli, M., Molteni, G., Luppi, M.P., Nizzoli, F. ... Presutti, L. (2011) The role of early voice therapy in the incidence of motility recovery in unilateral vocal fold paralysis. *Logopedics Phoniatrics Vocology*, 36(1), 40–47. <https://doi.org/10.3109/14015439.2011.554433>
- Mattioli, F., Menichetti, M., Bergamini, G., Molteni, G., Alberici, M.P., Luppi, M.P. ... Presutti, L. (2015) Results of early versus intermediate or delayed voice therapy in patients with unilateral vocal fold paralysis: our experience in 171 patients. *Journal of Voice*, 29(4), 455–458. <https://doi.org/10.1016/j.jvoice.2014.09.027>
- Mutsekwa, R.N., Wright, C., Byrnes, J.M., Canavan, R., Angus, R.L., Spencer, A. & Campbell, K. L. (2022) Measuring performance of professional role substitution models of care against traditional medical care in healthcare—a systematic review. *Journal of Evaluation in Clinical Practice*, 28(2), 208–217. <https://doi.org/10.1111/jep.13613>
- Occomore-Kent, L.C., Hatch, E. & Cruice, M. (2021) Scoping opinion: speech and language therapists' views on extending their role to the urgent ear, nose and throat pathway. *International Journal of Language & Communication Disorders*, 56(5), 975–988. <https://doi.org/10.1111/1460-6984.12650>
- Payten, C.L., Eakin, J., Smith, T., Stewart, V., Madill, C.J. & Weir, K.A. (2020) Outcomes of a multidisciplinary Ear, Nose and Throat Allied Health Primary Contact outpatient assessment service. *Clinical Otolaryngology*, 45(6), 904–913. <https://doi.org/10.1111/coa.13631>
- Payten, C.L., Nguyen, D.D., Novakovic, D., O'Neill, J., Chacon, A.M., Weir, K.A. & Madill, C.J. (2022) Telehealth voice assessment by speech language pathologists during a global pandemic using principles of a primary contact model: an observational cohort study protocol. *BMJ Open*, 12(1), e052518–e052518. <https://doi.org/10.1136/bmjopen-2021-052518>
- Pernambuco, L.A., Almeida, M.N., Matias, K.G. & Costa, E.B.M. (2015) Voice assessment and voice-related quality of life in patients with benign thyroid disease. *Otolaryngology-Head and Neck Surgery*, 152(1), 116–121. <https://doi.org/10.1177/0194599814557468>
- Randolph, G.W. (2010) The importance of pre- and postoperative laryngeal examination for thyroid surgery.(Editorial). *Thyroid: Official Journal of the American Thyroid Association*, 20(5), 453. <https://doi.org/10.1089/thy.2010.1632>
- Randolph, G.W. & Kamani, D. (2006) The importance of preoperative laryngoscopy in patients undergoing thyroidectomy: voice, vocal cord function, and the preoperative detection of invasive thyroid malignancy. *Surgery*, 139(3), 357–362. <https://doi.org/10.1016/j.surg.2005.08.009>
- Sabaretnam, M., Mishra, A., Chand, G., Agarwal, G., Agarwal, A., Verma, A.K. & Mishra, S.K. (2012) Assessment of swallowing function impairment in patients with benign goiters and impact of thyroidectomy: a case control study. *World Journal of Surgery*, 36(6), 1293–1299. <https://doi.org/10.1007/s00268-012-1562-8>
- Sapir, S., Aronson, A.E. & Thomas, J.E. (1986) Judgment of voice improvement after recurrent laryngeal nerve section for spastic dysphonia: clinicians versus patients. *Annals of Otolaryngology, Rhinology and Laryngology*, 95, 137–141
- Schwarz, M., Ward, E.C., Seabrook, M., Davis, J. & Whitfield, B.C.S. (2021) Outcomes from an extended scope of practice speech-language pathology service for low risk ENT outpatients: a 5-year service review. *International Journal of Speech Language Pathology*, 1–9. <https://doi.org/10.1080/17549507.2021.1916592>
- Schwarz, M., Ward, E., Seabrook, M., Coccetti, A. & Whitfield, B. (2018) Administration of Co-Phenylcaine Forte Nasal spray during nasendoscopy: implementing and evaluating this extended scope role for speech language pathologists. *Journal of Clinical Practice Speech-Language Pathology*, 20, 5.
- Seabrook, M., Schwarz, M., Ward, E.C. & Whitfield, B. (2019) Implementation of an extended scope of practice speech-language pathology allied health practitioner service: an evaluation of service impacts and outcomes. *International Journal of Speech-Language Pathology*, 21(1), 65–74. <https://doi.org/10.1080/17549507.2017.1380702>
- Sinclair, C.F., Bumpous, J.M., Haugen, B.R., Chala, A., Meltzer, D., Miller, B.S. ... Randolph, G.W. (2016) Laryngeal examination in thyroid and parathyroid surgery: an American Head and Neck Society consensus statement. *Head & Neck*, 38(6), 811–819. <https://doi.org/10.1002/hed.24409>
- Sørensen, J.R., Hegedüs, L., Kruse-Andersen, S., Godballe, C. & Bonnema, S.J. (2014) The impact of goitre and its treatment on the trachea, airflow, oesophagus and swallowing function. A systematic review. *Best Practice & Research Clinical Endocrinology & Metabolism*, 28(4), 481–494. <https://doi.org/10.1016/j.beem.2014.03.002>
- Steurer, M., Passler, C., Denk, D.M., Schneider, B., Niederle, B. & Bigenzahn, W. (2002) Advantages of recurrent laryngeal nerve identification in thyroidectomy and parathyroidectomy and the importance of preoperative and postoperative laryngoscopic examination in more than 1000 nerves at risk. *The Laryngoscope*, 112(1), 124–133. <https://doi.org/10.1097/00005537-200201000-00022>
- Viana Baptista, S.I.R., Lott, D.G., Almeida, S.C.C., Cid, M.O., Vera-Cruz, P.S. & Zagalo, C. (2021) Preoperative voice characteristics in thyroid patients. *Journal of Voice*, 35(5), 809.e1–809.e6. <https://doi.org/10.1016/j.jvoice.2019.12.024>

**How to cite this article:** Davis, J., Ward, E.C., Seabrook, M., Gundara, J. & Whitfield, B.C.S. (2023) Outcomes of a first point of contact speech language therapy clinic for patients requiring vocal cord check pre and post thyroid/parathyroid surgery. *International Journal of Language & Communication Disorders*, 1–13. <https://doi.org/10.1111/1460-6984.12976>