INTRODUCTION

People wait longer than clinically recommended for specialist outpatient assessment in the public health system. Governments are focused on redesigning service delivery, aiming to provide more flexible and patient-focused services, whilst increasing access to high-value care, at acceptably low costs. Optimising and extending allied health practitioner (AHP) scope of practice can provide a responsive workforce whilst maintaining safe and quality health care. Expanded roles for AHPs have gained popularity over the last decade, however, are not widely accepted as a sustainable alternative to the medical-led outpatient service model.
Delays in accessing ear, nose and throat (ENT) diagnostic services can result in longer wait-times for treatment, negatively impacting treatment outcomes and increasing healthcare costs. The usual pathway in most outpatient ENT services is referral from primary care directly to the ENT surgeon for initial assessment. In this model, the “ENT pathway,” priority for early assessment is given to patients with symptoms of suspected malignancy (ie persistent neck lump, otalgia, odynophagia) who may require surgical management. Lower priority patients, including adults with unilateral hearing loss or teachers with a hoarse voice, wait longer for ENT assessment, and are often referred to AHPs for investigation and treatment after medical diagnosis. An alternative model is where lower priority patients are seen by an advanced-level AHP before or instead of the ENT specialist. AHP expanded scope models can positively impact health care through streamlined access to the right treatment services, improved patient outcomes, patient satisfaction and cost benefits.

Our study aimed to evaluate the impact of multiple AHP Primary Contact ENT (AHPC-ENT) pathways, including dysphagia, dysphonia, vestibular, retro-cochlear and paediatric glue ear by addressing these questions:

1. What is the impact of the AHPC-ENT on wait-times for assessment, compared with the ENT pathway?
2. What percentage of patients seen in the AHPC-ENT returned to ENT for surgical or pharmacological management?
3. Were there any adverse events of the AHPC-ENT?
4. What are the staff costs required to deliver the AHPC-ENT compared with the ENT pathway?

2 METHODS

2.1 Ethical considerations

Ethical clearance was sought from the Hospital Human Research and Ethics committee who approved the study as a Quality Audit (HREC/17/QGC/126).

2.2 Study design

This prospective cohort study compared 3 groups of patients: group 1 ENT pathway—ENT clinic patients seen only by ENT between July 2014 and June 2016 (24-month pre-implementation of the AHPC-ENT); group 2 combined pathway—ENT wait-list patients who transferred to the AHPC-ENT pathway in July 2016; and group 3 AHPC-ENT—patients referred directly to the AHPC-ENT between July 2016 and June 2017.

2.3 Service credentialing

The Health Service Credentialing and Defining Scope of Clinical Practice Committee approved the AHPC-ENT. The SLP was credentialled for extended scope of practice for endoscopic evaluation of voice and swallowing, previously described by Seabrook et al.

2.4 Study population

The ENT surgical team triaged patients as: “category 1” (urgent, assess < 30 days), “category 2” (complex care, assess < 90 days) and “category 3” (non-urgent, assess < 365 days). Relevant category 2 and category 3 referrals were then allocated to 1 of 5 AHPC-ENT pathways by the ENT surgical team based on symptomatology. The 5 clinics included the following: (a) SLP-led dysphagia, (b) SLP-led dysphonia, (c) physiotherapy/audiology-led vestibular, (d) audiology-led retro-cochlear and (e) audiology-led paediatric glue ear (Figure 1).

2.5 Inclusion and exclusion criteria

Inclusion and exclusion criteria for each AHPC-ENT stream were developed by ENT and AHP senior clinicians and outlined in Table 1. All category 2 and category 3 referrals with symptoms matching the inclusion/exclusion criteria were recruited.

2.6 AHPC-ENT assessment

Initial assessment conducted by the advanced AHP included the following: case history of presenting symptoms, medical/surgical intervention, symptom onset and progression, social history and clinical assessments appropriate for the presenting condition (ie vestibular...
assessments utilising video Frenzel and video head-impulse test, audiology, clinical voice and swallowing assessments). Extended scope assessments including flexible laryngoscopy, videostroboscopy, Flexible Endoscopic Evaluation of Swallowing (FEES) were included for the SLP. A standardised assessment protocol for laryngeal imaging was consistently used in order to document anatomical markers and movement parameters to aid visual-perceptual ratings. AHP assessment outcomes from vestibular and audiology clinics were discussed with a consultant ENT or senior specialist registrar in training when clinically indicated. For the SLP pathway, the ENT reviewed clinical details of all patients in a case-by-case discussion including case history and audio-visual review of the laryngeal imaging, for interpretation of structure and function and verification of the diagnostic impressions.

2.7 | Outcome measures and statistical methods

The primary outcome measure was mean number of days waiting from date of referral to initial assessment. Multiple regression analysis was used to evaluate the relationship between pathway type and wait-times for assessment. All analyses were carried out using STATA, version 16. Secondary outcome measures included the following: number of patients referred to ENT after AHP assessment, number of patients discharged from the AHPC-ENT, number of adverse events and staffing cost comparisons for AHPC-ENT and ENT pathways.

Cost comparisons were calculated by estimating the time each clinician typically sees a patient in both the AHPC-ENT and the ENT pathway, based on the hourly cost of each professional. Assumptions are made that the ENT consultant sees every new patient in addition to the specialist registrar in training for an average of 15 minutes in the ENT pathway and that all patients seen in the ENT pathway would be referred to AHP for management. Costs for the ENT pathway include both ENT and AHP assessments to reflect the activity provided within the AHPC-ENT for the likely population.

3 | RESULTS

3.1 | Patient demographics

Group 1(n = 399) were seen in the ENT pathway, group 2 (n = 382) commenced on the ENT wait-list and then transferred to the AHPC-ENT wait-list at the time of its inception (Table 2), and group 3 (n = 356) entered the AHPC-ENT wait-list on referral and were seen in the AHPC-ENT (Table 2). There were no significant differences between the control group (group 1) and the experimental groups (groups 2 and 3) for age (P < .0001) or gender (P < .001). Group 1 (n = 566, 85%) had more category 2 patients, compared with groups 2 and 3 (n = 326, 45%).

3.2 | Waiting times for assessment

Linear regression demonstrated patients in group 1 waited significantly longer than those in group 2 and group 3, respectively.

FIGURE 1 Care pathways for the “usual care” ENT clinic and the AHPC-ENT clinic
| Service inclusion criteria | Service exclusion criteria |
|---------------------------|---------------------------|
| **Dysphonia pathway—adult** | **Dysphonia pathway—adult** |
| • Symptoms of oropharyngeal dysphagia (ie food sticking, coughing/ choking on food/ liquids) | • Any suspected category 1 condition (ie current smoker, neck lump, otalgia) |
| • Symptoms of globus in the absence of any category 1 symptoms (ie current smoker, neck lump, otalgia) | • Any significant medical co-morbidities (ie endocrine/thyroid/Neoplasm) |
| • Symptoms of regurgitation or reflux | • Any condition already deemed to require surgical intervention that would not benefit from immediate speech pathology intervention (ie Barrett’s oesophagus/pharyngeal pouch) |
| | • Odynophagia/ pain when swallowing |
| **Dysphagia pathway—adult** | **Dysphagia pathway—adult** |
| • Symptoms of dysphonia or hoarseness persisting for more than 4 wk | • Any suspected category 1 condition (ie current smoker, neck lump, otalgia) |
| • Existing diagnosis of functional dysphonia/muscle tension dysphonia | • Any significant medical co-morbidities (ie endocrine/thyroid) |
| • Symptoms of chronic refractory cough | • Any condition already deemed to require surgical intervention that would not benefit from speech pathology intervention |
| • Suspected symptoms vocal cord dysfunction | |
| **Vestibular pathway—adult** | **Vestibular pathway—adult** |
| • Dizziness | • Patients who have already completed a diagnostic workup elsewhere (ie vestibular diagnostic assessment by an audiologist or physiotherapist) |
| • Vertigo | |
| • Balance disorders | |
| • Possible Benign paroxysmal positional vertigo (BPPV) | |
| • Possible Meniere’s disease | |
| **Retro-cochlear pathway—adult** | **Retro-cochlear pathway—adult** |
| • Asymmetrical sensorineural hearing loss (SNHL) | • Recurrent outer/middle ear infections |
| • Unilateral/asymmetrical tinnitus | • Active perforations/mastoid cavities |
| • Asymmetrical subjective hearing loss | • Polyps/possible foreign bodies |
| • Dizziness previously investigated with no known cause | • Persistent ear pain/facial pain |
| | • Pulsatile tinnitus |
| | • Recent sudden hearing loss |
| | • Any other unusual presenting feature at the discretion of the audiologist |
| **Glue ear pathway—paediatric** | **Glue ear pathway—paediatric** |
| • Routine middle ear disease: glue ear, recurrent acute otitis media, otitis media with effusion | • Otitis externa |
| • Hearing loss/difficulties listening | • Otorrhoea |
| • Speech and language delays | • Current tympanic membrane perforations |
| • Academic difficulties | • Chronic supportive otitis media (CSOM) |
| • Syndromes and other significant medical conditions (these patients will also continue to ENT appointment prior to discharge or for management) | • Pre-existing sensorineural hearing loss (SNHL) |
| | • Wax impaction |
| | • Cholesteatoma |
| | • Retraction pockets |
| | • Other ENT symptoms |
| | • Sudden hearing loss |

| TABLE 2 Demographic information of all patients included in the study |
|------------------------|------------------------|
| All patients | Breakdown by pathway (groups 2 and 3) |
| ENT cohort | AHPC-ENT | AHPC-ENT | Dysphagia | Dysphonia | Vestibular | Retro-cochlear | Glue ear |
| | (group 1) | (group 2) | (group 3) | | | | |
| Number | 399 | 382 | 356 | 66 | 153 | 151 | 60 | 308 |
| Mean age (y, range) | 39 (0-90) | 37 (0-88) | 36 (0-88) | 58 (18-88) | 59 (20-88) | 60 (20-88) | 58 (21-84) | 6 (0-18) |
| Female | 187 | 206 | 188 | 44 | 107 | 92 | 30 | 121 |
| Triage category, Cat 2 | 342 | 179 | 203 | 21 | 87 | 10 | 17 | 192 |
| Triage category, Cat 3 | 57 | 148 | 208 | 45 | 66 | 141 | 43 | 116 |

Abbreviations: AHP-ENT, allied health primary contact ear, nose and throat clinic; ENT = ear, nose and throat.

*aPatients seen by ENT 24 mo prior to implementation of the AHPC-ENT, with symptoms recorded at the time of referral matching the AHPC-ENT triage criteria. Data obtained from the hospital health analytics outcomes database.

*bPatients appropriate for the AHPC-ENT who were on the ENT wait-list at the time of AHPC-ENT implementation and seen in the AHPC-ENT.
TABLE 3 Waiting times to initial assessment for the “usual care” ENT pathway and the allied health primary contact ENT (AHPC-ENT) pathway

| Pathway/referral symptoms | Group 1\(^a\) ENT only cohort | Group 2\(^a\) AHPC-ENT (taken from ENT pathway) | Group 3 AHPC-ENT (referred after implementation) | Linear regression |
|---------------------------|-----------------------------|----------------------------------|---------------------------------|-----------------|
|                           | N  | Mean days waiting | SD  | N  | Mean days waiting | SD  | N  | Mean days waiting | SD  | P-value | % variance from the mean (R-squared) | Mean difference in wait days (coefficient) | 95% conf. interval |
| Dysphagia                 | 44 | 410.95           | 203.07 | 35 | 119.69           | 150.41 | 31 | 62.09           | 44.64 | .0000 | 0.5230 | -355.544 | -420.309, -290.779 |
| Dysphonia                 | 75 | 151.73           | 142.63 | 71 | 141.9           | 189.74 | 82 | 50.02           | 31.91 | .0000 | 0.1938 | -142.479 | -180.575, -104.383 |
| Vestibular                | 52 | 582.61           | 239.66 | 77 | 270.16           | 271.03 | 74 | 51.85           | 35.92 | .0000 | 0.6454 | -535.241 | -590.425, -480.058 |
| Retro-cochlear           | 72 | 467.68           | 231.99 | 41 | 193.22           | 85.7  | 19 | 98.89           | 75.38 | .0000 | 0.3895 | -383.660 | -467.000, -300.321 |
| Glue ear                 | 158 | 240.28          | 155.74 | 158 | 141.34           | 100.22 | 150 | 83.69           | 61.19 | .0000 | 0.3047 | -163.108 | -185.637, -140.579 |
| All pathways              | 399 | 328.1           | 237.24 | 382 | 170.99           | 176.7 | 356 | 68.25           | 53.04 | .0000 | 0.3515 | -277.221 | -299.152, -255.290 |

Abbreviation: SD, standard deviation.
\(^a\)Patients seen by ENT 24 mo prior to implementation of the AHPC-ENT, with symptoms recorded at the time of referral matching the AHPC-ENT triage criteria. Data obtained from the hospital health analytics outcomes database.
\(^b\)Patients appropriate for the AHPC-ENT were waiting on the ENT wait-list prior to implementation and therefore waited on both the ENT wait-list and AHPC-ENT wait-list.

3.6 | Patients returned to ENT

Post hoc analysis was completed on the 312 (42%) patients who required further assessment or intervention with ENT after attending the AHPC-ENT (Table 4). Thirty-one (4%) were re-categorised to a higher priority for urgent ENT intervention, including dysphagia (n = 7), dysphonia (n = 11) and paediatric glue ear (n = 13). Twenty-five of these 31 patients were re-categorised as urgent (cat-1) and the mean wait-times for all re-categorised patients to see ENT was 15 days.

3.5 | Estimated costs of the AHPC-ENT service

Estimated staff costs to deliver the AHPC-ENT dysphagia and dysphonia clinics were AU$96 per patient vs AU$125 in the ENT pathway (27% saving). The AHPC-ENT vestibular and audiology staff costs of AU$195 per patient vs AU$249 ENT pathway. Calculations are shown in the Appendix 1.

3.4 | Adverse events

There were 2 recorded adverse events, defined as unexpected clinical events involving the patient as a result of the AHPC-ENT service.

3.3 | Outcomes of AHPC patients

Discharge outcomes were recorded for patients seen only in the AHPC-ENT vestibular, dysphonia and dysphagia pathways, which offer treatment, patients received a mean of 2.25 occasions of service. Seventy one of the 153 patients (46.4%) seen in the dysphonia pathway were referred to the SLP voice treatment service.

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3.0 | Summary

Estimated staff costs to deliver the AHPC-ENT dysphagia and dysphonia clinics were AU$96 per patient vs AU$125 in the ENT pathway (27% saving). The AHPC-ENT vestibular and audiology staff costs of AU$195 per patient vs AU$249 ENT pathway. Calculations are shown in the Appendix 1.
4 | DISCUSSION

4.1 | Synopsis of key findings

To our knowledge, this is the largest study to evaluate the service impact of multiple AHP primary contact assessment clinics in a publicly funded Australian hospital ENT outpatient service. Five AHP pathways (AHPC-ENT) for dysphagia, dysphonia, vestibular, retro-cochlear and paediatric glue ear were included. The key driver for the AHPC-ENT was to reduce wait-times for assessment and streamline access to appropriate treatment pathways, allowing ENT surgeons to prioritise time and skills on complex patients and surgery. Our study demonstrated AHPs with advanced skills in ENT disorders enabled a faster “one-stop” assessment for patients waiting to see ENT. All patients in the AHPC-ENT were seen within clinically recommended time frames, improving hospital service performance.

4.2 | Comparison with other studies

Our findings on reduced wait-times and discharge without the need for surgical intervention are comparable with similar AHP-led services in fields including ENT, musculoskeletal, pelvic health and gastroenterology.10,12-16

The AHPC-ENT aimed to capture only patients suitable for AHP intervention without returning to ENT, supporting the “one-stop” approach. Most patients seen in the AHPC-ENT were managed by AHPs without a need for ENT intervention, although results differed across the 5 AHPC-ENT pathways. In the dysphonia and dysphagia pathways, relatively few patients returned to ENT as also reported in similar models.13,14 A small number of these patients required ENT priority assessment following the AHPC-ENT and were seen by ENT in less than 4 weeks. Earlier identification of patients for ENT medical or surgical intervention was another benefit of this model for patients initially categorised as a low acuity, who would otherwise have remained on the wait-list with untreated symptoms. This raises a question, can AHP assessment reliably triage patients for priority surgical assessment, whilst also providing better access to non-surgical treatments?

In the vestibular pathway, only 25.83% required ENT intervention, and to our knowledge, our study is the first to report on outcomes from physiotherapy-led primary contact vestibular assessment. In physiotherapy-led orthopaedic and pelvic health clinics, approximately 81% of patients seen by extended scope physiotherapists did not require surgical assessment.11,12

In our retro-cochlear pathway, 47% of patients returned to ENT for surgical assessment. One role of the retro-cochlear pathway is to identify the cause of unilateral hearing loss using audiometry assessments before the surgeon can decide on management. In the pre-existing ENT pathway, all patients were seen by ENT before referral for audiometry. If conductive or mixed hearing loss was identified, they returned to ENT for surgical intervention. In the AHPC-ENT, over 50% did not require ENT after audiology assessment, and for those who required surgery, only one ENT appointment was needed. Similar findings were reported in a primary care audiology service, where approximately 50% of patients with asymmetrical hearing loss required referral to ENT for surgical management after assessment by audiologist.17

The paediatric glue ear pathway had the largest number of patients (64%) returned to ENT for management. Most patients in this pathway have a conductive hearing loss, and the best practice is to monitor for 3 months before surgical intervention is considered.9 In this study, children had waited longer than 3 months on the ENT wait-list prior to the AHPC-ENT. It is therefore likely patients in this pathway had chronic symptoms, at an age critical to language development, requiring immediate surgical intervention, accounting for the high return to surgery rate. A recent retrospective observational study predicted 59% of patients could have been managed by an audiology-led first contact assessment.18 To our knowledge, our study is the first to report on the actual impact of a paediatric audiology-led primary contact service, and our findings provide a useful benchmark for other audiology-led services.

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FIGURE 2 Discharge outcomes from the allied health primary contact ENT (AHPC-ENT) clinics categorised into individual symptom pathways
### TABLE 4 Details of the patients referred back to ENT for priority assessment and intervention following assessment in the allied health primary contact ENT (AHPC-ENT) clinics

| Pathway | Age | Gender | Initial priority category | Wait-time before AHPC-ENT assessment | Reason for priority referral to ENT | Time from AHPC-ENT to ENT review | ENT intervention and outcome |
|---------|-----|--------|---------------------------|--------------------------------------|-------------------------------------|---------------------------------|------------------------------|
| Dysphagia | 48  | Female | 2                         | 67 d                                 | Enlarged thyroid nodule             | 13 d                            | Conservative management with GP |
| Dysphagia | 59  | Female | 2                         | 60 d                                 | Irregularity of the right true vocal fold | 60 d                           | Conservative management with ENT monitoring and speech pathology |
| Dysphagia | 88  | Female | 2                         | 39 d                                 | Candida laryngitis                  | 0 d                             | Pharmacological monitoring with ENT |
| Dysphagia | 54  | Female | 2                         | 49 d                                 | Left vocal fold leukoplasia         | 10 d                            | Microlaryngoscopy, no dysplasia or invasive carcinoma |
| Dysphagia | 50  | Female | 2                         | 150 d                                | Unilateral otalgia and smoking history | 0 d                            | Reassurance and conservative management |
| Dysphagia | 47  | Male   | 3                         | 13 d                                 | Left vocal fold mid-membranous lesion | 0 d                            | Microlaryngoscopy, vocal fold polyp excised followed by speech pathology |
| Dysphagia | 54  | Male   | 3                         | 34 d                                 | Lesion in the left pyriform sinus   | 0 d                            | Pan endoscopy was normal      |
| Dysphagia | 76  | Male   | 3                         | 1229 d                               | Unilateral vocal fold granuloma     | 7 d                             | Pharmaceutical and speech pathology management, then surgical excision |
| Dysphonia | 56  | Male   | 2                         | 188 d                                | Unilateral vocal fold leukoplasia, smoker | 18 d                           | Microlaryngoscopy, confirmed dysplasia |
| Dysphonia | 35  | Female | 2                         | 39 d                                 | Thyroid                             | 4 d                             | Conservative management with GP |
| Dysphonia | 28  | Female | 2                         | 17 d                                 | Required rescope with ENT           | 10 d                            | Pt cancelled appointment reporting symptoms resolved |
| Dysphonia | 34  | Female | 2                         | 31 d                                 | Right vocal fold lesion, smoker     | 0 d                             | Microlaryngoscopy, no dysplasia or invasive carcinoma |
| Dysphonia | 60  | Female | 2                         | 20 d                                 | Vocal fold irregularity and unilateral otalgia | 20 d                           | Reinke's oedema, conservative management |
| Dysphonia | 45  | Female | 2                         | 55 d                                 | Unilateral subglottic lesion        | 0 d                             | Microlaryngoscopy was normal |
| Dysphonia | 57  | Female | 2                         | 43 d                                 | Bilateral vocal fold oedema, smoker | 82 d                            | Patient failed to attend 2 appointments with ENT |
| Dysphonia | 65  | Female | 2                         | 30 d                                 | Circumscribed pigmented lesion in nasopharynx | 0 d                           | Conservative management and review, lesion was not present at review |
| Dysphonia | 69  | Male   | 3                         | 36 d                                 | Hyperkeratosis on the right true vocal fold | 0 d                            | Microlaryngoscopy, confirmed dysplasia |
| Dysphonia | 52  | Male   | 3                         | 29 d                                 | Unilateral ventricular fold prominence | 0 d                            | Microlaryngoscopy was normal |
| Glue ear | 6   | Male   | 2                         | 434 d                                | Worsening hearing loss on review    | 4 d                             | Insertion of grommets         |
| Glue ear | 5   | Female | 2                         | 331 d                                | Moderate conductive hearing loss    | 10 d                            | Insertion of grommets         |
| Glue ear | 5   | Male   | 2                         | 232 d                                | Tonsillitis                         | 0 d                             | Insertion of grommets         |
| Glue ear | 4   | Male   | 3                         | 268 d                                | Wax removal                         | 0 d                             | Insertion of grommets         |
| Glue ear | 4   | Female | 2                         | 232 d                                | To discuss sedation/GA ABR         | 16 d                            | Auditory brain stem response under general anaesthesia |
| Glue ear | 3   | Male   | 2                         | 176 d                                | To discuss audiology results       | 0 d                             | Conservative management       |
| Glue ear | 6   | Male   | 2                         | 167 d                                | Hearing loss                        | 61 d                            | Conservative management       |

(Continues)
4.3 | Clinical applicability of the findings

Implementation of AHPC-ENT relies on AHPs working at advanced scope of practice, without overutilisation of ENT surgeons during the assessment. In our study, the AHP assessments were all within scope, with the exception of laryngoscopy. Endoscopic examination of voice and swallow is extended scope in Australia requiring additional credentialing, and SLPs cannot provide a medical diagnosis, that is anatomical or pathological presentations in larynx. Visualisation of the pharynx and larynx to identify organic pathophysiology is critical, but clinical assessments used by SLPs also add diagnostic value where there is no organic pathophysiology. Our SLP-led clinics (dysphagia, dysphonia) ran parallel to ENT clinics to enable case discussion with the surgeon whilst upholding the “one-stop” model; the surgeon was overall responsible for diagnostic decision-making. This increased burden to ENT clinical staff, when fewer than 10% of patients were found to have organic pathophysiology. Additionally, Medicare procedure rebates in Australia can only be claimed if laryngoscopy is performed by a medical doctor; thus, potential revenue to the health service may be lost despite the cost benefits of a more responsive service. Perhaps a more cost-effective model is where the SLP provides multidimensional clinical assessment before the ENT to triage the patients who need priority ENT assessment.

The point of triage for new referrals is critical when determining urgency for assessment. We found a 2-step triage process was effective in identifying the most suitable patients for the AHPC-ENT, demonstrated by the low number of patients returned to ENT for priority assessment. However, accurate referral triage was confounded by the lack of detail provided in the primary care referral. Most patients who returned to ENT in our study were for symptoms not documented in the referral, that is rhinosinusitis. The use of a pre-screening questionnaire for patients at the point of triage could be incorporated into the process to help determine the most direct assessment route for the patient.

4.4 | Study limitations and future research

Whilst this prospective clinical study has demonstrated positive outcomes, some limitations exist. Referral rates to AHP treatment for patients seen in the ENT pathway pre-intervention group were unable to be retrieved and would have provided comprehensive analysis of the service outcomes. Secondly, a validated health-related Quality of Life (HRQOL) tool to measure the impact on patient well-being was not used and should be considered in future studies to measure health economic benefit for the AHPC-ENT and more detailed cost analysis. Our cost comparison provides a simple overview of the likely cost benefit of the AHPC-ENT from a health service perspective; however, more detailed cost-effectiveness analysis from both the health service and societal perspectives would provide a clearer picture of the true cost benefit for the hospital, and the wider socioeconomic burden of delayed access to health care.

This study did not examine the reliability of the AHPC-ENT assessment compared with the ENT-led pathway for the purposes of diagnosis.
Future research could explore the level of agreement between AHPs and ENTs in forming a diagnosis to demonstrate validity of the AHPC-ENT.

For all pathways, further research is required to develop a robust triage process to better differentiate patients who will benefit from AHP intervention prior to initial assessment, vs those who require ENT.

5 | CONCLUSION

Our study investigating the service outcomes of five AHP primary contact pathways demonstrated that a locally credentialed AHPC-ENT resulted in shorter wait-times for initial assessment and improved access to AHP treatment; effectively highlighted patients for prioritisation for surgical assessment and intervention; and had no increase in staffing costs to deliver the pathway safely. This study provides further evidence for wider implementation of AHP primary contact models for patients requiring ENT services. Further research is needed to measure validity of the AHP primary contact assessment to demonstrate the model is reliable, safe and cost-effective.

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CONFLICT OF INTEREST

None 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.

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APPENDIX 1
Calculations of the staff costs required to see a patient for assessment in the "usual care" ENT clinic compared with the AHPC-ENT clinic.

SLP-led dysphagia and dysphonia pathways
"Usual care" ENT = ENT (15 min) + SP (60 min) = $54 + $78 = $132
AHPC-ENT = SP (60 min) + ENT (5 min) = $78 + $18 = $96 (18% cost saving)

PT/Aud-led vestibular pathway
"Usual care" ENT = ENT (15 min) + PT (90 min) + Aud (60 min) = $54 + $117 + $78 = $249
AHPC-ENT = PT (90 min) + Aud (60 min) = $117 + $78 = $195 (12% cost saving)

Aud-led retro-cochlear and paediatric glue ear pathways
"Usual care" ENT = ENT (15 min) + Aud (60 min) = $54 + $78 = $132
AHPC-ENT = Aud (60 min) = $78 = $78 (18% cost saving)

SLP = speech-language pathology; Aud = audiologist; PT = physiotherapist.

Costs obtained from the Hospital and health Service Finance Department.

Costs calculated in Australian dollars (AUS$).

Costs of an ENT consultant per hour = $217; cost of a HP5 AHP per hour = $78.