Background and Context

- Unilateral tinnitus is a debilitating condition, with important psychosocial implications.
- It must be investigated with a Magnetic Resonance Image (MRI) to rule out a rare but important finding of a cerebello-pons angle lesion.\(^2\)
- Good Practice Guidelines exist but are followed by 14% of GPs.\(^3\)
- No widely accepted tinnitus management protocol, resulting in the tinnitus patient pathway varies greatly.\(^4\)

The Systematic Review

- A systematic review was conducted of existing published literature to identify the most common unilateral tinnitus patient pathway within the UK.
- The Cochrane Database, Embase, Ovid MEDLINE, PubMed and NICE evidence search were searched in accordance with PRISMA guidelines.
- Of 8,176 records identified, 8 articles met the inclusion criteria (Figure 1).
- The systematic review found that the commonest NHS tinnitus patient pathway was as follows:

<table>
<thead>
<tr>
<th>Process</th>
<th>Current State</th>
<th>Alternative Process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Referral</td>
<td>GP → ENT → MRI → ENT-OP</td>
<td>GP → Referral to tinnitus clinic</td>
</tr>
<tr>
<td>Touch time</td>
<td>10m</td>
<td>1m</td>
</tr>
<tr>
<td>Hand-off</td>
<td>1d</td>
<td>0d</td>
</tr>
<tr>
<td>Lead time</td>
<td>10d</td>
<td>1d</td>
</tr>
</tbody>
</table>

Objectives

- **Primary aim:** to evaluate the efficacy of a streamlined, unilateral tinnitus patient pathway.
- **Null hypothesis:** there is no difference in the following primary endpoints between the control arm and experimental arm:
  - Referral to treatment (RTT) time
  - Number of patient healthcare visits
  - Number of Value Process Map (VPM) steps
  - Lead time
- **Secondary aim:** present the design and implementation of the streamlined pathway.

Research methodology and methods

- A streamlined patient pathway was designed using lean management techniques\(^5\) and presented as a case study (Box 1), addressing the secondary aim.
- A prospective, experimental, non-randomised control study with historical controls was used to evaluate the streamlined pathway efficacy, addressing the primary aim. Value process mapping and patient questionnaires were conducted before and after the introduction of the new pathway (pre and post-intervention).

Results: pre-intervention control group results

- 22 eligible patients were identified for the study historical control group, from those presenting to the local hospital within a one-month period (average age 55, 15 females: 7 males).
- The ‘current state’ unilateral tinnitus pathway VPM (pre-intervention) is demonstrated in Figure 2.
- Pre-intervention questionnaire results indicated 2/3 of respondents would prefer fewer appointments that last longer. 90% thought the streamlined pathway would be a little or much better. Example white space responses are provided in Figure 3.

Results: Post intervention data and comparisons

- 22 eligible patients were identified for the study experimental group, from those consecutively treated on the new pathway (average age 57, 8 females: 14 males).
- The ‘actual future’ state value process map is shown in Figure 7. This provided a statistically significant reduction in delay between referral received to treatment, number of patient healthcare visits, number of pathway steps, hand-off and lead time (Figure 8).
- Post-intervention questionnaires showed the most common response was ‘neither satisfied or dissatisfied’ amongst the pre-intervention group, whilst it was ‘satisfied’ for the post-intervention group. This failed to reach statistical significance \((p=0.127)\).
- The Statistical Process Control chart for the pre-intervention RTT (Figure 9) demonstrates that all data points lay between the upper and lower control limits (mean +/− 3 standard deviations), indicating acceptable variation.

Conclusions

This research demonstrates a robust and comprehensive methodology for re-designing patient pathways, using lean management techniques. The streamlined unilateral tinnitus patient pathway confers significant benefits to patients, the NHS and wider health economy. Whilst there is no widely accepted tinnitus management protocol in the UK, widespread adoption of this pathway would further reduce inequity of patient care, with potential savings of £5.3 million per year. Future research should focus on the challenge of scaling and sustaining innovation.

References:

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