Does a Symbiotic Culture Of Bacteria & Yeast (a by-product of Kombucha tea manufacture) have a similar or superior fidelity in representing skin when compared with current suturing/excision models?

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In teaching the skills of suturing and excision to medical students, staff at the Grampians Clinical School – Deakin University (GCS) have used ethylene-vinyl acetate (EVA) pads and pork belly as models to simulate human skin. The literature has reported other models used to represent human skin including vegetables, pads and foam products, chicken legs, pig feet, and other postmortem animal parts.1-6

The Problem

• Cost of pork and EVA pads
• Storage and handling of meat products
• Fidelity of pork and EVA pads in representing skin
(evaluation of the fidelity of various models was not identified in the literature)1-4

Research Design

Part one – Identification of descriptors that defines the fidelity profile of skin suturing and excision.

Ten expert clinicians independently recorded their opinions, attitudes and ideas using open ended questions pertaining to the fidelity of pork, SCOBY and EVA models. They were asked to rate three models and to perform an elliptical excision of two models. They were then asked to answer the six questions in (box 1).

A thematic analysis of responses was undertaken and despite small sample size, saturation was achieved. This gave us the aspects of fidelity against which we could evaluate the three models (box 2).

Part two – Identifying the model that best represents the fidelity of skin when suturing and excising.

33 participants were asked to rate two of the models and to perform an elliptical excision of two models. They were then required to fill in a questionnaire with each of the descriptors (box 2) listed against a 5 point Likert-type scale. In addition, participants were asked which of these three models they thought most suitable for teaching suturing and which one was most suitable for teaching excision.

Box 1.
1. Have you sutured human skin within the last 3 months?
2. Have you excised human skin within the last 3 months?
3. Which model most closely resembles the clinical reality of suturing human skin?
4. Which model most closely resembles the clinical reality of excising human skin?
5. What has led you to these decisions? List and explain as many possible comparable properties that best describes the fidelity of suturing or excising human skin.
6. Any other comments –

Box 2.

<table>
<thead>
<tr>
<th>Suturing Likeness</th>
<th>CUT THROUGH OF SUTURES</th>
<th>RESPONSE TO TENSION OF SUTURES</th>
<th>GENERAL</th>
<th>SMALL</th>
<th>FEEL</th>
<th>LOOK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pork</td>
<td>5.50 (2.35)</td>
<td>5.50 (2.35)</td>
<td>5.00 (2.5)</td>
<td>5.00 (2.5)</td>
<td>5.00 (2.5)</td>
<td>5.00 (2.5)</td>
</tr>
<tr>
<td>SCOBY</td>
<td>4.00 (2.00)</td>
<td>5.00 (2.5)</td>
<td>4.00 (2.0)</td>
<td>4.00 (2.0)</td>
<td>4.00 (2.0)</td>
<td>4.00 (2.0)</td>
</tr>
<tr>
<td>EVA</td>
<td>2.25 (1.25)</td>
<td>3.25 (1.75)</td>
<td>2.00 (1.0)</td>
<td>2.00 (1.0)</td>
<td>2.00 (1.0)</td>
<td>2.00 (1.0)</td>
</tr>
</tbody>
</table>

Results

Table 1 shows a consistent trend in ratings in that participants generally rated both Pork and SCOBY as superior to EVA. The primary exception to this was with regard to smell where EVA was rated best and SCOBY worst.

- Both SCOBY and Pork were rated as significantly better than EVA on the dimensions of Skin Likeness, Cutting Likeness, Suturing Likeness, and Feel (p<0.05).
- There was no significant difference in the ratings of Pork and SCOBY on the dimensions of Skin Likeness, Cutting Likeness, Suturing Likeness, and Feel (p>0.05).
- On the dimension of Suturing Likeness, Pork was rated as significantly better than both SCOBY and EVA (p<0.05).
- The one dimension on which SCOBY was rated significantly worse than both Pork and EVA was that of Smell (p<0.05).
- There was no correlation between the recency of practice and final model preference.

Despite the lack of a significant difference in suturing likeness, the majority of the qualitative feedback noted that SCOBY was not as robust as pork.

Feedback

Cultural impact of using porcine skin significant.
• “I felt uncomfortable suturing it (pork) due to religious beliefs”
• “Model b (pork) was not tried due to cultural reason”

Discussion

• Over 10% of participants had concerns regarding the use of pork models. Clinicians were asked to rate each model carefully considering the cultural impact of using porcine skin.
• The cultural impact of tools used in teaching needs careful consideration.
• The vinegary smell of SCOBY is a result of the secondary fermentation of alcohol to acetic acid
• Future avenues to explore in order to reduce the vinegary smell include washing the SCOBY prior to use, and dusting the SCOBY in bicarbonate
• Growing SCOBY is a relatively simple process – grown in dark at room temperature
• Growing SCOBYs is cheap, with ongoing costs for sugar and tea bags only
• Convenient for faculty when compared to level of care required for pork belly

Conclusion

SCOBY offers a cost effective, culturally sensitive and realistic alternative to pork and EVA on which to teach the skills of suturing and excision to medical postgraduate students.

The convenience of storage, use, and supply may be sufficiently advantageous in clinical schools that lack capacity for refrigeration and are looking for a more cost effective model on which to teach suturing and excision.

Future projects may see its successful application in wound management whereby wounds can be realistically portrayed with foreign bodies insitu, and blood and contaminate easily added.

References

10. deakin.edu.au
11. Deakin University CRICOS Provider Code: 00113B