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RESEARCH

Where's my what? A survey of anatomical knowledge in a community in Western Melbourne

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SUMMARY
This project deployed a three-dimensional model to explore if people could identify the site of specific body organs and the likely site of pain associated with those organs. Most respondents failed to locate the body organs and the anatomical source of the pain. People located organ sites in 34 per cent of cases and the anatomical source of pain in 39 per cent of cases. These data suggest a poorer health literacy than previously described in the literature. Such information has implications for help-seeking behaviour and may be a factor in delayed presentation for serious pathology.

Key Words
Health literacy; patient education; anatomy; symptom assessment; pathological conditions, signs and symptoms

ABSTRACT

Background and Aims

This study aimed to explore if members of the public could identify the location of major body organs as well as pain associated with major organ pathologies.

Method

A survey of 100 participants was conducted in Melbourne, Australia. Participants were invited to mark the location of two internal organs and the site of pain for two pathologies on a manikin. Five anatomical questions and four clinical scenario questions were randomised prior to data collection. Photographs of participant responses were compared to responses of a doctor, and if a site within the same area was identified the participant was deemed correct.

Results

Correct identification of body organ site was poor at 34 per cent (±6.6%; CI 95%) and only slightly better for the location of pain related to clinical pathologies at 39 per cent (±6.8%; CI 95%). Respondents were more likely to identify the location of the heart, or pain associated with a myocardial infarction; 51.2 per cent (±15.3%; CI 95%) and 79.6 per cent (±10.7%; CI 95%), respectively. A minority, 18.6 per cent (±11.6%; CI 95%), were able to locate the gallbladder, and fewer still, 6.4 per cent (±7%; CI 95%), identified the location of pain due to cholelithiasis (gallstones).

Conclusion

Most respondents failed to identify the major organs or the likely location of pain for related pathologies. Limited anatomical knowledge is reflected in the literature, however, these results were poorer than previous studies suggest. These data have implications for help-seeking behaviour and may be a factor in delayed presentation for serious pathology.

BACKGROUND

The literature suggests that the general public has limited knowledge of the location of key body organs.[1–7] Weinman and Yusuf[5] demonstrated that patients have poor anatomical knowledge, even when they have organ-specific pathologies. Comparing recent results to similar work conducted over 40 years ago[1] implies that greater accessibility to health information has not improved the anatomical knowledge of lay people. A recent study of European populations reported that laypersons have a "reasonable" understanding of anatomy,[7] however, even within this data fewer than 50 per cent of respondents could correctly locate major organs. Studies assessing anatomical knowledge of the general public typically use a questionnaire format, broadly based on the *Inside-of-the-body* test devised by Tait and Ascher.[8] Few studies assessed patients' understanding of the correlation of gross anatomy knowledge with pain patterns of common pathologies based on three-dimensional models.

METHOD

A convenience sample of adult shoppers at a shopping mall in western Melbourne were invited to participate. The location of the study was a major regional shopping centre located 29 kilometres (18 miles) west of the Melbourne Central Business District (CBD) in Victoria, Australia. The shopping centre has 275 stores. It includes a two-level high end department store, Gold Class cinemas, several homeware and clothing stores, a fresh food precinct, a library, and an entertainment complex. A stand manned by two medical students was set up and participants were recruited following informed consent. We anticipated that only half the sample would respond correctly, therefore a sample of 96 people offered a margin of error of 10 per cent to confirm a distribution of responses within 95% confidence intervals.[9] One hundred responses were collected.

Participants were invited to identify: (1) the location of two organs randomly selected[10] from the liver, kidneys, appendix, gall bladder, or heart; and (2) the likely location of pain in two clinical scenarios randomly selected[10] from myocardial infarction, gallstones (cholelithiasis), kidney stones, and appendicitis on a dress-shop manikin. All responses were recorded with digital photographs. Correct anatomical locations and pain patterns for all clinical scenarios were determined by consultation with a doctor. If a participant placed a mark within the designated area identified by the doctor, the answer was deemed correct.

RESULTS

The participants in this survey were broadly representative of the adult population in this municipality (Table 1).[11] Examples of participant responses are shown in Figure 1. Overall, correct identification of body organ location was poor at 34 per cent (±6.6%; CI 95%) and only slightly better for the location of pain related to clinical pathologies at 39 per cent (±6.8%; CI 95%) (Figure 2). There was no evidence in this study of a gender difference in responses (Figure 2).

Respondents were more likely to correctly identify the location of the heart, or pain associated with myocardial infarction; 51.2 per cent (±15.3%; CI 95%) and 79.6 per cent (±10.7%; CI 95%), respectively (Figure 3). The minority of respondents were able to correctly identify the location of the kidneys, liver, appendix, or gall bladder. The gall bladder was least likely to be identified by all respondents with only 18.6 per cent (±11.6%; CI 95%) able to correctly locate it, and fewer still, 6.4 per cent (±7%; CI 95%) of participants, correctly identifying the location of pain associated with cholelithiasis (Figure 3). Common errors in identification were seen for location of the appendix (incorrect side) but no other broad patterns of incorrect responses were observed. Participants appeared more likely to respond correctly if they had personally experienced that pathology.

DISCUSSION

The majority of participants could not identify the location of major anatomical organs or the most common site of pain for common clinical pathologies. Compared to previous reports,[1–7] the ability of the general public to identify

anatomical locations was poorer. Data published by Moxham et al[7] suggested much better anatomical knowledge. For two prior studies,[5, 6] identification of the location of the heart and kidneys was comparable, although the liver and gall bladder were less likely to be correctly identified in this study.

Few studies have assessed lay knowledge of the pain patterns for common clinical scenarios other than myocardial infarction.[12, 13] It was notable that most participants (79.6 per cent) could accurately identify the typical location of pain associated with myocardial infarction, despite a significant number of participants incorrectly locating the heart (48.8 per cent). It is possible that this is a reflection of public health awareness campaigns on the symptoms of a heart attack.[14]

Limitations and Strengths

Weinman and Yusuf [5] identified that women's anatomical knowledge was superior to men when a female body outline was used. While the manikin we used for this study was male, there was no significant difference in the anatomical knowledge between genders. Due to the modest sample size for this study only broad patterns in gender differences were explored. This study was also subject to self-selection bias. It is possible that the requirement to identify anatomical locations in a three-dimensional context may be a more challenging but more valid assessment of knowledge.

CONCLUSION

With ready access to health information there is increasing scope for patient self-education.[15] While patient engagement is desirable, patients' knowledge of anatomy and associated pain patterns may influence the type and source of information accessed. Help-seeking behaviour can potentially be influenced by accessing incorrect or unrelated information, and if a patient does not suspect the cause of their symptoms, they may procrastinate to their detriment.[16]

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CONFLICTS OF INTEREST
The authors declare that they have no competing interests.

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ETHICS COMMITTEE APPROVAL
Ethics approval for this project was received from The University of Notre Dame Australia Human Research Ethics Committee (approval number 016196S).

Table 1: Characteristics of participants

Age	Number of Participants	Municipality*[11] (%)
18–24	6	9.6
25–34	18	18.9
35–44	23	16.8
45–54	19	11.7
55–64	18	8.3
65–74	10	4.9
75+	6	2.8
Total	100	100
Gender		
Male	55	49.9
Female	45	50.1
Total	100	100

*The figures listed under municipality indicate the demographic breakdown of age and gender within the local government region where the shopping mall is located. These figures provide a general indication of the demographics of local residents likely to be attending the shopping centre.

Figure 1: Example of participant responses for the identification of anatomical locations.

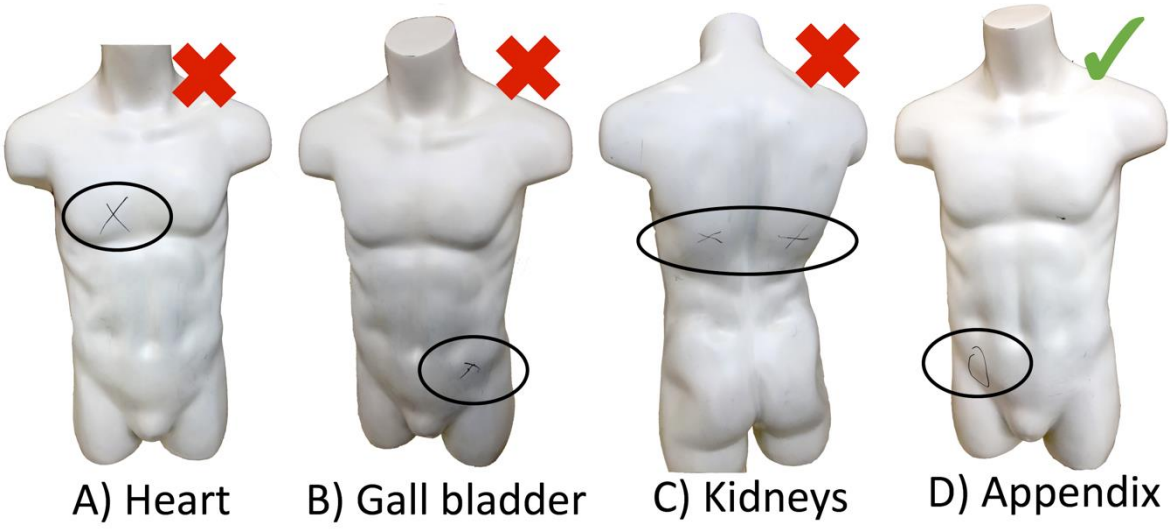

Figure 2: Percentage of correct responses to anatomical location and clinical scenario questions by gender. Margin of error is calculated at 95% confidence intervals.

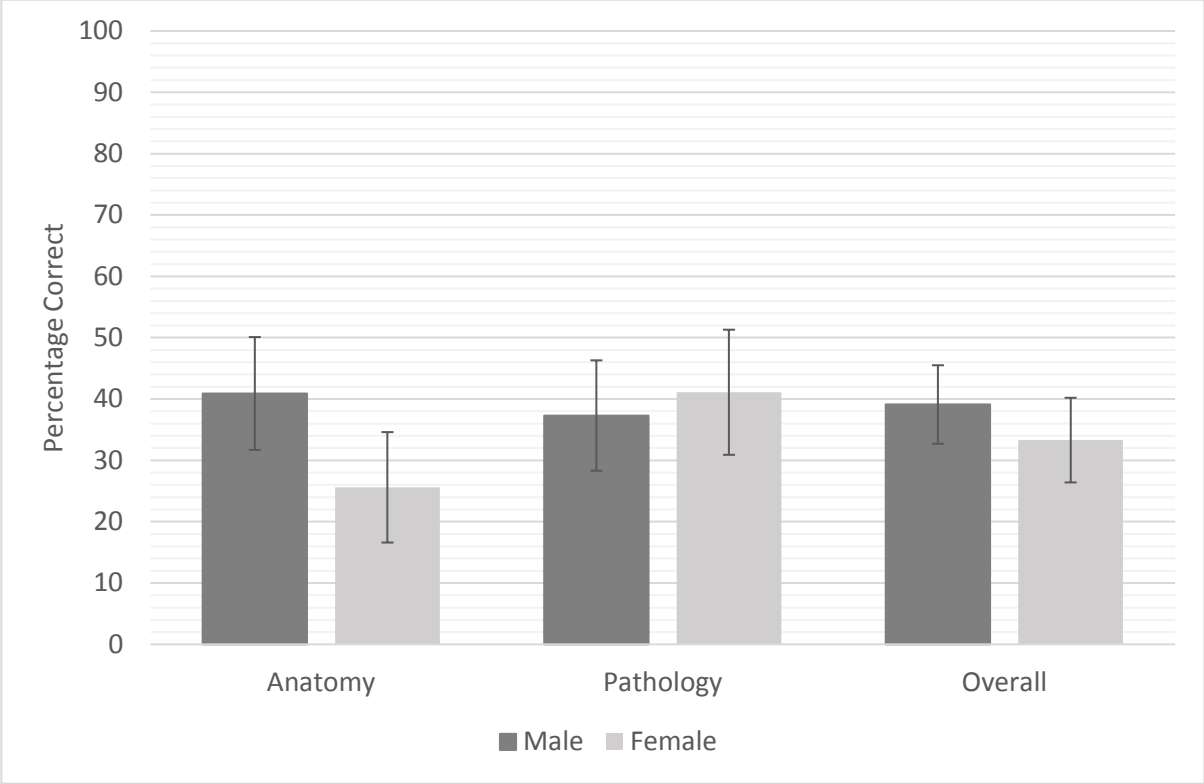

Figure 3: Percentage of correct responses to identification of anatomical locations (A) and the location of pain patterns for clinical scenarios (B). Margin of error is calculated at 95% confidence intervals.