Aims: To explore knowledge and attitudes of medical students before and after exposure to a technology-enhanced learning and teaching (TELT) session about electroconvulsive therapy (ECT).

Background: Adequate knowledge of and attitudes toward ECT is essential for medical students. However, the impact of teaching on knowledge and attitudes is infrequently studied.

Methods: Fourth- and fifth-year medical students at the University of Glasgow were provided with an online questionnaire before and after engaging in a remote TELT session, led by a consultant psychiatrist with expertise in ECT. The online teaching session used resources developed by a multidisciplinary team who specialize in ECT. The teaching session lasted around 1 hour. The questionnaire contained 3 sections: baseline demographics, knowledge of ECT, and attitudes toward ECT. Changes in scores were analyzed.

Results: Sixty-seven students completed the teaching session. Response rate to the precourse questionnaire was 68.7% (n = 46), and the postcourse questionnaire was 44.8% (n = 30). Prior to engaging with the learning materials, 9 students reported no knowledge of ECT and a third believed that ECT did not cause a seizure. In general, students who had personal experience of mental illness (friend, relative, or self) had more positive attitudes toward ECT and higher knowledge scores. In general, an increase in knowledge and attitude scores was found in the postcourse questionnaire.

Conclusions: Exposing medical students to a TELT session focused on ECT during their psychiatric placement appeared to improve knowledge and attitudes surrounding ECT.

Key Words: ECT, knowledge and attitudes, medical student, technology-enhanced learning and teaching (TELT)

ECT, electroconvulsive therapy (ECT) is an effective and safe treatment for several mental illnesses such as major depressive disorder, bipolar disorder, and schizophrenia.13 ECT was first used in 1938, and although specific approaches and governance have changed, the treatment remains widely used and effective today.4,5 Complications from ECT are generally rare but include anesthetic complications, cardiovascular or respiratory difficulties, prolonged seizures, dental trauma, headaches, muscle aches, nausea, confusion, and cognitive side effects such as memory loss.6

Despite the potential beneficial effects of ECT and its good safety profile, the role of ECT in psychiatric care continues to be debated.1 Stigma and lack of training may cause ECT to be avoided, despite it being widely documented to be safe and effective.8,9 The media negatively depicting ECT as unsafe can affect perceptions and reduce the likelihood of prescription and uptake of ECT.3,10,11

Education and direct observation of treatment practices may improve medical students’ perception and knowledge of ECT.5,8 The lack of guidelines regarding the teaching of ECT and differences in access to ECT education results in a large variation in the information taught in different medical schools.12 Medical students’ knowledge, skills, and attitudes will impact their future procedures in practice. Improving knowledge is theorized to reduce stigma and increase the likelihood of offering ECT as a treatment option.1,3 Exposure to lived experiences and observation of ECT have been established as powerful ways to reduce stigma.5

EXISTING RESEARCH

There is a growing body of research exploring the impact of ECT lectures and observations on treatment on the knowledge and attitudes of medical students. Despite technology-enhanced learning and teaching (TELT) within medical education becoming more widespread,13 there are minimal studies exploring its use in ECT education.

Several studies have used questionnaires to explore knowledge and attitudes to ECT of medical students across different settings.14–16 In general, these studies report that medical students lack knowledge about ECT,17 have obtained information about ECT from informal sources such as movies and the media, and may hold misconceptions about ECT such as it being a painful procedure that could cause death or permanent brain damage.17 One study explored the knowledge and attitudes of medical students cross-culturally from Iraq (n = 181), Egypt (n = 85), and the United Kingdom (n = 73). They found that attitudes toward ECT were most positive for the UK students who had generally observed ECT more often than those in Iraq and Egypt.

Several studies have also been undertaken to explore medical student’s knowledge and attitudes before and after a psychiatry placement where they were able to attend a lecture about ECT and/or an observation of the procedure.1,2,10–12,18–24 These studies have reported that medical students had increased knowledge and more positive attitudes toward ECT following the lecture or observation.

TELT where “learning activities and environments are potentially improved or enhanced with information and communication technologies”13 has rarely been evaluated in the context of ECT teaching. Kitay and colleagues3 explored knowledge and attitudes of ECT for medical students before and after exposure to 7 short video clips embedded into a 55-minute lecture. The video clips
focused on the clinical presentation, informed consent and treatment options, the procedure, and posttreatment interview. The authors found that students' knowledge and attitudes improved following the teaching session.

These findings all suggest that educational material and observation of ECT can improve medical students' knowledge and attitudes. As such, exposure to ECT could be considered an important component of psychiatric education. Prepandemic, University of Glasgow medical students were able to attend the ECT suite during their fourth- and fifth-year psychiatric placement. However, due to COVID-19 restrictions, medical students were unable to attend the ECT suite. To address this loss of learning opportunity, a new online TELT session focused on ECT was created.

AIMS AND RESEARCH QUESTIONS

The primary aim of this study was to explore the impact that the new TELT session focused on ECT created during the COVID-19 pandemic had on the knowledge and attitudes about ECT held by a group of medical students. The impact of gender, personal experience of mental illness, and whether students considered specializing in psychiatry were also explored.

METHODS

Design

Fourth- and fifth-year medical students undertaking their clinical placement in psychiatry were invited to an optional ECT TELT session. This was delivered on Microsoft Teams and led by a consultant psychiatrist with a special interest in ECT. During this hour-long session, a newly developed ECT learning resource was shared with the medical students. The consultant psychiatrist led the students through the learning materials, with opportunities for the students to ask questions. The ECT learning resource was made available on the students' online learning platform (Moodle). Students were invited to complete an electronic questionnaire at the start and at the end of the teaching session exploring knowledge of and attitudes toward ECT.

ECT Learning Resource

The academic content of the learning resource was developed by a multidisciplinary team of professionals (psychiatrists, mental health nurses, and anaesthetists, with expertise in ECT, and psychologists with skills in digital learning pedagogy). The resource was hosted on the Rise platform and included written text, quizzes, videos, and interactive case studies. The educational content was structured around 4 intended learning outcomes, namely:

1. To develop an understanding of what ECT is and how the treatment is given,
2. To critically discuss indications and contraindications of ECT,
3. To understand the benefits and risks of ECT treatment, and
4. To develop an understanding of the role of stigma in ECT.

Six main sections explored different aspects of ECT. These included the following:

- What is ECT?
- Indications and contraindications for ECT
- Potential benefits and adverse effects of ECT
- Stigma and ECT
- Consent and ECT
- Referral to the ECT service

The clinical team responsible for ECT delivery provided guided video representations of the key phases of the procedure within the ECT suite. In addition, films were created where people with lived experience shared their ECT journey. These were recorded after appropriate consent had been established.

Once developed, the resource was piloted with a range of interested and relevant health professionals including the University of Glasgow's subdean for psychiatry, medical students who had recently completed an intercalated degree in psychological medicine, and a postgraduate medical doctor in training. All feedback was positive with no gaps in learning material identified.

Questionnaire

The anonymized questionnaire was hosted on Jisc Online Surveys. Baseline demographic questions included the following: year of study, gender, experience of mental illness in a friend/relative or self, and experience of ECT. The questionnaire included 24 knowledge questions and 18 attitude questions adapted from the above outlined studies. 4, 16, 18, 19

Knowledge Questions

The questions about knowledge had responses recorded as yes, no, or unsure. The scores were calculated with a score of +1 for correct answers and 0 for incorrect and unsure answers. The maximum knowledge score was 24.

Attitude Questions

Attitudes toward ECT were answered with a 5-point Likert scale (strongly agree, agree, unsure, disagree, strongly disagree). The maximum score for the attitudes section was 36, with the following scores: strongly agree = +2, agree = +1, unsure = 0, disagree = −1, strongly disagree = −2.

The precourse questionnaire was completed at the start of the teaching session, and the same questions were included in the postintervention questionnaire administered immediately following the teaching session. The participant's preresponse and postresponse were not linked. The questionnaire is included in Appendix 1, http://links.lww.com/JECT/A239.

Statistical Analysis

Statistical analyses were undertaken using STATA, Excel, and R. Total scores before and after the teaching session were calculated to explore knowledge and attitudes toward ECT. As the participants could not be matched across both questionnaires and can also not be regarded as independent, it was not possible to directly compare precourse and postcourse knowledge scores. However, the precourse data were used to establish a class baseline mean of knowledge and attitude scores against which the postcourse scores were compared in 1-sample $t$ tests. This made it possible to establish if there was significant improvement in knowledge and attitude. We were also interested in whether there was a relationship between attitude and knowledge before the course and calculated a correlation to assess this. A $P$ value of less than 0.05 was considered statistically significant for all the above tests. Additional analysis was undertaken to explore the knowledge and attitudes toward ECT when the student had personal experience of mental illness in both the precourse and postcourse data. The effects of gender and intention to specialize in psychiatry were only examined in the precourse data and were considered in relation to existing knowledge and attitudes. Unpaired $t$ tests were used to compare between the demographic groups, and alpha levels were adjusted accordingly using Bonferroni corrections. One person did not answer any of the attitude questions in the pretraining questionnaire, and 1 person did not answer them in the posttraining questionnaire, so they were removed.
Ethical Considerations

This research was approved by the University of Glasgow MVLS Research Ethics Committee (200210083), and permission was obtained from the University Sub Dean for Psychiatry.

RESULTS

Sixty-seven medical students attended the teaching session. Two thirds (68.7%, n = 46) completed the precourse questionnaire, and 44.8% (n = 30) completed the postcourse questionnaire. For the precourse questionnaire, ages ranged from 18 to 30 (mean age was 23.6). The year of medical school ranged between year 4 and year 6, but most were in year 5.

Two thirds of the precourse questionnaire respondents were females (67.4%, n = 31). Over half (63%, n = 29) reported having a friend or relative who was diagnosed with mental illness, and almost a quarter (23.9%, n = 11) reported personal experience of being diagnosed with a mental illness. Almost half (45.7%, n = 21) reported that they would consider specializing in psychiatry. Similar demographics were recorded for the postcourse questionnaire respondents (Table 1).

Knowledge of ECT Prior to Teaching Session

Prior to engaging in the teaching session, 9 (19.6%) students reported no knowledge of ECT. Some reported acquiring their existing knowledge of ECT from reliable sources of information including health professionals (45.7%, n = 21) or medical books/journals (23.9%, n = 11). Two (4.3%) had observed ECT. However, over a third reported that their knowledge came from movies and television (37%, n = 17). Several misconceptions were identified, for example, nearly a third (32.6%, n = 15) believed that ECT did not cause a seizure and were unsure if muscle relaxants were used (32.6%, n = 15). Around a fifth (17.4%, n = 8) were unsure if a general anesthetic was used, and 37.8% (n = 17) were unsure if ECT was painful. Despite a low awareness of the details of the procedure, the majority (93.5%, n = 43) agreed that ECT was an effective treatment.

Postteaching Knowledge

Knowledge improved after the teaching session from 65.95% (SD = 19.33) average correct answers precourse to 88.19% (SD = 14) correct answers postcourse. The mean knowledge score before the session was delivered was 14.07 (SD = 6.71) and 19.37 (SD = 3.9) after the session. Significant improvement was established over baseline knowledge ($t_{(29)} = 6.9786$, $P < 0.001$) in the postcourse scores. Using the effect size R package, an effect size $d = 1.08$ (95% confidence interval [CI], 0.58–1.57) was estimated for this improvement, which represents a large effect size with the lower $95%$ CI, 0.58–1.57. This results infer that within the class a significant improvement in knowledge is demonstrated. In particular, knowledge about how ECT is delivered and indications for its use improved in the postcourse questionnaire (Table 2).

However, 1 question stood out as having high rates of incorrect answers even after training with most students answering “no” to the question “Patients cannot be given ECT against their will” after training (63%, n = 19). The authors believe that this question was poorly phrased as issues around consent were explicitly discussed within the learning program. Removing the question from the analysis made no difference to the inference that can be drawn from the results, so it has been included in the analysis.

Attitudes to ECT

Before the course, most students (58.7%, n = 27) agreed or strongly agreed that ECT was a frightening treatment. Over a quarter (28.3%, n = 13) agreed or strongly agreed that ECT should be used as a last resort and 6.7% (n = 3) considered ECT to be a cruel treatment. After completing the course, fewer students agreed or strongly agreed that ECT was a frightening treatment (43.3%, n = 13), ECT should be used as a last resort (23.3%, n = 7), and that ECT was a cruel treatment (3.4%, n = 1).

To explore if there was an improvement in attitude for students after training, the precourse questionnaire was engaged to set a baseline against which the posttraining scores were compared in a 1-sample $t$ test. Prior to the course, the mean score for the attitude section of the questionnaire was 17.24 (SD = 10.4). This score was engaged as the baseline for comparing attitudes after the course, which had a mean score of 22.42 (SD = 7.24). A significant difference in attitude was found compared with the baseline ($t_{(29)} = 3.04; P = 0.005$ with estimated effect size of $d = 0.48$; 95% CI, 0.01–0.95). The results infer that there was a significant shift in attitudes toward ECT meaning that those who completed the questionnaire viewed the treatment more positively after the teaching session.

Knowledge and Attitudes

The authors also explored if there was a relationship between knowledge and attitudes to ECT prior to the course and found a significant correlation of $r(43) = 0.641, P < 0.001$ with 95% CI, 0.43–0.79, indicating a middle to highly significant positive relationship between knowledge and attitudes before the course (Fig. 1). This meant that students who came with more knowledge about ECT also had a more positive attitude to it. However, this relationship may have been driven by the students in the sample who had considered a future career in psychiatry as they had significantly more knowledge about ECT and a trend toward more positive attitudes to ECT.

<table>
<thead>
<tr>
<th>Question</th>
<th>Change Score*</th>
</tr>
</thead>
<tbody>
<tr>
<td>During ECT a general anesthetic is used.</td>
<td>0.33</td>
</tr>
<tr>
<td>ECT is painful.</td>
<td>0.35</td>
</tr>
<tr>
<td>ECT is given as a once off treatment.</td>
<td>0.39</td>
</tr>
<tr>
<td>ECT is used to treat suicidal behavior.</td>
<td>0.40</td>
</tr>
<tr>
<td>Pregnant women can also receive ECT.</td>
<td>0.47</td>
</tr>
<tr>
<td>ECT can be used to treat postpartum psychosis.</td>
<td>0.51</td>
</tr>
<tr>
<td>ECT can be used to treat mania.</td>
<td>0.52</td>
</tr>
</tbody>
</table>

*Change score was calculated by subtracting the proportion of students who answered the question correctly in the precourse questionnaire from the proportion who answered correctly in the postcourse questionnaire.

### TABLE 1. Demographics of Respondents

<table>
<thead>
<tr>
<th>Questionnaire</th>
<th>Precourse</th>
<th>Post Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>% (n), (n = 46)</td>
<td>% (n), (n = 30)</td>
<td></td>
</tr>
<tr>
<td>Mean age</td>
<td>23.6</td>
<td>24.4</td>
</tr>
<tr>
<td>Female</td>
<td>67.4 (31)</td>
<td>63.3 (19)</td>
</tr>
<tr>
<td>Year 5 of study</td>
<td>91.3 (42)</td>
<td>86.7 (26)</td>
</tr>
<tr>
<td>Friend/relative with mental illness</td>
<td>63.0 (29)</td>
<td>50.0 (15)</td>
</tr>
<tr>
<td>Personal history of mental illness</td>
<td>23.9 (11)</td>
<td>20.0 (6)</td>
</tr>
<tr>
<td>Consider specializing in psychiatry</td>
<td>45.7 (21)</td>
<td>50.0 (15)</td>
</tr>
</tbody>
</table>
Exploration of Explanatory Variables

The data were explored for possible explanatory variables. Overall, it was found that the various demographic differences did not result in significant differences between groups in knowledge or attitudes. To analyze the effects of gender, consideration of specializing in psychiatry, role of friend/relative with mental illness, and self-reported mental illness, 2-sample t tests were calculated. These compared groups within each of the datasets, and the significance threshold was adjusted to $P < 0.006$ (alpha divided by 8) for the pretest data and $P < 0.01$ (alpha divided by 4) in the postcourse data to correct for multiple tests. There was no difference in the means for knowledge and attitudes for males versus females (knowledge 17.07 vs 15.19, $P = 0.29$ and attitudes 20.60 vs 15.06, $P = 0.09$). Those considering specializing in psychiatry had a higher mean knowledge compared with those not considering specializing in psychiatry (16.81 vs 15.80, $P < 0.001$). There was no difference in attitudes (20.61 vs 13.72, $P = 0.02$). There was no significant difference in knowledge of ECT and attitudes toward ECT between students who did and did not have a friend or relative diagnosed with a mental illness or if they themselves had been diagnosed with a mental illness (Table 3).

**DISCUSSION**

This study found that the TELT session improved the knowledge and attitudes of medical students toward ECT. In particular, knowledge about how ECT is delivered and indications for its use improved in the postcourse questionnaire.

Fundamental knowledge of ECT improved after engagement with the learning resource. For instance, knowledge about the use of general anesthesia and that ECT caused a seizure all improved after the teaching session. Students could also identify misinformation such as ECT being painful and causing burns, showing an improvement in knowledge.

Our findings are similar to and build on other studies in the field. For example, Benbow found that 85% of medical students believed that ECT was a helpful and useful treatment after direct exposure to patients who had benefitted from ECT. Kitay and colleagues reported that medical students' knowledge of and attitude toward ECT improved when they had experience of a lecture about ECT, which had video content embedded within it.

**Strengths and Limitations**

Strengths include that the questionnaire measured both knowledge and attitudes independently. The educational resource was independently piloted before it was shown to students. The learning material was developed as a resource that could be engaged for independent online study, and it was this approach that was used for the piloting process. It would be valuable to establish if there is greater value in offering a facilitated learning session with a psychiatric specialist than undertaking a distance learning session independently.

Limitations include that the questionnaire was not piloted prior to the study. Response rate was low with fewer medical students completing the postcourse questionnaire than the precourse questionnaire. Almost half of students indicated an interest in...
specializing in psychiatry, which is likely not representative of the wider medical student cohort. It was also not possible to match participants between the precourse and postcourse datasets; the solution adopted was to use the precourse data as a baseline measure; however, that limits the ability to generalize findings beyond the current cohort. Future work in which the questionnaire is administered prior to teaching across a wider range of students would help to establish a more robust baseline for the comparison.

Conclusion and Future Work

In this study, medical students’ knowledge and attitudes toward ECT appeared to be positively impacted by the TELT session, which focused on ECT. Results were suggestive of knowledge improving more than attitudes. Given the positive impact the session had on medical students' knowledge and attitudes toward ECT, it remains important to include learning resources focused on ECT within the curriculum taught to medical students irrespective of their intention to specialize in psychiatry. Future work may involve evaluating which components of the TELT session are most beneficial at improving knowledge of and attitudes toward ECT and if improvements are sustained over a prolonged time.

REFERENCES


