Attitudes Toward Tuberculosis of Final Year Medical Students From Canada, India, and Uganda

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**Background:** Tuberculosis, although both preventable and treatable, continues to be the world’s leading cause of death from an infectious agent.

**Purpose:** To extend the results of our previous study of knowledge and practices of final year medical students regarding tuberculosis at three medical schools from endemic and nonendemic areas and to describe their attitudes.

**Methods:** Eight statements assessing attitudes, as part of a larger survey, were administered to final year medical students at McMaster University in Canada, Christian Medical College in India, and Makerere University in Uganda.

**Results:** One hundred sixty surveys were returned with 155 completed attitude responses. The response rate was 68.4% (65 of 95) for McMaster University, 39.7% (23 of 58) for the Christian Medical College, and 78.3% (72 of 92) for Makerere University. Analysis showed that six of eight attitude items were slightly statistically different among the schools with minimal effect of curriculum time and patient exposure.

**Conclusions:** Despite quite varied exposure to tuberculosis, students from endemic and nonendemic areas responded similarly on statements addressing attitudes toward tuberculosis.

Tuberculosis, although both preventable and treatable, continues to be the world’s leading cause of death from an infectious agent. In 1993, the World Health Organization declared a world emergency concerning tuberculosis, with an estimated one third of the world’s population infected. If global control of tuberculosis does not improve, the annual incidence is expected to increase by 41% (range, 21%–61%) between 1998 and 2020 (from 7.4 million to 10.6 million cases per year).

With tuberculosis on the rise, physicians are seeing an increasing number of patients with the disease. Previous studies have shown that physicians manage tuberculosis less than optimally and require further training. Although extensive research has described
physicians’ knowledge and practices regarding tuberculosis, little has addressed attitudes specifically. The literature regarding other infectious diseases and related public health interventions clearly shows that attitudes play an integral role in how physicians relate to and manage patients with communicable diseases.\(^7\)–\(^10\)

Despite the resurgence of tuberculosis, no information is available that examines the competence of medical school graduates in providing appropriate and comprehensive care for patients with tuberculosis. Therefore, we surveyed final year medical students at three medical schools from endemic and nonendemic areas regarding their knowledge, practices, and attitudes toward tuberculosis. The knowledge and practices portion of the survey was reported previously\(^11\) and demonstrated significant differences in undergraduate exposure to tuberculosis, total knowledge, and practice competency at medical schools in Canada, India, and Uganda. In general, the knowledge base and practice competency of all three graduating classes were adequate.

Here, we report on the attitudes of these students. We hypothesized that students from endemic areas would have higher levels of awareness and therefore would be more receptive to issues pertaining to tuberculosis than their peers from nonendemic areas.

**Methods**

The survey was administered to all final year medical students in the last months of each student’s training during a 6-month period from November 1998 to April 1999. The three institutions surveyed were McMaster University in Canada, the Christian Medical College in India, and Makerere University in Uganda. Ethics approval for the project was obtained at each of the study sites. Participation was voluntary and confidentiality was ensured, because no identifying data were required of the participants. Students were provided with tokens of appreciation for participating in the study. At McMaster University, coffee was provided and questions were answered after the surveys were completed. In India, several textbooks were donated to the main medical library at the suggestion of the students. In Uganda, students were provided with refreshments, and a monetary donation of approximately $100 Canadian dollars was given to the Makerere Medical Student Council to be used at their discretion.

The questionnaire consisted of 20 multiple-choice questions evaluating knowledge, practices, and exposure\(^11\) and eight statements assessing attitudes. For the attitude statements, students were asked to identify the degree to which they agreed with each item on a 5-point Likert scale ranging from 1 (strongly agree) to 5 (strongly disagree) adapted from a study by Sugarman et al.\(^12\) The initial survey was critiqued by a panel of experts in the fields of statistics and epidemiology, community medicine, family medicine, public health, and respirology. The survey then was pilot tested by students in Hamilton and India, none of whom were included in the study population.

**Results**

A total of 160 surveys were returned. The attitude results were based on the 155 with completed attitude responses. The response rate was 68.4% (65 of 95) for McMaster University, 39.7% (23 of 58) for the Christian Medical College, and 78.3% (72 of 92) for Makerere University. Due to the anonymous nature of the survey, we had no information about the nonresponders.

**Statistical Analysis**

To examine the hypothesis that school and country differences may influence exposure to tuberculosis and hence attitudes toward patients who host the disease, it was important to establish some evidence of construct validity.

Three main statistical procedures were used to measure the construct validity. Analysis of variance and analysis of covariance designs were used to compare mean (both unadjusted and adjusted) country and school differences. Pearson correlation coefficients were used to measure the degree of association between potential causal factors (i.e. knowledge) and the attitudinal outcome measures. Chi-square tests of significance were used to look at categorical differences among the three schools in terms of exposure to tuberculosis (either through curriculum or in the clinical context).

**Attitudes**

The eight statements used to assess the students’ attitudes toward tuberculosis addressed issues relating to (a) epidemiology, (b) reporting of infectious cases, (c) isolation of infectious cases, (d) legal measures for noncompliant infectious cases, (e) autonomy of patients with infectious multiple-drug-resistant (MDR) tuberculosis, (f) noncompliance, (g) right to refuse to provide care for patients with infectious disease, and (h) occupational risk.

The following means are for McMaster University, the Christian Medical College, and Makerere University, respectively, with lower scores indicating greater agreement with the statement (Table 1). The majority of students did not believe that tuberculosis is a problem only for developing countries (4.12, 3.39, 3.59). Most students readily agreed with notification of infec-
### Table 1. Mean Ratings of Attitude Items

<table>
<thead>
<tr>
<th>Item</th>
<th>Canada, McMaster University&lt;sup&gt;a&lt;/sup&gt;</th>
<th>India, Christian Medical College&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Uganda, Makerere University&lt;sup&gt;c&lt;/sup&gt;</th>
<th>M&lt;sup&gt;d&lt;/sup&gt;</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Epidemiology</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Tuberculosis (TB) is only a problem in developing countries.</td>
<td>4.12</td>
<td>3.39</td>
<td>3.59</td>
<td>3.78</td>
<td>F(2, 152) = 5.50 p = .0049</td>
</tr>
<tr>
<td></td>
<td>0.121</td>
<td>0.293</td>
<td>0.156</td>
<td>0.097</td>
<td>SEM</td>
</tr>
<tr>
<td><strong>Rights of individual versus society (2–5)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Physicians should have to notify the public health department of people with active, pulmonary TB.</td>
<td>1.60</td>
<td>2.30</td>
<td>1.98</td>
<td>1.87</td>
<td>F(2, 152) = 3.29 p = .0398</td>
</tr>
<tr>
<td></td>
<td>0.140</td>
<td>0.269</td>
<td>0.136</td>
<td>0.093</td>
<td>SEM</td>
</tr>
<tr>
<td>3. Patients with active, pulmonary TB should be kept in a special center just for patients with TB until they are cured.</td>
<td>3.67</td>
<td>3.56</td>
<td>3.25</td>
<td>3.47</td>
<td>F(2, 152) = 1.75 p = .1765</td>
</tr>
<tr>
<td></td>
<td>0.131</td>
<td>0.272</td>
<td>0.169</td>
<td>0.101</td>
<td>SEM</td>
</tr>
<tr>
<td>4. Patients with active, pulmonary TB who stop taking their medications should be legally forced to.</td>
<td>3.00</td>
<td>2.91</td>
<td>2.70</td>
<td>2.85</td>
<td>F(2, 152) = 1.28 p = .2815</td>
</tr>
<tr>
<td></td>
<td>0.149</td>
<td>0.273</td>
<td>0.155</td>
<td>0.100</td>
<td>SEM</td>
</tr>
<tr>
<td>5. Patients with active, multidrug resistant TB should be allowed to make their own decisions about their treatment even if they do not follow their physician’s orders.</td>
<td>3.56</td>
<td>3.78</td>
<td>4.35</td>
<td>3.94</td>
<td>F(2, 152) = 9.05 p = .0002</td>
</tr>
<tr>
<td></td>
<td>0.135</td>
<td>0.251</td>
<td>0.117</td>
<td>0.088</td>
<td>SEM</td>
</tr>
<tr>
<td><strong>Treatment Failure</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Patient non-compliance is the biggest factor contributing to treatment failure.</td>
<td>2.24</td>
<td>1.65</td>
<td>1.59</td>
<td>1.86</td>
<td>F(2, 152) = 10.81 p = .0000</td>
</tr>
<tr>
<td></td>
<td>0.122</td>
<td>0.204</td>
<td>0.100</td>
<td>0.076</td>
<td>SEM</td>
</tr>
<tr>
<td><strong>Perceived Risk and Professional Obligation (7–8)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Medical students should be able to refuse to care for a patient who has active, pulmonary TB.</td>
<td>3.64</td>
<td>4.30</td>
<td>4.12</td>
<td>3.95</td>
<td>F(2, 152) = 4.06 p = .0192</td>
</tr>
<tr>
<td></td>
<td>0.146</td>
<td>0.212</td>
<td>0.129</td>
<td>0.090</td>
<td>SEM</td>
</tr>
<tr>
<td>8. Medical personnel who work with TB patients have a significantly higher chance of getting TB.</td>
<td>2.23</td>
<td>2.21</td>
<td>1.84</td>
<td>2.05</td>
<td>F(2, 152) = 3.57 p = .0304</td>
</tr>
<tr>
<td></td>
<td>0.117</td>
<td>0.251</td>
<td>0.096</td>
<td>0.074</td>
<td>SEM</td>
</tr>
</tbody>
</table>

Note: SEM = standard error of the mean. A 5-point Likert scale from 1 (strongly agree) to 5 (strongly disagree) was used. The lower the score, the higher the agreement with the statement.

<sup>a</sup>n = 63; <sup>b</sup>n = 23; <sup>c</sup>n = 69; <sup>d</sup>n = 155.
tious cases (1.60, 2.30, 1.98) but were more reluctant to support stronger measures such as isolation (3.67, 3.56, 3.25) and enforcement of medication compliance (3.00, 2.91, 2.70). Students were less willing to allow patients with infectious MDR to make their own decisions regarding medical treatments (3.56, 3.78, 4.35). Patient noncompliance was agreed to be the biggest factor in treatment failure (2.24, 1.65, 1.59). Although students acknowledged the increased occupational risk for those working with tuberculosis patients (2.23, 2.21, 1.84), they did not support the right to refuse to care for patients with the disease (3.64, 4.30, 4.12). A one-way analysis of variance by school for each of the attitude items indicated that six of the eight items showed a statistically significant difference among the school means (Table 1). Although statistically significant, the mean differences were less than 1 point on a 5-point scale.

Education and Exposure

Tables 2 and 3 show the number of curriculum hours devoted to tuberculosis and the number of patients with active tuberculosis seen by students in the 6 months before the survey. Eighty percent (56 of 70) of Makerere students and 65% (15 of 23) of Christian Medical College students reported that greater than 7 curricular days had been spent on tuberculosis. McMaster students estimated that significantly less time was spent on tuberculosis education, with 94% (61 of 65) of respondents indicating a maximum of 8 hours of curricular time, Yates corrected $\chi^2(8, N = 158) = 116.987, p = .0000$. In the previous 6 months, students from Makerere and the Christian Medical College had seen significantly more patients with tuberculosis than students at McMaster, Yates corrected $\chi^2(6, N = 160) = 156.721, p = .0000$. Seventy-six percent (55 of 72) of Makerere students estimated they had seen >25 patients, 91% (21 of 23) of Christian Medical College students had seen >10 patients, and 77% (50 of 65) of McMaster students had not seen any patients with tuberculosis.\(^{11}\)

Analysis of covariance revealed that four items showed a trend for a statistically significant effect after adjustment was made for curriculum time, patient exposure, and a combination of both variables. Although significant, the means changed only slightly. The association between individual attitude items and exposure (curriculum time and patient contact) was weak, with Pearson correlations of <.30 for any given exposure-attitude variable pair. The greater the exposure, the more likely students from Makerere and the Christian Medical College agreed with stronger measures for patients and the right to refuse to care for patients with active tuberculosis.

Discussion

Our study has shown that despite quite varied exposure to tuberculosis, students from endemic and nonendemic areas responded similarly on statements addressing attitudes toward tuberculosis. Although we found a significant difference between schools, the magnitude of the difference was less than 1 point on a 5-point Likert scale. Adjustment for curriculum time and patient exposure had only minimal effect on the results.

Epidemiology

With one third of the world’s population infected with tuberculosis, it is the most prevalent infection in the world. Despite the enormity of the problem, few students were able to correctly identify the proportion of the world’s population infected with the disease.\(^{11}\) Although their knowledge of the epidemiology was poor, students generally agreed that tuberculosis is not

Table 2. Reported Curriculum Time Devoted to Tuberculosis

<table>
<thead>
<tr>
<th>Curriculum Time</th>
<th>Canada, McMaster University</th>
<th>India, Christian Medical College</th>
<th>Uganda, Makerere University</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1 hr</td>
<td>26</td>
<td>1</td>
<td>0</td>
<td>27</td>
</tr>
<tr>
<td>1–8 hrs</td>
<td>35</td>
<td>2</td>
<td>5</td>
<td>42</td>
</tr>
<tr>
<td>2–3</td>
<td>3</td>
<td>2</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>4–7</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>&gt;7 days</td>
<td>0</td>
<td>15</td>
<td>56</td>
<td>71</td>
</tr>
<tr>
<td>Total</td>
<td>65</td>
<td>23</td>
<td>70</td>
<td>158</td>
</tr>
</tbody>
</table>


Table 3. Reported Number of Patients With Active Tuberculosis Seen by Students in Previous 6 Months

<table>
<thead>
<tr>
<th>Number of Patients</th>
<th>Canada, McMaster University</th>
<th>India, Christian Medical College</th>
<th>Uganda, Makerere University</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>50</td>
<td>1</td>
<td>0</td>
<td>51</td>
</tr>
<tr>
<td>&lt;5</td>
<td>14</td>
<td>1</td>
<td>0</td>
<td>15</td>
</tr>
<tr>
<td>10–20</td>
<td>0</td>
<td>12</td>
<td>17</td>
<td>29</td>
</tr>
<tr>
<td>&gt;25</td>
<td>1</td>
<td>9</td>
<td>55</td>
<td>65</td>
</tr>
<tr>
<td>Total</td>
<td>65</td>
<td>23</td>
<td>72</td>
<td>160</td>
</tr>
</tbody>
</table>

a problem limited to developing countries. In nonendemic areas where exposure to tuberculosis in clinical situations is limited, it is important to ensure awareness of the disease, particularly in light of global migration patterns.

Rights of Individual Versus Society

The rights of individuals to live as they choose and the right of society to be protected from disease have long been debated in regard to communicable diseases such as tuberculosis. In the past, many in both the medical and lay field feared contact with “consumptives.” Sanatoriums were established away from the general public to isolate and treat infected persons. With the advent of more effective treatments that decreased the duration and degree of infectiousness, the use of sanatoriums was slowly phased out.13,14

The reemergence of tuberculosis raises the same issues that were so hotly debated years ago. Although recognizing the rights of the individual to autonomy and self-determination, public health officials have had to use some coercive measures to minimize the risk of infectious patients.15–18 Reporting of infectious cases, contact tracing, and quarantine all have been used to control tuberculosis. Presently, the World Health Organization endorses universal directly observed therapy short course (DOTS) for all patients with active tuberculosis as a way to ensure completion of treatment.2 The study from which some of the attitude statements were adapted showed that health care workers agreed that noncompliant patients should be compelled legally to undergo treatment but did not agree on the need to isolate patients.12 Students in this sample supported public health notification but were less likely to agree with stronger measures of isolation and enforcement of medication compliance. The Ugandan students who had the greatest experience most closely resembled those results reported by Sugarman et al.12

Both our study and Sugarman et al.’s12 showed that respondents were more comfortable evoking stronger measures for patients with MDR tuberculosis. MDR tuberculosis is becoming increasingly problematic in both developing and developed countries.19,20 Outbreaks reported in the United States demonstrate that treatment is more expensive and complex, mortality is much higher, especially in patients with HIV, and the potential for nosocomial transmission is concerning.21–24

Treatment Failure

The same factors that contribute to the development of MDR tuberculosis also play a major role in treatment failure. Improper regimens, inconsistent drug supply, inadequate access to services, and poor treatment outcome evaluation are far larger contributors to problems with tuberculosis control than is patient noncompliance.25–28 Despite evidence that shows treatment failure is multifactorial, physicians have tended to focus on patient noncompliance without recognizing the complex sociocultural dimension of the problem.26–32 In our study, most students agreed with the statement indicating that patient noncompliance is the biggest factor contributing to treatment failure. Because we did not offer alternative options for treatment failure, it can be argued that students would have agreed with other factors if given the choice.

Perceived Risk and Professional Obligation

Tuberculosis has long been recognized as an occupational risk for health care workers.33 Transmission usually requires close, frequent, or prolonged exposure. The degree of risk is influenced by the prevalence of tuberculosis in the population served, occupational group and responsibility of the worker, effectiveness of control measures, rapidity with which effective treatment is initiated, and susceptibility of the organism to medications.34 Nosocomial transmission can be reduced greatly with proper infection control practices such as air filters, room ventilation, ultraviolet light, masks, and early identification and isolation of infectious cases.34–36

The majority of students were able to correctly identify the primary mode of transmission of the bacillus11 and readily agreed with the statement that medical personnel who work with tuberculosis patients are at higher risk of getting the disease. Although students acknowledged the risk in treating patients with tuberculosis, they did not support a student’s right to refuse to care for such patients (Pearson $r = .0893$). Physicians have always had to balance a sense of duty to care for their patients with the fear of becoming infected with a communicable disease.37–40

Limitations

Because no measure of social desirability was used, we cannot be sure our results represent the true attitudes of students surveyed. Students may have answered in ways that made them seem more aware of tuberculosis or more receptive to dealing with patients with the disease. At the same time, students who had more negative views may have chosen not to answer the questions. Because only five surveys contained incomplete data, this was unlikely to influence the results. The fact that we measured attitudes and exposure concurrently makes it impossible to comment on any temporal relation between the two variables.

The response rate was variable among the different sites. In both Uganda and Canada, all of the students were gathered in one room for a lecture and the survey
could be administered at one sitting. In India, the students were never together at one time; therefore, the survey was delivered to each student at his or her respective placement, making it much more difficult to administer the survey in a controlled setting and to collect it on completion.

Implications

To effectively combat tuberculosis, physicians must be knowledgeable about the disease, competent in the fundamental principles of its management, and receptive to caring for patients with tuberculosis. An integral part of any successful educational program is promotion of compassionate and comprehensive care. The results of this study indicate that students in three countries support public health and professional conduct in the management of the current tuberculosis epidemic. Fostering such positive attitudes is a lifelong process that can be enhanced by encouraging individuals to consider their own attitudes in their continuing education.

References


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