



# Medical students' perceptions on preparedness and care delivery for patients with autism or intellectual disability

## Perceptions des étudiants en médecine quant à leur degré de préparation et à la prestation de soins aux patients autistes ou présentant un handicap intellectuel

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Volume 15, Number 1, 2024

URI: <https://id.erudit.org/iderudit/1110449ar>

DOI: <https://doi.org/10.36834/cmej.76338>

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Publisher(s)

Canadian Medical Education Journal

ISSN

1923-1202 (digital)

[Explore this journal](#)

Cite this article

Bitektine, E., Hintermayer, M., Chen, A., Ko, A. & Rodriguez, C. (2024). Medical students' perceptions on preparedness and care delivery for patients with autism or intellectual disability. *Canadian Medical Education Journal / Revue canadienne de l'éducation médicale*, 15(1), 37–47. <https://doi.org/10.36834/cmej.76338>

Article abstract

**Introduction:** To provide competent care to patients with autism spectrum disorder (ASD) or intellectual developmental disorder (IDD), healthcare professionals must recognize the needs of neurodivergent populations and adapt their clinical approach. We assessed the perceived preparedness of medical students to adapt care delivery for patients with ASD/IDD, as well as their perceptions on neurodiversity education.

**Methods:** We conducted a sequential explanatory mixed-methods study on undergraduate medical students at McGill University during the academic year 2020-2021. We administered an online survey, followed by semi-structured interviews. We analyzed data using descriptive statistics and thematic analysis. We integrated findings at the interpretation level.

**Results:** We included two-hundred-ten survey responses (~29% of class), and 12 interviews. Few students felt prepared to adjust care for patients with ASD/IDD despite most indicating doing so was important. Ninety-seven percent desired more training regarding care accommodation for neurodivergent patients. Thematic analysis unveiled the perception of current insufficient education, and the value of experiential learning.

**Discussion/Conclusions:** This study highlights low perceived preparedness of medical students to accommodate care for neurodivergent patients, and a desire for more instruction. Incorporating interactive training in medical school curricula regarding modifying care delivery for neurodivergent individuals may improve the perceived preparedness of medical trainees to work with these patients and care quality.

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# Medical students' perceptions on preparedness and care delivery for patients with autism or intellectual disability

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Published ahead of issue: Jan 18, 2024; published: Feb 29, 2024. CMEJ 2024, 15(1) Available at <https://doi.org/10.36834/cmej.76338>

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### Abstract

**Introduction:** To provide competent care to patients with autism spectrum disorder (ASD) or intellectual developmental disorder (IDD), healthcare professionals must recognize the needs of neurodivergent populations and adapt their clinical approach. We assessed the perceived preparedness of medical students to adapt care delivery for patients with ASD/IDD, as well as their perceptions on neurodiversity education.

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**Results:** We included two-hundred-ten survey responses (~29% of class), and 12 interviews. Few students felt prepared to adjust care for patients with ASD/IDD despite most indicating doing so was important. Ninety-seven percent desired more training regarding care accommodation for neurodivergent patients. Thematic analysis unveiled the perception of current insufficient education, and the value of experiential learning.

**Discussion/Conclusions:** This study highlights low perceived preparedness of medical students to accommodate care for neurodivergent patients, and a desire for more instruction. Incorporating interactive training in medical school curricula regarding modifying care delivery for neurodivergent individuals may improve the perceived preparedness of medical trainees to work with these patients and care quality.

### Résumé

**Introduction :** Pour fournir des soins compétents aux patients atteints d'un trouble du spectre de l'autisme (TSA) ou d'un trouble du développement intellectuel (TDI), les professionnels de la santé doivent reconnaître les besoins des populations neurodivergentes et adapter leur approche clinique. Nous avons évalué le degré perçu de préparation des étudiants en médecine à adapter la prestation de soins aux patients atteints de TSA/TDI, ainsi que leurs perceptions de la formation relative à la neurodiversité.

**Méthodes :** Nous avons mené une étude séquentielle explicative à méthodes mixtes auprès d'étudiants en médecine de premier cycle de l'Université McGill au cours de l'année universitaire 2020-2021. Nous avons administré un sondage en ligne, suivi d'entretiens semi-structurés. Nous avons analysé les données en faisant appel à la statistique descriptive et à une analyse thématique. Nous avons intégré les résultats sur le plan interprétatif.

**Résultats :** Nous avons inclus deux cent dix réponses à l'enquête (~29% de la classe), et 12 entretiens. Peu d'étudiants se sentaient préparés à adapter les soins aux patients atteints de TSA/TDI, bien que la plupart d'entre eux aient indiqué qu'il était important de le faire. Quarante-vingt-dix-sept pour cent d'entre eux souhaitaient davantage de formation sur l'adaptation des soins aux patients neurodivergents. L'analyse thématique a révélé que les participants considéraient la formation actuelle insuffisante et jugeaient utile l'apprentissage par l'expérience.

**Discussion/Conclusions :** Cette étude met en évidence le faible niveau de préparation perçu par les étudiants en médecine en ce qui concerne l'adaptation des soins aux patients neurodivergents, ainsi que le désir d'une formation plus poussée. L'intégration dans les programmes des facultés de médecine d'une formation interactive portant sur la modification de la prestation des soins pour les personnes neurodivergentes pourrait améliorer la perception des étudiants en médecine de leur degré de préparation à travailler avec ce type de patients et de la qualité des soins.

## Introduction

Patients with autism spectrum disorder (ASD) or intellectual developmental disorder (IDD) present with unique healthcare needs and utilize healthcare services more than neurotypical individuals.<sup>1-5</sup> These populations report dissatisfaction with the healthcare system and unmet healthcare needs,<sup>6-9</sup> partly attributable to providers' insufficient knowledge regarding challenges that neurodivergent patients face, and a lack of care delivery accommodation.<sup>10-13</sup> To improve care quality, deficits in the perceived preparedness of healthcare professionals with respect to the unique needs of neurodivergent patients should be assessed from the initial stages of undergraduate education.

Incorporating neurodivergent patient training into the undergraduate medical curriculum is opportunistic since medical students subsequently pursue diverse residency programs. At McGill University, training on this topic is limited to one lecture in pre-clerkship and a non-interactive session on ASD during clerkship family medicine rotations. A survey administered to Canadian medical students highlighted widespread support for more IDD training, with 70% believing that additional clinical contact with these patients would improve medical education.<sup>14</sup> However, very little is known about student perceptions regarding modifying care delivery for neurodiverse patients.

To fill this knowledge gap, we examined the perceived preparedness of medical students at a large Canadian university to work with patients with ASD and IDD in a clinical setting. This study was guided by two research questions:

1. What is the perceived preparedness of medical students in modifying care delivery for neurodivergent patients?
2. What training do medical students report concerning care delivery for neurodivergent populations, and how do they believe that this training could be improved?

## Methods

### Research design

We conducted a sequential explanatory mixed methods study<sup>15</sup> by gathering survey responses and conducting follow-up qualitative interviews. This study received approval from the McGill Faculty of Medicine and Health Sciences ethics review board (#A03-B29-21B (21-03-046)).

### Study population

We invited all medical students (Years 1-4 in Spring 2021;  $N = 720$ ) at McGill University to participate. We excluded non-medical students (i.e. dentistry students), those who did not complete the survey's demographics section, or those who indicated more than one current year of medical education.

### Data collection phase 1 – survey

We invited all medical students to fill out an electronic survey on Lime Survey software via institutional email addresses and private medical student Facebook groups (April-June 2021). The survey had three sections: 1) demographic information, 2) exposure to, and perceptions of preparedness and importance of care accommodation for patients with ASD or IDD, and 3) perceptions on medical education concerning neurodivergent patients (Appendix A). We adapted questions regarding exposure to neurodivergent populations and perceptions on education from Burge and colleagues.<sup>14</sup> We administered the questionnaire to peers peripherally involved in the project to verify question interpretation. We invited participants to indicate their willingness to be subsequently interviewed. As an incentive, gift cards were offered. Eight randomly selected survey respondents received a \$10 gift card.

### Data collection phase 2 – interviews

During survey completion, eighteen students initially volunteered to be interviewed, and twelve were subsequently available. We conducted semi-structured virtual interviews from August to October 2021. We recorded interviews with participants' consent and manually transcribed them verbatim.

### Data analysis

We used GraphPad Prism for data visualization and statistical analysis of survey data. We reported means and standard errors, or percentage of respondents where indicated. Statistical comparisons consisted of two-way analysis of variance (ANOVA) with Tukey *post hoc* test as described throughout the results section. For the interviews, EB and AK independently coded the data then identified and tabulated subthemes using an inductive semantic thematic analysis approach.<sup>16</sup> MAH then determined subtheme equivalence. In team discussions, the research team clustered subthemes into major theme categories. We used a sequential explanatory mixed method design to integrate qualitative and quantitative results, which we obtained interdependently.<sup>17</sup>

We conducted and analyzed 12 interviews. No new ideas or subthemes were identified after the 9<sup>th</sup> interview, indicating that we reached data saturation. We identified and summarized similarities and differences between both components.

## Results

Two-hundred-ten participants (~29% of the study population) completed the questionnaire, with four participants excluded for not meeting our eligibility criteria. Most respondents were pre-clerks (69%), and a majority (70%) identified as female (Table 1). Twelve students were subsequently interviewed (Table 2).

From the interview data analysis, we identified 10 subthemes which we clustered into five major theme categories (Table 3). We integrated these data throughout the results section along with quantitative data.

### Varied exposure to neurodivergent patients

Less than half of the respondents indicated that they had interacted with individuals with ASD (39.0%) or IDD (33.3%) in a professional setting. Clerks reported almost double the professional exposure (ASD: 59.1%; IDD 48.5%) than pre-clerks (ASD: 29.9%; IDD: 26.4%). Eight interviewees described non-medical experiences with neurodivergent

populations, including tutoring and camp counselor experiences. Three participants shadowed physicians working with neurodivergent populations and one student highlighted this experience as particularly impactful.

### Perceived ill-preparedness to accommodate care for neurodivergent patients

Nearly all respondents indicated that adjusting communication or physical exam for a neurodivergent patient is highly important ( $\geq 8/10$ ), but few felt prepared to do so (Figure 1A). This is reflected in the identification of the theme *Importance of modifying care for neurodiverse patients*. The wo-way ANOVA showed a main effect of education level on perceived preparedness to accommodate care for patients with neurodivergence ( $F(1,656)=24.61, p < 0.0001$ ). Tukey *post hoc* test confirmed that clerks had greater perceived preparedness than pre-clerks to modify their clinical approach for patients with ASD/IDD ( $p = 0.013$ ; Figure 1B). Interview thematic analysis showed a *perceived lack of preparedness to work with neurodivergent patients*, with more than half ( $n = 8$ ) of interviewees feeling inadequately prepared. Participants mentioned feeling “anxious,” “not well equipped,” “awkward” or stated, “I really don’t feel prepared at all.”

Table 1. Participant demographic characteristics: survey

| Parameter             | Response Frequency: number of responses (percentage of total) |                |                          |                             |                             |              |
|-----------------------|---------------------------------------------------------------|----------------|--------------------------|-----------------------------|-----------------------------|--------------|
| Gender                | <b>Female</b>                                                 | <b>Male</b>    | <b>Nonbinary</b>         | <b>Prefer not to Answer</b> | <b>Other</b>                |              |
|                       | 147 (70.3%)                                                   | 57 (27.3%)     | 0 (0.0%)                 | 4 (1.9%)                    | 1 (0.5%)                    |              |
| Age (years)           | <b>20-29</b>                                                  | <b>30-39</b>   | <b>40-49</b>             | <b>&gt;49</b>               | <b>Prefer not to Answer</b> | <b>Other</b> |
|                       | 189 (91.3%)                                                   | 15 (7.2%)      | 0 (0.0%)                 | 0 (0.0%)                    | 3 (1.4%)                    | 0 (0.0%)     |
| Ethnicity             | <b>Caucasian</b>                                              | <b>Black</b>   | <b>Asian</b>             | <b>Hispanic</b>             | <b>Prefer not to Answer</b> | <b>Other</b> |
|                       | 137 (65.2%)                                                   | 3 (1.4%)       | 39 (18.6%)               | 0 (0%)                      | 13 (6.2%)                   | 18 (8.6%)    |
| Year of Study         | <b>Med 1</b>                                                  | <b>Med 2</b>   | <b>Med 3</b>             | <b>Med 4</b>                |                             |              |
|                       | 59 (28.1%)                                                    | 85 (40.5%)     | 30 (14.3%)               | 36 (17.1%)                  |                             |              |
| Residency Acceptance* | <b>Family Medicine</b>                                        | <b>Surgery</b> | <b>Internal Medicine</b> | <b>Pediatrics</b>           | <b>Psychiatry</b>           | <b>Other</b> |
|                       | 8 (22.2%)                                                     | 7 (19.4%)      | 7 (19.4%)                | 2 (5.6%)                    | 1 (2.8%)                    | 11 (30.6%)   |

\*Only applies to fourth-year medical students.

Table 2. Participant demographic characteristics: interviews

| Parameter     | Response Frequency: number of responses (percentage of total) |               |              |              |           |
|---------------|---------------------------------------------------------------|---------------|--------------|--------------|-----------|
| Gender        | <b>Female</b>                                                 | <b>Male</b>   | <b>Other</b> |              |           |
|               | 8 (66.7%)                                                     | 4 (33.3%)     | 0 (0.0%)     |              |           |
| Age (years)   | <b>20-29</b>                                                  | <b>&gt;30</b> |              |              |           |
|               | 12 (91.3%)                                                    | 0 (0.0%)      |              |              |           |
| Year of Study | <b>Med 1</b>                                                  | <b>Med 2</b>  | <b>Med 3</b> | <b>Med 4</b> | <b>R1</b> |
|               | 0 (0.0%)                                                      | 6 (50.0%)     | 5 (41.7%)    | 0 (0.0%)     | 1 (8.3%)  |

Table 3. Subthemes extracted from interview analysis clustered into major theme categories.

| Subthemes                                                                                      | Major Theme Categories                                                                                    |
|------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|
| The importance of interacting with ND population                                               | Perceived importance of practicing interacting with ND patients - the value of exposure to ND individuals |
| The value of personal and professional experiences in working with ND patients                 |                                                                                                           |
| Usefulness of workshops as an interactive educational component                                |                                                                                                           |
| ND patients involved in lectures, workshops, and small group activities                        | Perceived importance of including ND patients in educational program development and execution            |
| Having patience when working with ND population                                                | Importance of modifying care for ND patients                                                              |
| Caregiver involvement as an important method for understanding lived experience of ND patients |                                                                                                           |
| The need to modify communication and/or environment for ND patients                            |                                                                                                           |
| Importance of not infantilizing ND patients, and including them in discussions                 |                                                                                                           |
| Perceived insufficient education on ND patient care                                            | Perceived insufficient education on ND patient care                                                       |
| Perceived lack of preparedness to work with ND patients                                        | Perceived lack of preparedness to work with ND patients                                                   |

"ND" is used to refer to the word "neurodivergent"

### Perceived need for improving medical training regarding neurodivergence

Whereas 16% of respondents reported receiving formal training, 97.4% indicated that they would benefit from training on this topic (Figure 1C). Students indicated a preference for direct interactions with neurodivergent individuals (67.9%) compared to small group activities (50%), lectures (35.4%), and role-playing (34.4%) (Figure 1D).

We identified the theme of insufficient education on neurodivergent patient care, with all interviewees reporting that training needs improvement. Responses included: "Absolutely! It [education] needs to exist." (Participant #10), "I think it [training] needs to improve, I think there is almost nothing about it [neurodivergence] [...]" (Participant #12). Interviewees suggested various training modalities, including direct interactions, simulation activities, and workshops, informing the theme: importance of practicing interacting with neurodivergent patients – the value of exposure to neurodivergent individuals.

Similarly, we identified the importance of including neurodivergent patients in educational program development and execution. Participants mentioned the importance of hearing about patient experiences directly from neurodivergent individuals and having them contribute to teaching materials.

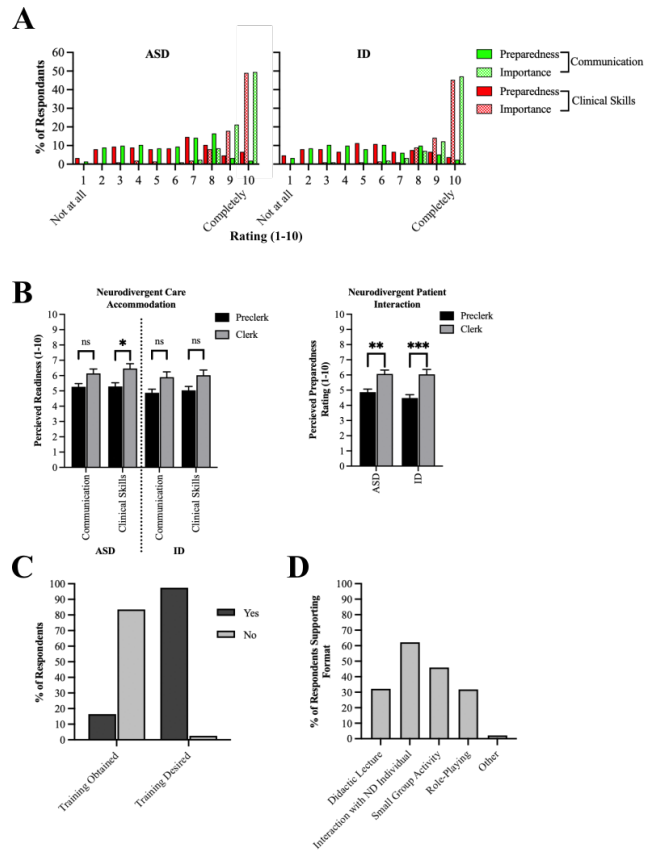


Figure 1. Medical student perceived preparedness for working with neurodiverse patients and perceptions on medical education regarding neurodivergent patients.

(A) Medical student perceived preparedness to modify communication or clinical skills when working with neurodiverse patients. Preparedness (solid colour) and importance (dashed colour) ratings on a scale from 1 (not at all) to 10 (completely) regarding communication (red) or clinical skills (green) accommodation. (B) Perceived preparedness of pre-clerk or clerk students to modify their communication or clinical exam skills to accommodate the needs of a patient with ASD or IDD. Medical student preparedness for interacting with an ASD or IDD patients at the time of completing the survey. Error bars represent standard errors of the mean (SEM). \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ . (C) Percentage of respondents indicating that they have or have not received any formal training regarding working with neurodiverse patient groups (Training Obtained) and percentage that do or do not believe that additional training would be beneficial to themselves and their peers (Training Desired). (D) Preferred educational formats for training on providing care for neurodiverse patients, expressed as total percentage of respondents supporting that method of education.

## Discussion

Neurodivergent patients experience lower care quality.<sup>6,12</sup> Their perception of poor care is produced by inadequacies in communication and care accommodation by healthcare workers.<sup>18</sup> Our study found that medical students believe that they have insufficient exposure to neurodivergent patients throughout the medical curriculum and are inadequately prepared to accommodate care delivery for them. Our study also reports that medical students acknowledge the importance of accommodating care for neurodivergent patients and expressed a nearly unanimous desire for more education on this topic.

Whereas a few participants reported having formal training on care accommodation for neurodivergent patients, nearly all indicated that such education would be beneficial. This corroborates findings by other groups reporting strong interest in training about neurodivergence.<sup>14,19</sup> Our respondents strongly agreed that modifying communication or clinical skills is important, yet their perceived preparedness to implement modifications is low. As evidenced in postgraduate psychiatry education, improving education on care for patients with one type of neurodivergence can improve the competency of healthcare professionals when working with diverse patients more broadly.<sup>20</sup> Based on the findings of this study, we suggest that this training occurs at the undergraduate level to include trainees who will pursue many different specialties.

Respondents indicated a strong preference for experiential learning opportunities such as workshops and interactions with neurodivergent patients. This result echoes findings in a previous report that identified the 'need for exposure' as key in promoting confidence when working with this population.<sup>21</sup> Notably, medical students value the involvement of neurodivergent individuals in the development of educational programs about neurodivergence which is consistent with previous literature highlighting the learning benefits of involving patients in medical education.<sup>22,23</sup>

### Limitations

As is frequently reported in social sciences experiments, our survey had predominantly female respondents, with an overrepresentation of pre-clerks. Pre-clerks have fewer encounters with patients, which might overstate the lack of preparedness in interacting with patients with neurodivergence. However, with the exception to modifying clinical skills for ASD patients, pre-clerks and clerks did not significantly differ in their perceived preparedness to modify clinical encounters for patients with neurodivergence. Further, we conducted our study during the COVID-19 pandemic, which affected students' clinical experiences. However, clerks still rotated in clinical settings and the knowledge-based curriculum was adapted to a virtual platform. Although we had a solid response rate amongst all medical students (~29%), those who responded might have an interest in advocating for and learning about neurodivergent populations. As is the case in mixed-methods studies, only a small subset of our survey participants agreed to participate in follow-up interviews. That said, the interviews consistently aligned with the findings obtained in the quantitative phase of the study.

Although our findings are likely to be generalizable to other undergraduate medical schools in Canada, we sampled students from a single large medical school. A larger study involving other Canadian universities would provide a broader perspective on the state of healthcare education in medical schools for neurodivergent patients.

## Conclusion

In this investigation, medical students perceived themselves as inadequately prepared to modify care for patients with neurodivergence and showed interest in obtaining more education on care delivery accommodation, especially in the form of patient interactions. Importantly, the results point out the students' interest in the involvement of neurodivergent patients' participation in instructional design. Efforts to improve education on this topic may positively contribute to the perceived preparedness of medical trainees to accommodate care for patients with neurodivergence, which may improve care quality and patient satisfaction.

**Funding:** The authors received no funding specifically for this project. Funding for gift cards for survey participants was obtained from McGill club Diverging Minds.

**Conflicts of interest:** At the beginning of the project, the authors EB, MAH, and AC were involved in McGill Student Society affiliated Diverging Minds student group, which is working on implementing a workshop for medical students about interacting with neurodivergent populations. C Rodriguez is an editor for CMEJ. She was not involved in any editorial decisions for this submission. No other conflicts of interest to declare.

**Authorship:** E Bitektine and MA Hintermayer contributed equally as co-first authors.

**Edited by:** Henry Moon (section editor); Cindy Schmidt (senior section editor); Marcel D'Eon (editor-in-chief)

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## Appendices

### Appendix A.

Thank you for agreeing to complete our short questionnaire. The purpose of this study is to assess the perceived preparedness level of medical trainees in providing medical care for individuals with autism spectrum disorders and intellectual disability. Completion of this survey should take approximately 15-30 minutes and should be completed in one sitting.

Your participation in this study is completely voluntary and anonymous. You may skip any questions on this questionnaire. Thank you for your time! Your participation is greatly appreciated.

**I consent to my participation in the current survey and understand that I may discontinue at any time. (Check box)**

#### **Part A - Demographic information.**

1. Please describe your educational level as of Spring 2021.
  - a. MDCM Year 1
  - b. MDCM year 2
  - c. MDCM year 3
  - d. MDCM year 4
2. For those starting residency in Fall 2021, indicate the residency program you have been accepted to.
  - e. Not applicable
  - f. Surgical specialty
  - g. Internal medicine
  - h. Family medicine
  - i. Obstetrics and gynecology
  - j. Psychiatry
  - k. Pediatrics
  - l. Neurology
  - m. Emergency medicine
  - n. Other (please specify)
  - o. I prefer not to answer
3. Please indicate your age range.
  - p. 20-29
  - q. 30-39
  - r. 40-49
  - s. 50 or older
  - t. I prefer not to answer
4. Please describe ethnicity.
  - u. Caucasian
  - v. Black
  - w. Asian
  - x. Hispanic
  - y. Other (please specify):
  - z. I prefer not to answer
5. Please describe your gender.
  - aa. Female
  - bb. Male
  - cc. Non-binary
  - dd. Other (please specify):
  - ee. I prefer not to answer

#### **Part B - Autism Spectrum Disorder**

This section will ask you questions regarding your clinical encounters with individuals who have autism spectrum disorders (ASD). For the purposes of this survey, ASD should be formally diagnosed, and is defined as a condition that involved persistent challenges in social interaction, speech and nonverbal communication, and restricted/repetitive behaviors.

6. How would you describe your general knowledge of autism spectrum disorder (ASD)?
  - ff. Very informed



- gg. Somewhat informed
- hh. Limited information
- ii. No information

7. Do you have or have you had interactions with individuals with ASD in a professional setting?

- jj. Yes
- kk. No

8. Do you have or have you had personal interactions (family member, friend...) with individuals with ASD?

- ll. Yes
- mm.No

9. How prepared would you be to modify your communication from verbal any other communication method (i.e., visual aids, hand motions, eye contact, written word...) if it were required by a patient? Please rate on a scale of 1-10, with 1 being not prepared at all and 10 being completely prepared.

10. How important do you believe it is to modify your communication from verbal to another communication method, if it were required by a patient? Please rate on a scale of 1-10, with 1 being not important at all and 10 being extremely important.

11. How prepared would you be to modify a physical examination or clinical environment, if it were requested by a patient or care giver due to anxiety, sensory overstimulation or any other problems or concerns? Please rate on a scale of 1-10, with 1 being not prepared at all and 10 being completely prepared.

12. How important do you think it is to modify a physical examination or clinical environment, if it were requested by a patient or caregiver due to anxiety, sensory overstimulation or any other problems or concerns? Please rate on a scale of 1-10, with 1 being not important at all and 10 being extremely important.

13. Do you feel prepared to interact with in patients with ASD in the clinical setting?

Please rate on a scale of 1-10, with 1 being not prepared at all and 10 being completely prepared.

14. How would you go about modifying your communication style when working with someone with ASD?

15. How would you go about modifying your physical exam when working with someone with ASD?

### **Part C - Intellectual Disability (ID)**

This section will ask you questions regarding your clinical or personal encounters with individuals who have intellectual disability (ID). For the purposes of this survey, IDD is defined as a condition that involved problems with general mental abilities that affect functioning in intellectual functioning (such as learning, problem solving, judgement), or adaptive functioning (activities of daily life such as communication and independent living).

1. How would you describe your general knowledge of intellectual disability (ID)?

- a. Very informed
- b. Somewhat informed
- c. Limited information
- d. No information

2. Do you have or have you had interactions with individuals with IDD in a professional setting?

- a. Yes
- b. No

3. Do you have or have you had personal interactions (family member, friend...) with individuals with ID?

- a. Yes
- b. No

4. How prepared would you be to modify your communication from verbal an other communication method (i.e. visual aids, hand motions, eye contact, written word...) if it were required by a patient? Please rate on a scale of 1-10, with 1 being not prepared at all and 10 being completely prepared.

5. How important do you believe it is to modify your communication from verbal to another communication method, if it were required by an IDD patient? Please rate on a scale of 1-10, with 1 being not important at all and 10 being extremely important.

6. How prepared would you be to modify a physical examination or clinical environment, if it were requested by an IDD patient or caregiver due to anxiety, sensory overstimulation or any other problems or concerns? Please rate on a scale of 1-10, with 1 being not prepared at all and 10 being completely prepared.

7. How important do you think it is to modify a physical examination or clinical environment, if it were requested by an IDD patient or caregiver due to anxiety, sensory overstimulation or any other problems or concerns? Please rate on a scale of 1-10, with 1 being not important at all and 10 being extremely important.

8. Do you feel prepared to interact with in patients with IDD in the clinical setting?

Please rate on a scale of 1-10, with 1 being not prepared at all and 10 being completely prepared.

9. How would you go about modifying your communication style when working with someone with ID?

10. How would you go about modifying your physical exam when working with someone with ID?

#### **Part D - Education**

16. Have you received any formal training on the topic of providing care for and adapting to the needs of individuals with ASD and/or IDD in medicine?

nn. Yes

oo. No

17. Do you believe that you or your classmates would benefit from more training on this topic?

pp. Yes

qq. No

18. What do you think is the best way to teach/train on this topic? Check all that apply.

rr. Not applicable

ss. Didactic lecture

tt. Interaction with patients with ASD or ID

uu. Small group activities

vv. Role-playing activities

ww. Other:

#### **Part E - End of survey**

19. Please indicate any additional comments you may have on the topic of this survey.

By participating in this survey, you can opt to be included in a 25\$ gift card draw. You are also able to indicate if you would like to be contacted to participate in a follow-up interview with our research team to elaborate on your experiences when working with neurodivergent populations. Finally, you can provide us with your contact information if you would like to be informed about the results of this survey.

For the opportunity to enter the \$25 gift card draw, to indicate your interest in a follow up interview, or to be contacted regarding the results of this study, please follow this link to the follow-up survey so that your contact information is kept separate from your responses.

#### **Follow up Survey (via a separate link)**

1. I would like to be included in a draw to win one of three \$25 gift cards:

a. Yes (please input your contact information)

i. Name

ii. Email

b. No

2. I would like to be contacted for a follow-up interview to elaborate on your experiences when working with neurodivergent populations.

a. Yes (please input your contact information)

i. Name

ii. Email

b. No

3. I would like to be notified regarding the results of this survey when they are published.

a. Yes (please input your contact information)

i. Name

ii. Email

b. No

## Appendix B. Interview Guideline

*This document serves as a general structural guideline for follow-up interviews with volunteers on Zoom regarding the completed medical student survey.*

### Introduction:

“Hello and thank you for expressing your interest in a follow up interview with us regarding the survey you completed as part of our study. We really appreciate you taking the time to meet with us and elaborate on your responses. We are now displaying the consent form for you to read over if you haven’t already (\*displayed on the Zoom screen\*). The purpose of the interview is to allow you to elaborate on the topic of providing care for neurodivergent patients in healthcare. You may disclose as much or as little information regarding this topic as you like. Throughout the interview we may ask prompting questions to help guide our discussion, but please feel free to discuss any topic that you wish. I remind you that our discussion will remain confidential, in that the insights and quotations obtained will in no way be associated with your name or any identifying features. We will be recording the Zoom call to allow us to compose a transcript of the conversation to do further qualitative analysis. If you do not wish to be video recorded, you can choose to only have your voice recorded during the interview. If you wish direct quotes not to be used, you may indicate so or if after sharing information you wish to retract a statement so that it cannot be used for the study, you may do so.

Please take a moment to read over the consent form if you haven’t already and, once read, indicate whether or not you consent to the interview. If you consent, we will start the recording, at which point we will need you to indicate your consent again so that we have it recorded. Please also feel free to let us know if you have any questions regarding our consent document or the interview.”

### Stage 0: Demographics

*The purpose of this stage is to simply gather basic demographic data from the participants so that their responses can be interpreted in the context of their current level of training.*

1. Can you please indicate your current level of training in the MDCM program, as well as your educational history?
2. Can you indicate your age?
3. Do you have a specific medical specialization that you are interested in pursuing at this point in your training?

### Stage 1: Survey Results and Prepared Comments (if applicable)

*The purpose of stage 1 is to further explain the results obtained from the survey. We will share our Zoom screen to show the interviewee tables and figures summarizing the main results from the survey. This will allow to refresh their memory regarding the survey and allow participants to further elaborate on the survey questions and results. This section will also allow the student to discuss anything that they have pre-emptively wished to discuss, if applicable. This could be a question or topic that they thought of prior to the interview, or one that they had in response to one of the survey questions. We must have the survey questions available so that we can share our Zoom screen and allow the individual to be reminded of the question.*

1. Before we ask you any questions, we wanted to show you a summary of our survey results (\*displayed on Zoom screen\*) to refresh your memory about our survey and allow you to voice any comments you might have regarding survey questions or the results that you see. We want to allow you the opportunity to lead the interview by discussing anything specific that you wished to discuss with us regarding the survey that you completed. If you do not have any specific questions or comments that is okay, but we wanted to ensure that if you had something fresh in your mind that you wished to share that you would have the opportunity to do so.

### Stage 2: Personal and Professional Experiences

*The purpose of stage 2 is to prompt the individual to reflect on their personal and professional exposures and experiences working with individuals with autism spectrum disorder or intellectual disability. Prompting questions:*

1. What can you tell me about your experiences with individuals with autism spectrum disorder or intellectual disability in the healthcare or a personal setting?

- a. The participant might indicate a personal experience. If so, consider asking them how the experience transpired, how it affected them and the people involved, and what they would have liked to be done differently.
2. How do you feel about the idea of providing care to individuals with neurodivergence?
  - a. Do you think it is necessary to modify your approach to care for this patient populations? Why or why not? Bearing in mind that there is a big range in presentation of ASD and ID
  - b. Have you ever needed to modify your approach to care of a neurodivergent individual?
  - c. Any tips or tricks or adaptations you learned through your past interactions with people with autism spectrum disorder or intellectual disability?
  - d. How important do you think these tips and tricks are in improving the clinical encounter with patients with autism spectrum disorder or intellectual disability?

### **Stage 3: Education**

*The purpose of this stage is to assess the interviewee's perceptions on changes that need to occur in the curriculum.*

1. What is your view on, or what has been your experience with the MDCM curriculum with regard to education on this topic?
  - a. Do you think education on this topic is sufficient, or does it need to improve?
2. How do you think should the UGME curriculum go about teaching about this subject?
3. Do you find you and your peers had enough learning opportunities to learn about interacting and adapting the clinical encounter to patients with autism spectrum disorder or intellectual disability?
  - a. What learning opportunities did you have throughout the curriculum regarding interacting with patients with autism spectrum disorder or intellectual disability?

### **Stage 4: Wrap-up**

"Is there anything that we have not yet covered that you would like to discuss?"

### **Stage 5: Conclusion**

Interviewer: "Thank you so much for taking the time to meet with us and discuss your perspectives and experiences. We really appreciate the rich insights that we have gained from our interview with you. If you would like to learn more about our study or be notified when results become available, feel free to let us know and we will add you to our email list. If you find yourself having any questions or concerns regarding your participation in our study today, please feel free to contact us via email at \_\_\_\_\_, and we will be happy to assist you.

If you do not have any further questions or concerns for us, we will end the interview, and wish you a good day."