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# Physician Practice Patterns and Barriers to Counselling on Physical Activity in Solid Organ Transplant Recipients

Authors' Contribution:  
Study Design A  
Data Collection B  
Statistical Analysis C  
Data Interpretation D  
Manuscript Preparation E  
Literature Search F  
Funds Collection G

ADEFG 1 **Amy Pang**  
ABCDEF 1 **Sarangan Lingham**  
ABCDEF 1 **Weina Zhao**  
ADEF 1 **Stephanie Leduc**  
ADE 2 **Agnès Räkel**  
ADE 3,4,5 **Ruth Sapir-Pichhadze**  
ADE 6,7 **Sunita Mathur**  
ACDEG 1,7,8 **Tania Janaudis-Ferreira**

1 School of Physical and Occupational Therapy, McGill University, Montreal, Quebec, Canada  
2 Division of Endocrinology, Department of Medicine, University of Montreal Hospital Center, Montreal, Quebec, Canada  
3 Division of Nephrology and Multi-Organ Transplant Program, Department of Medicine, McGill University Health Centre, Montreal, Quebec, Canada  
4 Metabolic Disorders and Complications, Centre for Outcomes Research and Evaluation, Research Institute of McGill University Health Centre, Montreal, Quebec, Canada  
5 Department of Epidemiology, Biostatistics and Occupational Health, McGill University, Montreal, Quebec, Canada  
6 Department of Physical Therapy, University of Toronto, Toronto, Ontario, Canada  
7 Canadian National Transplant Research Program, Edmonton, Alberta, Canada  
8 Translational Research in Respiratory Diseases Program, Research Institute of The McGill University Health Centre, Montreal, Quebec, Canada

**Corresponding Author:** Tania Janaudis-Ferreira, e-mail: Tania.janaudis-ferreira@mcgill.ca  
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**Background:** Many solid organ transplant (SOT) recipients fail to meet the recommended physical activity (PA) levels. "Physician recommendation" has previously been reported by SOT recipients as a key facilitator to being more physically active. The purpose of this study was to determine the proportion of Canadian SOT physicians providing PA counselling and identify barriers to including such counselling as part of the SOT recipients' routine care.

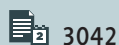
**Material/Methods:** We conducted a cross-sectional web-based survey study to evaluate physicians' PA counselling practices, including the prevalence and barriers to such practice. A survey link was sent to a convenience sample of transplant physicians who are members of the Canadian Society of Transplantation.

**Results:** Thirty-four physicians (13.6%) participated in the survey. While 97% (n=33) of the participants reported providing PA counselling to their transplant patients, only 18% (n=6) responded they were very confident in PA counselling. Lack of time (n=19; 56%) and a lack of exercise guidelines (n=18; 53%) were identified as the main barriers to PA counselling.

**Conclusions:** Incorporating sufficient PA knowledge into physicians' educational curricula system, developing specific PA guidelines as well as establishing an easier referral system to exercise specialists might improve the frequency and quality of PA counselling post-transplant.

**MeSH Keywords:** Counseling • Exercise • Motor Activity • Organ Transplantation • Physician's Practice Patterns

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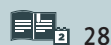
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## Background

Solid organ transplant (SOT) is the therapeutic option for patients with end stage organ failure of the heart, lungs, pancreas, liver, and kidneys. Post-transplant care usually involves long-term follow-up and rehabilitation which are both primordial in the prevention of associated conditions such as infections, rejections, and overall deconditioning [1]. Long-term impairments may include reduced exercise capacity, decreased muscle strength, and increased cardiovascular risk, all of which can be amenable through regular participation in physical activity (PA) and structured exercise [2–7].

Unfortunately, evidence shows that many SOT recipients do not meet the recommended PA level requirements [8–14]. A Canadian survey of 113 SOT recipients showed that 60% of participants were engaging in low levels of PA and 16% had activity levels lower than what has been observed in frail individuals. Additionally, a large portion of those individuals had never engaged in light to strenuous exercise or strengthening exercises [15]. This is important because low levels of PA post-transplant are associated with poor graft function and higher risk of mortality [8,16–18].

In a study examining barriers and facilitators to PA, “Physician recommendation” was previously reported by SOT recipients as a main facilitator to being more physically active [15]. However, previous general medical studies reveal only about 30–50% of the family physicians counsel their patients about exercise [19,20]. Some of the barriers physicians identified included: short patient-physician interaction time [8], feeling of isolation from exercise facilities and other exercise professionals [21], lack of training regarding exercise counselling [22], personal beliefs and barriers regarding exercise [23], communication skills and motivation to use these skills, as well as the health care system’s support of PA [23].

Current research on transplant physicians’ PA counselling practices remains scarce. It is unclear whether transplant physicians involved in the care of SOT recipients counsel their patients on matters of PA, and what the barriers to such practice could be. The purpose of this study, therefore, is to 1) determine the proportion of Canadian SOT physicians providing PA counselling and 2) identify barriers to including such counselling as part of the SOT recipients’ routine care.

## Material and Methods

### Study design

We conducted a cross sectional study and administered an internet-based questionnaire using LimeSurvey™. The detailed questionnaire is shown in Appendix 1.

## Questionnaire development and data collection

Investigators developed a 21-item questionnaire (Appendix 1) which was composed of 6 subsections: A) pre-questionnaire eligibility (1 item); B) consent (1 item); C) demographics (6 items); D) knowledge about physical activity (6 items); E) physical activity counselling and potential barriers (5 items); and F) future considerations (2 items).

### Section A: Pre-questionnaire eligibility

For the purpose of this study, we defined SOT physician as a physician who provided care for SOT recipients (heart, lung, kidney, pancreas, liver, and/or multi-organ), and PA as any bodily movement produced by skeletal muscles that requires energy expenditure, such as structured exercise training, leisure activity, and household/work-related activity. Questions about the eligibility of participants were included in this section.

### Section B: Consent questions

Upon determination of eligibility, participants were asked for their consent to participate in the study and informed that their responses would remain confidential. Physicians who did not meet the inclusion criteria, and those declining to participate were thanked for their interest in the study and their questionnaires were closed.

### Section C: Demographic questions

Demographic data collected included sex, province of practice, years of experience and year of graduation. Questions pertaining to SOT physicians’ practice included field of specialty, and the type of SOT recipients they care for.

### Section D: Knowledge about physical activity

This section was designed to determine whether and to what extent SOT physicians’ medical training addressed matters of PA, including the benefits, risks, as well as exercise training and evaluation. It also determined SOT physician’s referral patterns and which healthcare professional physicians would refer to when PA counselling is required. A 5-point Likert scale (i.e., strongly disagree, disagree, neutral, agree, strongly agree) as well as the option of “don’t know” were used to determine if SOT physicians agreed with the claims that PA can help improve a patient’s overall quality of life (QoL), exercise capacity, muscle strength, reduce the risk of metabolic disease, reduce fatigue, and improve self-efficacy.

### Section E: Physical activity counselling and potential barriers

Items in this section inquired whether SOT physicians provided PA counselling to their patients. Respondents who answered

that they did not provide PA counselling were instructed to skip ahead to question 5 while participants who responded that they did provide PA counselling were asked to estimate the proportion of their patients to whom PA counselling was provided. The next item asked SOT physicians to rank various factors influencing their decision to provide patients with PA counselling based on importance. They were asked their level of confidence when providing PA counselling (i.e. very confident, fairly confident, somewhat confident, and not confident at all). The last item in this section used a 5-point Likert scale as well as the option “don’t know” to determine the physician’s perception of barriers preventing them from providing PA counselling. Participants were also given space to comment on additional barriers not included in the questionnaire.

### Section F: Future considerations

The first item in this section inquired whether physicians would be interested in receiving evidence-based information regarding exercise in SOT recipients as a tool to help them with PA counselling. The survey was deemed complete for physicians who answered “no”. Physicians who answered “yes” were asked to comment on the format in which they would prefer to receive this information. The options were (i) evidence-based guidelines (online), (ii) evidence-based guidelines (paper), (iii) face to face workshops, (iv) webinars, and (v) other with the option to specify.

The survey was designed to take approximately 15 minutes to complete and was piloted by 2 SOT physicians. Changes in formatting and wording were implemented in response to this feedback for clarity and to ensure the survey was feasible to administer by a web survey software.

### Participants

We surveyed SOT physicians who are members of the Canadian Society of Transplantation (CST). Physicians providing care for SOT recipients (heart, lung, liver, pancreas, kidney, and/or multi-organs) were deemed eligible. Physicians not involved in the care of transplant patients or those only involved in the care of bone marrow, cornea, hematopoietic, or stem cell transplant recipients, were excluded.

The CST is a professional organization of healthcare practitioners in the field of transplantation, which encompasses over 600 members across Canada involved in clinical care or research across the transplant disciplines. It is estimated that 250 transplant physicians are members of this organization (Manager of the CST, oral communication, May 2017). We estimated that approximately 16% of CST physicians would complete our survey. This estimation was based on the response rate (16%) of the National Physician Survey in 2014 [24].

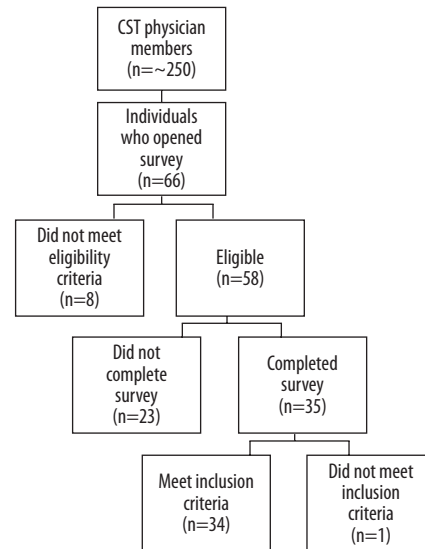


Figure 1. Flowchart of the study.

### Recruitment process

Study participants were recruited in the following manner: 1) A CST representative (who served as contact between the research team and the physicians) sent out an email containing the invitation in April 2017. The invitation included a cover letter explaining the study and a link to the questionnaire. 2) In accordance with CST policies, members were approached twice (via email and Facebook/Twitter). A reminder email was sent 1 week following the initial email invitation. In addition, Facebook/Twitter reminders were posted at the 1- and 3-week mark as a second reminder.

After the survey was open to the CST for 5 weeks, a Canadian National Transplant Research Program (CNTRP) manager (who served as contact between the research team and the physicians) sent out another reminder email to selected CNTRP members who were also members of the CST containing the aforementioned invitation. Following the third reminder, the survey was open for another 2 weeks before it was closed for analysis. Consent was assumed in all physicians who responded to the questionnaire.

### Data analysis

Data from LimeSurvey™ were exported to a Microsoft Excel spreadsheet. Data were summarized using frequencies and percentages.

## Results

A total of 66 individuals opened the survey, giving us an initial response rate of 26% (Figure 1). Thirty-four transplant physicians met the eligibility criteria and provided consent to participate, resulting in a final response rate of 13.6%. The majority of the physicians practiced in Quebec (n=17) and all except 2 individuals were practicing in Canada. The years of experience of the physicians who completed the survey varied. Thirty-eight percent (n=13) had been working in the field of SOT for more than 15 years, while 29% (n=10) had less than 5 years of experience (Table 1). The majority of the respondents worked with kidney (65%; n=22), liver (32%; n=11), or pancreas (29%; n=10) organ groups (Table 1). Additional information about respondents' characteristics is presented in Table 1.

### Medical training and knowledge about PA

Fifty-six percent of the respondents (n=19) stated they had received medical training on PA counselling, however, only 15% (n=5) expressed this knowledge was sufficient. The same response pattern occurred regarding the information they received on the benefits of PA. More than half of the respondents stated they had not received information on the risks of PA (53%; n=18) or that the information received was insufficient (35%; n=12). In addition, information on exercise testing or evaluation either was not received (62%; n=21) or was insufficient (29%; n=10) (Figure 2).

When asked if they knew which healthcare professional they would refer their patients to for PA counselling or exercise testing/evaluation, 50% of participants said they knew. Those who responded positively indicated they would refer to a physiotherapist (59%; n=10) followed by a kinesiologist (29%; n=5). In contrast, 41% were not sure and 9% did not know who to refer to (the percentages exceed 100% due to the fact that some participants reported more than one professional).

The majority of the participants agreed that PA can help improve patient's QoL (94%; n=32), exercise capacity (91%; n=31), muscle strength (88%; n=30) and patients' self-efficacy (79%; n=27). The majority also agreed that PA reduces patients' risk of developing metabolic diseases (94%; n=32) and fatigue (88%; n=30).

### PA counselling

The majority of respondents (97%; n=33) reported providing PA counselling to their transplant patients. However, only 27% (n=9) provided this counselling to all (100%) of their patients; 55% (n=18) provided counselling to a majority (> 50%) of their patients; and 18% (n=6) only provided counselling to 15–50% of their patients.

Common reasons for physicians to provide PA counselling included patients' level of PA prior to transplant, medical stability, patients' current weight, patients' motivation and the risk of the patient developing metabolic diseases (Figure 3).

### Physician confidence and barriers to physical activity counselling

When asked about their confidence in providing PA counselling, only 18% (n=6) responded they were very confident in PA counselling. Forty-two percent (n=14) of the respondents stated they were fairly confident and 39% (n=13) reported they were somewhat confident (Figure 4).

Questions regarding barriers to PA counselling revealed that lack of time (n=19; 56%) and lack of exercise guidelines (n=18; 53%) were the most common barriers. Other reported barriers were lack of confidence (n=8; 24%), lack of knowledge about exercise (n=7; 21%), and lack of research evidence of the benefits of PA (n=7; 21%). One respondent (3%) believed that exercise was not helpful (Figure 5). In addition to the list of barriers provided in the survey, physicians added lack of resources and financial support, lack of metrics to measure PA and fitness, and patients' motivation and energy levels as additional barriers to providing the necessary PA counselling to their transplant patients.

### Interest in receiving evidence-based information

The questionnaire also inquired whether physicians would be interested in receiving evidence-based information on exercise in SOT recipients to guide them on how to counsel their patients. Twenty-nine participants (85%) responded that they would be interested in this type of information. Of these respondents (n=29) 100% said they would like to receive the information in a web-based format; 31% (n=9) responded they would rather have a paper format, 21% (n=6) preferred face to face workshops, and 34% (n=10) through webinars.

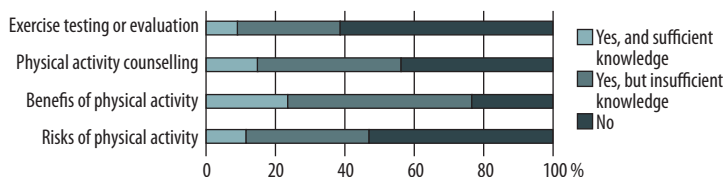
## Discussion

Despite an extensive body of research on the benefits of PA in people with chronic diseases, only 30–50% of family physicians counsel their patients on the matter [19,20]. In this study, we provided, for the first time, an objective description of the patterns of PA counselling given by SOT physicians in Canada and their perceived barriers to such practices. Our study revealed that of the physicians who reported counselling their patients about PA, only 27% provided PA counselling to all their patients.

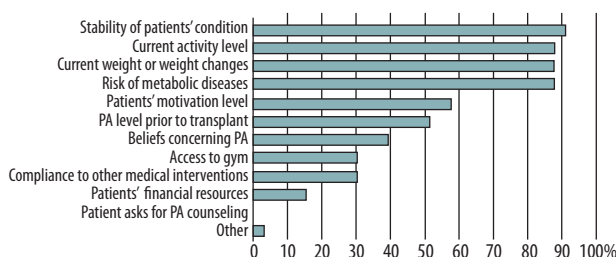
**Table 1.** Characteristics of study participants.

Characteristic	n	%
<b>Sex</b>		
Male	16	47.1
Female	18	53.9
<b>Place of practice</b>		
Ontario	4	11.8
Quebec	17	50.0
British Columbia	3	8.8
Manitoba	1	2.9
Alberta	6	17.6
Saskatchewan	1	2.9
Out of Canada	2	6.0
<b>Year of graduation from residency</b>		
2010–2016	8	23.5
2000–2009	12	35.2
1990–1999	6	17.6
1980–1989	8	23.5
<b>Years of experience working in SOT</b>		
Less than 5 years	10	29.4
5–10 years	4	11.8
10–15 years	7	20.6
More than 15 years	13	38.2
<b>Area of specialty</b>		
Cardiologist	3	8.8
Nephrologist	18	52.9
Respirologist	2	5.9
Hepatologist	5	14.7
Surgeon	5	14.7
Other (Intensive Care)	1	2.9
<b>Organ group</b>		
Heart	6	17.6
Lung	3	8.8
Liver	11	32.4
Kidney	22	64.7
Pancreas	10	29.4
Other (bowel and bone marrow)	2	5.9

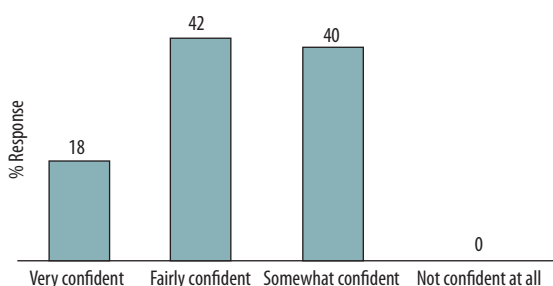
Physicians that worked with bowel and bone marrow were included because they also worked with the heart, lung, liver or kidney populations.



**Figure 2.** Distribution of what SOT physicians claim was included in their medical training.



**Figure 3.** Distribution of reasons in what SOT physicians claim would provide PA counseling for patients.

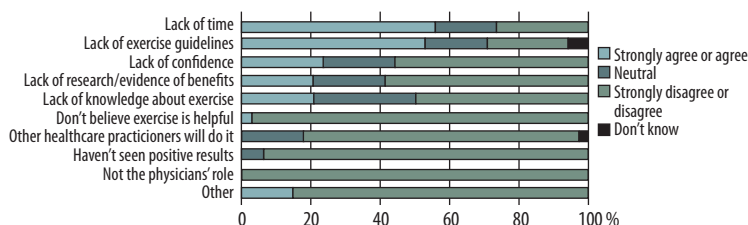


**Figure 4.** Distribution of SOT physicians' confidence in providing patients with PA counselling.

Despite the fact that 97% of the respondents reported counselling their patients about PA, only 27% reported doing so for all their patients. This low counselling rate is fairly similar to practice patterns of family physicians in other patient populations [19,20,22]. We acknowledge that exercise regimens may not be a priority, or even indicated in certain cases. In fact, our survey revealed that SOT patients' medical condition and lifestyle habits can influence transplant physicians' decision in delivering PA counselling. Nevertheless, given the growing evidence for the benefits of exercise and PA in SOT recipients,

including its positive effects on cardiovascular function, body composition, endurance and muscle strength and QoL in SOT recipients [25], if there is no absolute contraindication, individualized PA counselling should be part of the standard medical care of all SOT recipients. Interestingly, a previous study published by the American Academy of Family Physicians alludes to the importance of PA counselling in improving PA levels by revealing that most Americans fail to achieve their PA goals, reporting also that their physicians have not counselled them to increase PA [22]. The lack of counselling may even instill a fear of performing PA [22]. Patients regard their physicians as credible sources of information and rely on them for health-related advice.

When it comes to confidence in providing PA counselling to SOT recipients, only 18% of the respondents reported being very confident and 24% perceived confidence as a barrier to PA counselling. These results may be related to the insufficient training transplant physicians receive in exercise and PA prescription. Of the 56% (n=19) of the respondents that received education on PA during their medical training, only 15% (n=5) deemed their training to be sufficient. Respondents felt insufficiently trained in evaluation of a patient's exercise capacity, in the risks associated with PA in transplant patients, or in



**Figure 5.** Distribution of barriers perceived by SOT physicians when providing PA counselling. "Other" included lack of resources and financial support, lack of metric to measure activity and fitness, and patients' motivation and energy levels.

prescribing specific PA programs. In addition, half of the respondents were either not sure or did not know who to refer their patients to for exercise training or PA. While very knowledgeable, advice given by transplant physicians may be based on general principles of PA prescription and not specific to the SOT population. Fortunately, there is current efforts to integrate information regarding PA and exercise prescription into Canadian medical schools [26].

Lack of time (n=19; 56%) as recognized by transplant physicians, was the primary barrier to PA counselling. The same barrier was identified by 65.7% of Canadian family physicians surveyed in a previous study [27]. While transplant physicians aim to provide the best care to their patients, our healthcare system allows little time to discuss PA counselling, having to prioritize other medical issues and attending to the high demand of SOT [28]. It is therefore important that physicians consider referring their patients to an exercise specialist (i.e., physical therapists, kinesiologists, etc.) trained to provide specific PA counselling and prescription tailored to the patient's needs.

The second most prevalent barrier to PA counselling in this study was "lack of guidelines". We believe PA guidelines could act as a standard reference and play a key role in the promotion of a better and more thorough implementation of exercise into transplant recipients' care. The lack of availability of PA guidelines may be explained by limited number of high quality randomized controlled trials compared to those in other chronic diseases (e.g., stroke, diabetes) and by the limited evidence for the long-term benefits of PA on cardiovascular risk factors and transplant outcomes. Furthermore, general PA guidelines may not be sufficient or appropriate for SOT recipients as they are generally sedentary and deconditioned post-transplant with low exercise capacity [8–14] and may have ongoing medical concerns specific to transplantation [1]. Individualization as well as patient centered encouragement are important for those who are frail or deconditioned and may increase adherence rates. It is also important that SOT recipients be informed about the consequences of inactivity and the importance of regular PA in the pre-transplant period, so that they know what to expect after transplantation and have sufficient time to create a plan to increase their PA levels post-transplant.

Our study had some limitations. Generalizability may be compromised because of the small response rate and the fact that the majority of the respondents practiced in the province of Quebec and worked with the kidney and liver populations. Transplant cardiologists and respirologists were underrepresented in our study and given their area of expertise, we assume that they would be more familiar and confident with providing PA counselling. Moreover, we chose to recruit SOT physicians from members of a professional organization, knowing it does not include or represent all SOT physicians in Canada. Nevertheless, this organization is the Canadian frontrunner in the practice and science of transplantation.

Our survey questions also failed to capture the content and timing of the given PA counselling. Despite the fact that a great number of physicians reported providing PA counselling, without knowing the actual content or the stage (early or late post-transplant) at which they provide PA counselling, it is difficult to know the level of the appropriateness, sufficiency, or usefulness of their PA.

## Conclusions

Although the majority of transplant physicians in our study reported that they counsel their patients about PA; a minority of them felt very confident in doing so. In addition to low level of confidence, lack of time and PA guidelines were 2 common barriers to PA counselling among transplant physicians. Incorporating sufficient PA knowledge into physicians' standard educational curricula system, developing specific PA guidelines for transplant recipients as well as establishing an easier referral system to exercise specialists might improve the frequency and quality of PA counselling post-transplant.

## Acknowledgements

The authors would like to acknowledge David Hartell from the CNTRP and Rob Gallaher from the CST for their assistance in the delivery of the survey.

## APPENDIX

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### Appendix 1: Practice patterns and barriers to counselling on physical activity in solid organ transplant recipients

#### Section A: Pre-questionnaire Eligibility

In a recent survey of solid organ transplant (SOT) recipients, 59% of the respondents identified “physician recommendation” as the main facilitator to being more physically active. A student research group from the School of Physical Therapy at the McGill University is conducting a follow-up survey to identify the prevalence of physical activity (PA) counselling to SOT recipients by transplant physicians. A secondary goal is to identify the barriers physicians may encounter when counselling this population. Identifying barriers to routine PA counselling will enable the investigators to develop strategies to address these barriers.

WHO 2016 defined PA as any bodily movement produced by skeletal muscles that requires energy expenditure, such as structured exercise training, leisure activity and household/work-related activity. We define SOT as transplants of major organs in our body, including heart, lung, kidney, pancreas, liver, and/or any combination of former organs.

**If you meet the criteria outlined below**, and would like to participate in this survey, please answer the question below.

**If you are a physicians who is NOT involved in the care of solid organ transplant recipients or if you primarily practice/ are specialized in the fields of bone marrow, cornea, hematopoietic, or stem cell transplant**, please refrain from completing the questionnaire.

Thank you for your time and consideration. The researchers would appreciate your participation in this study.

**Are you a physician who provides care to solid organ (ie. heart, lung, liver, pancreas, kidney, and/or multi-organs) transplant recipients?**

Please choose **only one** of the following:

- Yes
- No

You have answered “yes” to the previous question. Please choose one of the following options:

#### Section B: Consent

Only answer this question if the following conditions are met:

**Answer was ‘Yes’ at question ‘2 [A1]’ (Are you a physician who provides care to solid organ (i.e. heart, lung, liver, pancreas, kidney, and/or multi-organs) transplant recipients?)**

Choose one of the following answers Please choose **only one** of the following:

- I have read and understood the questionnaire cover letter and give my consent to participate in the study.
- I decline to participate in the study.

#### Section C: Demographics

**What is your gender?**

Choose one of the following answers Please choose **only one** of the following:



- Male
- Female
- I prefer not to answer

**In which province do you currently practice?**

Choose one of the following answers Please choose **only one** of the following:

- Alberta
- British Columbia
- Manitoba
- New Brunswick
- Newfoundland and Labrador
- Northwest Territories
- Nova Scotia
- Nunavut
- Ontario
- Prince Edward Island
- Quebec
- Saskatchewan
- Yukon Territory
- Practice outside of Canada

**Please specify the country of your practice**

**Only answer this question if the following conditions are met:**

Answer was 'Practice outside of Canada' at question '5 [B2]' (In which province do you currently practice?) Please write your answer here:

**Please indicate the year of graduation from your residency**

Choose one of the following answers Please choose **only one** of the following:

- 2010–2016
- 2000–2009
- 1990–1999
- 1980–1989
- Before 1980

**Please indicate the years of experience working in field of solid organ transplantation**

Choose one of the following answers Please choose **only one** of the following:

- Less than 5 years
- 5–10 years
- 10–15 years
- More than 15 years

**Please indicate your area of specialty**

Choose one of the following answers Please choose **only one** of the following:

- Respiriologist
- Nephrologist

- Hepatologist
- Cardiologist
- Endocrinologist
- Surgeon
- Other

**If surgeon, please specify your area of specialty (e.g. Thoracic surgeon etc)**

**Only answer this question if the following conditions are met:**

Answer was 'Surgeon' at question '9 [B5]' (Please indicate your area of specialty) Please write your answer here:

**Please specify**

**Only answer this question if the following conditions are met:**

Answer was 'Other' at question '9 [B5]' (Please indicate your area of specialty) Please write your answer here:

**Please indicate which organ group you work with (check all that apply)**

Check all that apply

Please choose **all** that apply:

- Heart
- Lung
- Liver
- Kidney
- Pancreas
- Other

**Please specify**

**Only answer this question if the following conditions are met:**

Answer was at question '12 [B6]' (Please indicate which organ group you work with (check all that apply)) Please write your answer here:

#### **Section D: Knowledge of physical activity**

**(Physical activity is defined as any bodily movement produced by skeletal muscles that requires energy expenditure, such as structured exercise training, leisure activity and household/work-related activity)**

**Did your medical training include information on physical activity counselling?**

Choose one of the following answers Please choose **only one** of the following:

- Yes, and sufficient knowledge
- Yes, but insufficient knowledge

- No

**Did your medical training include information on BENEFITS of physical activity?**

Choose one of the following answers Please choose **only one** of the following:

- Yes, and sufficient knowledge  
 Yes, but insufficient knowledge  
 No

**Did your medical training include information on RISKS of physical activity?**

Choose one of the following answers Please choose **only one** of the following:

- Yes, and sufficient knowledge  
 Yes, but insufficient knowledge  
 No

**Did your medical training include information on exercise testing or evaluation?**

Choose one of the following answers Please choose **only one** of the following:

- Yes, and sufficient knowledge  
 Yes, but insufficient knowledge  
 No

**Would you know which health care professional to refer your patients to in order to obtain more detailed advice on physical activity?**

Choose one of the following answers Please choose **only one** of the following:

- Yes  
 Not sure  
 No

**Please specify the health care professional (s) you would refer your patients to:**

**Only answer this question if the following conditions are met:**

Answer was 'Yes' at question '18 [C5]' (Would you know which health care professional to refer your patients to in order to obtain more detailed advice on physical activity?)

Please write your answer here:

**Physical activity can help improve patients':**

Please indicate how much you agree with the following statements:

Please choose the appropriate response for each item:

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Don't know
Overall quality of life	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Exercise capacity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Muscle strength	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reduce the risk of developing metabolic diseases (e.g.: diabetes, hypertension)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reduce the risk of developing pulmonary infections (e.g.: pneumonia)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reduce fatigue	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improve self-efficacy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Section E: Physical activity counselling and potential barriers****Do you provide physical activity counselling to your patients?**

Please choose **only one** of the following:

- Yes
- No

**Please indicate overall, the proportion of your patients that you would provide physical activity counselling for:**

**Only answer this question if the following conditions are met:**

Answer was 'Yes' at question '21 [D1]' (Do you provide physical activity counselling to your patients?) Choose one of the following answers

Please choose **only one** of the following:

- All my patients (100%)
- The majority of my patients (>50%)
- Some of my patients (15-50%)
- Very few of my patients (<15%)

**I counsel about physical activity according to:**

**Only answer this question if the following conditions are met:**

Answer was 'Yes' at question '21 [D1]' (Do you provide physical activity counselling to your patients?) Check all that apply

Please choose **all** that apply:

- Patients' prior level of physical activity
- Patient's current activity level
- The stability of the patient's condition (associated conditions, complications, co-morbidities)
- Patients' current weight (whether there is any significant weight loss/gain)

- Whether patients have/ are at risk of metabolic diseases (e.g., diabetes or hypertension)
- Patients' compliance to other medical interventions given (e.g: medication regimen)
- Patients' level of motivation
- Patients' belief concerning physical activity (whether they agree or disagree with its potential benefits)
- Whether patients have access to gyms and/or community activity center.
- Patients' financial resources
- Only when patients ask me for physical activity counselling
- Other reasons

Please specify

**Only answer this question if the following conditions are met:**

Answer was at question '23 [D3]' (I counsel about physical activity according to:)

Please write your answer here:

**Please indicate how confident you are when you provide physical activity counselling:**

**Only answer this question if the following conditions are met:**

Answer was 'Yes' at question '21 [D1]' (Do you provide physical activity counselling to your patients?) Choose one of the following answers

Please choose **only one** of the following:

- Not confident at all
- Somewhat confident
- Fairly confident.
- Very confident

**Please indicate how much you agree with the following statements as the main barriers that may influence/limit your counselling of physical activity**

**Only answer this question if the following conditions are met:**

Answer was 'Yes' or 'No' at question '21 [D1]' (Do you provide physical activity counselling to your patients?)

Please choose the appropriate response for each item:

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Don't know	Lack of time
Lack of confidence in counseling about PA	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lack of knowledge about exercise	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lack of exercise guidelines available for SOT patients	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Lack of research evidence for benefits of exercise	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Don't believe exercise/PA is helpful for SOT patients	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is not physician's role to counsel about PA	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Haven't seen any positive result associated with exercise/PA.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I don't counsel my patients about PA because other members of the team do it	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Any other reason that may influence/limit your counselling of physical activity, not listed in the previous question?**

**Only answer this question if the following conditions are met:**

Answer was 'Yes' or 'No' at question '21 [D1]' (Do you provide physical activity counselling to your patients?)

Please choose **only one** of the following:

- Yes  
 No

Please specify

**Only answer this question if the following conditions are met:**

Answer was 'Yes' at question '27 [D6]' (Any other reason that may influence/limit your counselling of physical activity, not listed in the previous question?)

Please write your answer here:

**Section F: Future considerations**

**Would you be interested in receiving evidence-based information about exercise in SOT recipients to guide you on how to counsel about PA?**

Please choose **only one** of the following:

- Yes  
 No

**If yes, how would you like to receive this information?**

**Only answer this question if the following conditions are met:**

Answer was 'Yes' at question '29 [E1]' (Would you be interested in receiving evidence-based information about exercise in SOT recipients to guide you on how to counsel about PA?)

Check all that apply

Please choose **all** that apply:

- Evidence-based guidelines (paper form)

- Evidence-based guidelines (online form)
- Face to face workshops
- Webinars
- Other

Please specify:

Only answer this question if the following conditions are met:

Answer was at question '30 [E2]' (If yes, how would you like to receive this information?) Please write your answer here:

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