

BMJ Open Genetics Adviser: a protocol for a mixed-methods randomised controlled trial evaluating a digital platform for genetics service delivery

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ABSTRACT

Introduction The high demand for genetic tests and limited supply of genetics professionals has created a need for alternative service delivery models. Digital tools are increasingly being used to support multiple points in the genetic testing journey; however, none are transferable across multiple clinical specialties and settings nor do they encompass the entire trajectory of the journey. We aim to evaluate the effectiveness of the Genetics Adviser, an interactive, patient-facing, online digital health tool that delivers pre-test counselling, provides support during the waiting period for results, and returns results with post-test counselling, encompassing the entire patient genetic testing journey.

Methods and analysis We will compare the Genetics Adviser paired with a brief genetic counselling session to genetic counselling alone in a randomised controlled trial. One hundred and forty patients who previously received uninformative genetic test results for their personal and family history of cancer will be recruited from familial cancer clinics in Toronto and offered all clinically significant results from genomic sequencing. Participants randomised into the intervention arm will use the Genetics Adviser to learn about genomic sequencing, receive pre-test counselling, support during the waiting period and results, supplemented with brief counselling from a genetic counsellor. Participants in the control arm will receive standard pre-test and post-test counselling for genomic sequencing from a genetic counsellor. Our primary outcome is decisional conflict following pre-test counselling from the Genetics Adviser+genetic counsellor or counsellor alone. Secondary outcomes include: knowledge, satisfaction with decision-making, anxiety, quality of life, psychological impact of results, empowerment, acceptability and economic impact for patients and the health system. A subset of patients will be interviewed to assess user experience.

Ethics and dissemination This study has been approved by Clinical Trials Ontario Streamlined Research Ethics

Strengths and limitations of this study

- This randomised control trial (RCT) will provide high-quality evidence on the outcomes and costs of receiving pre-test counselling, return of results, and post-test counselling from the Genetics Adviser.
- Our study will include qualitative interviews with participants, enabling an in-depth understanding of patients' experiences using the Genetics Adviser.
- All participants in this study have undergone prior genetic counselling and genetic testing for cancer gene panels and will be English speaking, and therefore, our results may not be transferable to patients presenting for an initial genetics consultation.
- However, this trial reflects a non-hypothetical study of patients being offered all clinically significant findings from genomic sequencing and the actual return of those results through the Genetics Adviser.
- We will evaluate the clinical effectiveness and costs of the Genetics Adviser for delivering care throughout the full patient genetic testing journey including the pre-test counselling, support while waiting for results, return of results and post-test counselling.

Review System (REB#20–035). Results will be shared through stakeholder workshops, national and international conferences and peer-reviewed journals.

Trial registration number NCT04725565.

INTRODUCTION

Genomic testing is rapidly disseminating across medical disciplines.¹ As the use of genomic testing becomes embedded into routine practice, there is a need to develop innovative strategies to harness the full potential for prevention and treatment made

possible by these emerging tests. Genomic medicine has reached a critical juncture; as a direct consequence of the high demand for testing and limited supply of professionals (genetic counsellors, geneticists), alternative delivery models are emerging.²⁻⁴ Novel mainstreaming approaches that allow for genomic tests to be ordered by non-genetics specialists (eg, oncologists and cardiologists) and digital tools that are being used to supplement components of the genetic counselling journey are being widely implemented, with both models aiming to improve access and wait times for testing and counselling.^{15 6 7}

A diverse range of innovative digital tools have been developed across specialties, including primary care, prenatal screening, hereditary cancer care and paediatrics.^{5 8 9} Various tools have been developed to support multiple points in the genetic testing journey, including education, clinical assessment, family history-taking, post-test counselling and follow-up, using various modalities such as conversational chatbots, e-books, educational videos and electronic decision aids.^{5 7 8 10} Overall, digital genomic tools have been well received by patients, with high levels of usability, acceptability and satisfaction reported.^{9 11} Digital genomic tools have also been shown to improve patient-reported outcomes, including increasing knowledge, reducing decisional conflict, initiating active decision-making and facilitating patient-centred care.^{5 12} From the clinician and healthcare system perspective, digital tools have improved provider capacity and efficiency.^{7 13} Despite the increasing use of digital tools in genomic medicine, none have applicability across multiple clinical specialties or settings, nor do any of them encompass the entire trajectory of the genetic testing journey.⁶ This is a critical gap given the rise of large-scale initiatives to bring genomics into routine healthcare, such as the Genome UK initiative.¹⁴

We aimed to address these gaps by transforming our original Genomics ADvISER decision aid^{9 13 15} into a comprehensive patient-centred digital platform (Genetics Adviser) to guide patients through the genetic testing trajectory from pre-test counselling, through the waiting period and to the results disclosure (figure 1). In brief, the Genetics Adviser begins with a pre-test learning module where they learn about genetics and testing using a combination of video, text and graphic imagery, responsive to different learning styles. Next, users explore frequently asked questions (FAQs), risks and benefits of testing, engage in a values clarification and a risk tolerance exercise (with tailored feedback). The last stage of the pre-test module allows users to review all types of clinically significant findings available from genomic sequencing (adaptable to the clinic/settings' specific results offerings), make their selections and review important considerations. They are then able to download a summary of their session. Prior to receiving their results, participants can also log back into the Genetics Adviser for a check-in. This involves a review of the genomic findings they selected, things to consider, questions assessing how prepared they are for the results and helpful resources to access during the crucial waiting period. The final module includes the return of results, which presents an overview of the results and an action plan, with a shareable summary report intended to be shared with the patient's healthcare provider.

Hypotheses and aims

We aim to evaluate the effectiveness of the Genetics Adviser at three critical junctures along the patient genetic testing journey: (1) pre-test counselling, (2) waiting period and (3) return of results.

Our primary aim is to evaluate the effectiveness of the Genetics Adviser paired with brief genetic counselling

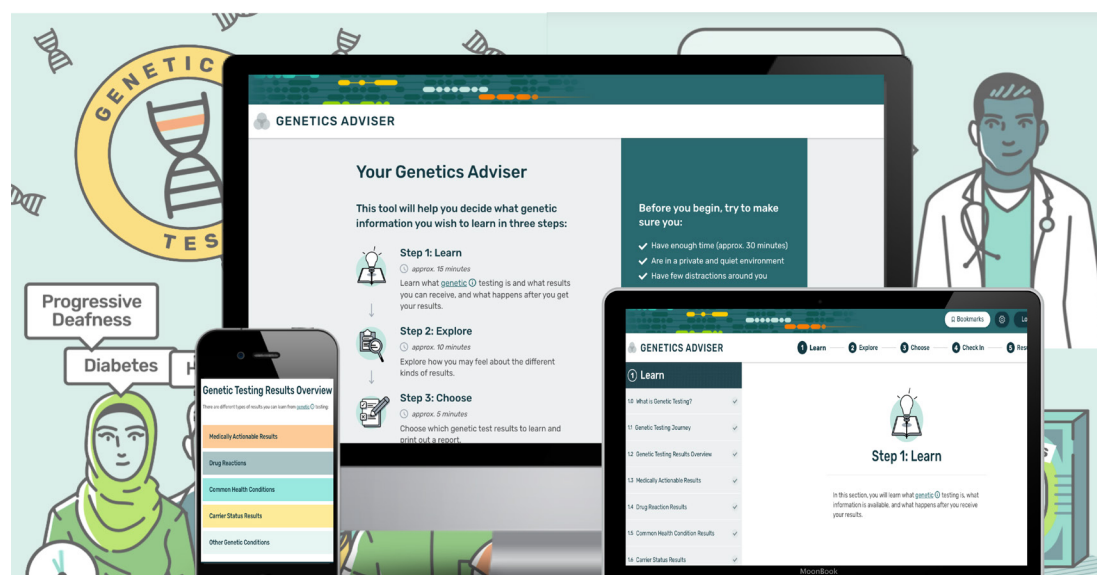


Figure 1 The Genetics Adviser, delivering pre-test counselling, waiting period support and result disclosure via all mobile applications such as smartphones and tablets or computer/desktop applications.

Table 1 Study measures across time points

Time point	Baseline*	+0 weeks†	+2 weeks‡	+2 months§	+4-6 months¶
Demographics and medical history	●				
State Trait Anxiety Inventory (6-item) ³⁵	●	●	●	●	●
Knowledge Scale ³³	●	●	●	●	●
Genetic Self Efficacy Scale ^{38 39}	●	●	●	●	●
Genomics Outcome Scale ⁴⁰					●
Decisional Conflict Scale ²⁹		●	●	●	●
Participant Satisfaction with Genetics Education ⁴¹		●		●	●
Web-based Participants' Quantitative Feedback Regarding the Interactive Computer Module†† ⁴¹		●		●	●
Satisfaction with Decision-Making Scale ³⁴		●	●		
The Feelings About genomiC Testing Results (FACToR) Questionnaire ³⁷					●
SF-12: Quality of Life ^{**36}	●				●
Economic Impact**					●
BRIEFS ⁴²	●				
eHEALS ⁴³	●				
Health Care System Distrust Scale ⁴⁴	●				
Control Preferences Scale ⁴⁵	●				

*T0.

†T11/C/T21.

‡T2C/T31.

§T3C/T41.

¶T4C/T51/T61.

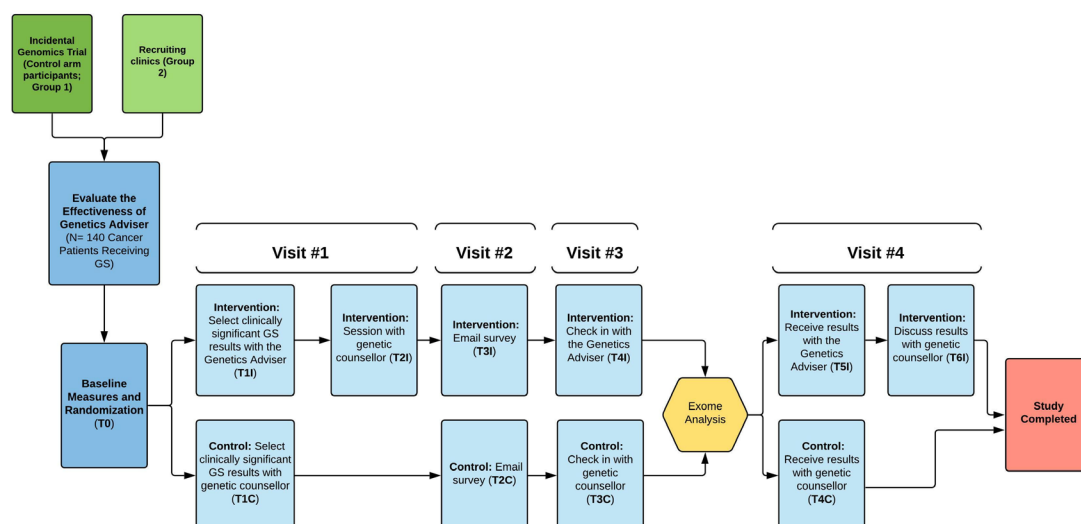
**Only for T4C and T61.

††Only for T11, T41 and T51.

BRIEFS, Brief Health Literacy Screening Tool; e-HEALS, e-Health Literacy Scale; SF-12, 12-item Short Form Survey.

versus genetic counselling alone in the pre-test time point, where individuals receive information about all types of clinically significant findings from genomic sequencing. Based on prior literature,⁵ we hypothesise that use of the Genetics Adviser will reduce patients' decisional conflict (primary outcome) and anxiety and improve patient knowledge and satisfaction with decisions compared with

genetic counselling alone following their selection of clinically significant findings from genomic sequencing (GS). The primary time points of comparison will be after a pre-test counselling session with a genetic counsellor for the control versus after using the Genetics Adviser and speaking with a genetic counsellor for the intervention group (table 1 and figure 2). Our exploratory aims are

**Figure 2** Overview of the Genetics Adviser trial.

to evaluate effectiveness of the platform in supporting patients while they wait for results and to explore the impact of returning results via the Genetics Adviser compared with receiving results from a genetic counsellor on decisional conflict, knowledge, satisfaction and anxiety.

METHODS

Study setting

The main study site is St. Michael's Hospital, Unity Health Toronto in Toronto, Ontario, Canada. As the trial is recruiting during the COVID-19 pandemic, all recruitment and procedures are being conducted virtually, via Zoom Healthcare or phone. Recruitment began in May 2021 and will end in October 2022.

Study design

This is a mixed-methods (explanatory-sequential design),^{16 17} non-blinded randomised controlled superiority trial. We will evaluate whether use of the Genetics Adviser paired with genetic counselling reduces decisional conflict compared with genetic counselling alone, in addition to its impact on knowledge, satisfaction with decision-making, anxiety, quality of life, empowerment, acceptability and costs and efficiency. As part of the trial, participants will be randomised to either use the Genetics Adviser or undergo traditional genetic counselling to select and receive clinically significant findings from genomic sequencing (exome sequencing). A subset of participants will participate in a follow-up qualitative interview to assess user experience of the Genetics Adviser. This protocol follows the 2013 SPIRIT guidance on clinical trials (online supplemental file 1).^{18 19}

Population

We will recruit participants from the control arm of the parent study (group #1) *The Health Outcomes, Utility and Costs of Returning Incidental Genomics Findings* (NCT#03597165; 'Incidental Genomics' trial described elsewhere).²⁰ Control arm participants from the parent trial included adult patients with cancer who underwent genomic sequencing and only received results for their primary indication (cancer). To supplement this sample, we will also recruit patients from cancer genetics clinics at Mount Sinai Hospital (MSH), Princess Margaret Cancer Centre (PMCC) and Sunnybrook Health Sciences Centre (SHSC) located in Toronto, Ontario, Canada (group #2).

Sample size

The study will require 64 patients/arm (128 total) to detect the minimal clinically important difference of 0.3 using the Decisional Conflict Scale (DCS), assuming a standard deviation of 0.6, an alpha of 0.05 (two sided) and power of 0.8.^{21 22} Given attrition rates in previous trials, we anticipate having to possibly oversample using group 2 participants, up to a total sample size of 140 participants.

Eligibility criteria

Inclusion

- ▶ Previous participants in the control arm of the Incidental Genomics Trial²⁰ who have given permission to be recontacted for future related research AND patients with:
 - Personal and family history of cancer or polyposis suggestive of a hereditary cancer syndrome.
 - Previous uninformative genetic test results (negative or variant of uncertain significance (VUS), ie, a variant for which the risk association with disease is unknown).
 - ≥18 years of age.

Exclusion (group #2)

- ▶ Received a positive or clinically significant (actionable) genetic result in a cancer gene (eg, *BRCA1* pathogenic variant) consistent with the family history such that genomic sequencing would not be clinically useful to provide a molecular diagnosis.
- ▶ Received previous genomic sequencing.
- ▶ Patient or partner is pregnant or planning to become pregnant. This exclusion criterion was intended to avoid any stress related to potential receipt of carrier results. If a participant or their partner were to become pregnant over the study period, they would not be excluded.
- ▶ Patient has recurrent or metastatic cancer (stage 4). This exclusion criterion was intended to avoid burdening patients amidst ongoing health challenges or if they are in active cancer treatment.²³
- ▶ If they or relatives participated in previous studies related to the Genomics Adviser including: the usability of the original Genomics Adviser⁹; the RCT of the Genomics Adviser^{13 15}; or the intervention arm of the Incidental Genomics Trial, in which they would have used the Genomics Adviser to select their preferred clinically significant findings.²⁰
- ▶ Do not speak or read English.

Recruitment

We will use different strategies to recruit participants in two groups. Group #1 includes control participants from the Incidental Genomics Trial who have had genomic sequencing but were only offered primary (cancer) findings in that trial. For this trial, these participants will have their sequence data reanalysed and be offered all clinically significant results (ie, secondary and incidental findings). The research coordinator will contact these participants via telephone or email to invite them into the next study. Individuals who are interested in the study will be sent a copy of the study information sheet and consent form via email or mail (based on their preference). If the individual is interested in participating in the study, the research coordinator will schedule a time to obtain verbal consent and if they are interested, enrol them in the study.

Group #2: we will recruit additional patients from genetics clinics at MSH, PMCC and SHSC who have already had panel testing for a cancer diagnosis and are eligible for genomic sequencing, similar to previous trials.^{13 20} The procedure for recruitment will be the same at all participating clinics. Eligible patients will be informed about the study by a genetic counsellor during a clinic visit or over the phone when their uninformative genetic test results (VUS or negative) are returned. During a clinic visit, interested patients will be provided a copy of the study invite package. If interested, they will be asked to fill out the contact form that will be given to the study coordinator who will follow up with the patient. If results are disclosed over the phone or other virtual method, the genetic counsellor will fill out the study contact form for interested patients. For both methods, the study coordinator will contact interested patients via the phone and explain the study further. Patients will have the option of also contacting the study coordinator directly and will be given the study coordinator's phone and email contact information by the counsellor. If the patient is not interested in participating, the recruiting genetic counsellor will ask the patient to state a reason for refusal, which will be documented on the contact sheet.

Procedure for qualitative recruitment

A subset of participants will be invited to participate in qualitative interviews. Participants will be able to refuse to take part in the qualitative component and still participate in the RCT. We will interview up to 40 participants in total in the intervention arm of the study, likely sufficient to reach thematic saturation, that is, when further analysis does not reveal novel themes or findings.^{24 25} We will first purposively sample participants by sociodemographic characteristics (eg, gender, age and ethnicity) and then theoretically sample based on emerging findings.^{26 27 28}

Data collection

After being consented by the study coordinator, all participants will complete a baseline questionnaire (T0) and then be randomised into the intervention arm or control arm. The baseline questionnaires will assess genome sequencing knowledge, anxiety, digital and health literacy, empowerment (ability to use results to inform health decisions), quality of life, attitudes towards healthcare and autonomy in decision-making (table 1). The research team already has demographic and medical history information collected from group #1 participants' medical charts with their consent from the previous Incidental Genomics Study.

Group #2 participants will complete demographic information and cancer history questionnaires and will have medical history information collected from their medical charts, with their consent. The study genetic counsellor will access medical chart information for these participants from the recruiting clinics, which will be used to confirm cancer and genetic testing history.

Randomisation

Participants will be consecutively randomised and allocated from an existing list of eligible subjects using computer-generated randomisation through REDCap in a 1:1 ratio, stratified by clinic, with random permuted blocks of varying sizes.

Study arms

All participants in the intervention and control arms will be offered the opportunity to receive all clinically significant findings from research genomic sequencing. Participants who were not part of the Incidental Genomics parent trial will receive primary cancer results regardless of the study arm, consistent with what was offered to all participants in the parent trial who received all types of clinically significant findings (primary, secondary and incidental findings).

Intervention

Following consent, baseline measures (T0) and randomisation, participants in the intervention arm will use the Genetics Adviser to learn about genomic sequencing and make their selections regarding the types of clinically significant findings they want to receive, and then complete another set of measures (T1I). Participants will then have a brief genetic counselling session with a genetic counsellor, followed by another round of study measures administered by the counsellor (T2I). All of these measures (T0, T1I and T2I) are completed during the first visit (figure 2). Following the first visit, participants will be emailed a link to complete self-administered measures at 2 weeks (T3I). Two months after the baseline meeting, participants will use the *Check-in module* of the Genetics Adviser, and then self-administer another set of measures (T4I).

Four to 6 months after the baseline appointment, participants will be notified via email that their genomic sequencing results are ready to view through the Genetics Adviser. The email will be sent by the study genetic counsellor who will provide instructions on how to access the Genetics Adviser and their results, along with a link to complete self-administered measures after viewing the results on their own (T5I). The study genetic counsellor will also schedule a meeting with the participant after they have viewed their results. The results meeting with the genetic counsellor will include an in-depth explanation of the results and action plan as well as the administration of the last set of measures (T6I).

Control

After participants have been consented and randomised into the control arm, they will complete study measures alongside the research coordinator (T0). Then, the genetic counsellor will provide pre-test genetic counselling about genomic sequencing. The participant will then choose which types of clinically significant findings they would like to receive, before completing additional study measures with the counsellor (T1C) (table 1 and

figure 2). Following the first visit (figure 2), participants will be emailed a link to complete self-administered measures at 2 weeks (T2C). Two months after the first visit, participants will complete a 2-month check-in with the genetic counsellor, completing study measures afterwards (T3C). Four to 6 months after the first visit, participants will be notified that genomic sequencing results are ready to be reviewed with the genetic counsellor (figure 2). The counsellor will contact the participant to book a time to review the results and complete another set of measures (T4C).

For the counselling components of the study, two study genetic counsellors will be trained on scripts to ensure consistency in the content and delivery of the counselling material.

Data management

The participants' choices for which findings they would like to receive from GS will be recorded in REDCap. The server is administered by the Applied Health Research Centre at SMH. Each team member will have their own individual login and password. The REDCap data collection form includes notes taken by the genetic counsellor from the discussion with the participant (participant study number, and cancer and genetic testing history for new participants) as well as the participants' category selections, notes about questions the participants asked during the counselling session and the start and end time of the session. All data will be kept on secure servers at SMH.

If participants miss any sessions, we will follow up with them to ensure they complete their measures on time. Participants can choose to leave the study at any time. Results of any analysis, including sequencing data and any other information recorded before withdrawal will still be used by the researchers for the study purposes, but no new information will be collected.

Outcomes

The primary outcome is decisional conflict, assessed via the validated DCS,^{29 30} and consistent with the Ottawa Decision Support Framework.³¹ The DCS is a reliable and sensitive measure of decisional conflict with a total of 16 items scored from 1 to 5.³² Total scores range from 0 (no decisional conflict) to 100 (extremely high decisional conflict), with scores lower than 25 associated with implementing decisions and scores over 37.5 associated with decision delay.³² The primary time point will be T2I versus T1C (adviser+genetic counsellor vs genetic counsellor only during the pre-test time point), but we will also assess decisional conflict following return of results by the adviser+genetic counsellor versus the counsellor alone (T6I vs T4C) as a secondary analysis to allow us to evaluate the impact of the Genetics Adviser across the entire genetic testing journey.

Secondary outcomes (table 1) include *knowledge*, measured using an established questionnaire³³; *satisfaction with decision-making* measured using the Satisfaction with

Decision scale³⁴; *anxiety* measured using the state subscale of the State-Trait Anxiety Inventory,³⁵ a commonly used psychological assessment tool to measure state anxiety in adult populations including those with chronic conditions; *quality of life* measured by the 12-item Short Form Survey³⁶; *return of results impact* measured via the validated Feelings About genomic Testing Results (FACToR) scale³⁷; *empowerment* measured via the Genetic Self-Efficacy Scale^{38 39} and the six-item Genomics Outcome Scale, derived from the Genetic Counselling Outcome Scale⁴⁰ and modified for GS; *acceptability* measured via the Participant Satisfaction with Genetics Education questionnaire⁴¹ and Web-Based Participants' Quantitative Feedback Regarding the Interactive Computer Module⁴¹; *health literacy* measured by the BRIEF and Health Literacy Screening tool⁴²; *digital health literacy* measured by the eHealth Literacy Scale⁴³; *attitudes towards healthcare* measured by the Health Care System Distrust Scale⁴⁴; and *autonomy in decision-making* measured by the Control Preferences Scale.⁴⁵

With regards to economic impact, we will compare short-term costs to participants and the health system between the two study arms. Health system resource use and costs will consist of genetic counsellor time and costs. We will account for genetic counsellor time by the counsellor self-reporting the length of all sessions and time spent on case preparation (writing letters, uploading documents to the Genetics Adviser, etc). We will then calculate the costs of genetic counsellor time by multiplying the average time counsellors spent for patients in each arm by the national average hourly wage for counsellors. Time and costs will be compared between the two arms. Costs to patients will include time off work and lost wages associated with using the tool or having genetic counselling, which will be captured using internally developed questions. Patient time and costs will be compared between arms.

Qualitative study of user experience with the Genetics Adviser

The study coordinator will interview 40 intervention participants who indicated an interest in participating in the interviews. The coordinator will confirm their interest and will schedule the telephone interview if they elect to proceed. Using an interview guide, the coordinator will explore their experience receiving pre-test education, support during the waiting time and return of results via the Genetics Adviser, their decision-making process and their views on benefits and concerns (online supplemental file 2). The interview guide was developed based on a literature review and expert input and will be modified based on findings from the data analysis. These interviews will take approximately 1 hour, be audio-recorded and transcribed verbatim. The interviewer will also take field notes immediately after each interview.

Data analysis

Quantitative

Primary and secondary outcomes

The analysis of outcomes will follow the intention-to-treat approach. Mean scores for the primary outcome, mean

DCS, will be compared using a t-test (assuming normal distribution). The secondary outcomes, satisfaction with decision-making, quality of life, impact of results, empowerment, autonomy in decision-making, knowledge of GS findings and counselling session lengths will be compared using a t-test or analysis of covariance (ANCOVA). Anxiety, literacy, knowledge of sequencing benefits and sequencing limitations scores will be assessed by summing the number of correct responses to the questions and compared adjusting for baseline scores using ANCOVA. The primary time points of comparison will be T1C for the control versus T2I for the intervention group (figure 2).

Exploratory outcomes

As part of an exploratory analysis, we will compare the impact of the delivery of results between the adviser and the counsellor on participants' decisional conflict, knowledge, satisfaction and anxiety scores. This comparison will be conducted using a t-test or ANCOVA test (depending on the presence of baseline measures) and consist of three analyses: (1) T1I versus T1C, which compares the Genetics Adviser alone vs genetic counselling at the pre-test time point, (2) T5I versus T4C, which compares the Genetics Adviser alone versus genetic counselling at the return of results time point and (3) T6I versus T4C, which compares the Adviser paired with the counsellor to the counsellor alone after return of results.

Qualitative

Thematic analysis,⁴⁶ employing constant comparison²⁷ will be used to analyse the transcripts. We will begin by open coding the data, which involves labelling the data with descriptive codes. Two team members will code transcripts independently and meet to discuss codes until consensus is reached. The next step involves constant comparison, in which codes will be compared across interviews to determine common and divergent themes and relationships among them and to characterise the entire dataset. Consistent with constant comparison, data will be analysed concurrent with data collection to explore preliminary themes and revise the interview guide accordingly. As part of the analysis process, the two coders will meet with the other team members for analysis meetings that will incorporate peer debriefings and analysis of field notes. Interviews will consider participants' sociodemographic factors that may influence their informational and decisional needs and the user experience of the Genetics Adviser. Validation methods will include triangulation and member-checking.^{47 48}

Patient and public involvement

We have an established advisory board consisting of patients with GS experience, genetic counsellors, geneticists, oncologists, decision-makers and shared decision-making experts. The advisory board was consulted to identify end-user needs, goals and key genetic counselling attributes to inform product development and

subsequently provide feedback on digital wireframes and videos and on usability and acceptability testing. The patient advisory board will also be involved in the conduct and reporting of the study.

Changes since trial registration

The following secondary outcomes have been added since the trial registration: Genetic Self-Efficacy Scale^{38 39} (added as a pre-test/post-test empowerment scale); Genomics Outcome Scale⁴⁰ (added to capture a positive oriented measure for patient impact); Participant Satisfaction with Genetics Education⁴¹ (added as an alternative satisfaction scale); Web-Based Participants' Quantitative Feedback Regarding the Interactive Computer Module⁴¹ (added to measure participants' reactions to the tool); FACToR Questionnaire³⁷ (added as a post-test measure of distress); the 4-Item Brief Health Literacy Screening Tool⁴² and the e-Health Literacy Scale⁴³ (added as baseline measures); Health Care System Distrust Scale⁴⁴ and Control Preferences Scale⁴⁵ (added for a substudy); and quality of life and costs were added to allow for planned economic evaluations. The Preparation for Decision-Making Scale was removed because it was felt to be redundant with the Satisfaction with Decision-Making and the Decisional Conflict scales.

Furthermore, the estimated date for the collection of the primary outcome measure has changed from February 2022 to October 2022 because of changes to the recruitment timeline of the Incidental Genomics trial, to which recruitment of this study is tied. Lastly, the analysis of qualitative data will use thematic analysis, changed from grounded theory, based on recommendations from the funder reviewers.

ETHICS AND DISSEMINATION

Ethical approval

This study has been approved by Clinical Trials Ontario Streamlined Research Ethics Review System (REB#20-035).

Ethics

Informed consent will take place over the phone or Zoom Healthcare and will be audio-recorded using an external recorder. All participants will receive a copy of the consent form for their own records (online supplemental file 3).

The study coordinator will review the consent form in detail and answer any questions regarding the study. For group #2 participants, the consent will ask for permission for access to medical records at recruiting clinics and for all participants, permission to be recontacted for future studies. All information collected during this study, including personal information, will be kept confidential. All data gathered will be kept in a secured location at St. Michael's Hospital. In the case that protocol amendments are required, revisions will be submitted to the Streamlined Research Ethics Review System. All changes will be communicated to the study team and ethics board.

If there are any changes that directly affect patients or require consent, all enrolled patients will be informed of the changes.

There will be data and sample transfer agreements between SMH and each of the recruiting sites. The study will not have a data monitoring committee given that we do not anticipate severe adverse effects and was not required for our study by the Research Ethics Board (REB). To assure compliance with ethical and study protocols, the St. Michael's Hospital REB regularly conducts audits of research studies.

Dissemination

This trial evaluates the effectiveness of a novel, interactive patient-centred platform that will support patients through their genetic testing journey—the Genetics Adviser. We will present data from this trial through local, national and international conferences and publications in peer-reviewed journals. Authorship eligibility will be based on The International Committee of Medical Journal Editors. Furthermore, we will organise a stakeholder workshop with genetic counsellors, geneticists, oncologists, family physicians, laboratory professionals, industry and patients to optimise the use of this platform in clinical practice and across different specialties. The final trial dataset will be accessed by the principal investigator, immediate study team and biostatistician.

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REFERENCES

- 1 Bunnik EM, Dondorp WJ, Bredenoord AL, *et al*. Mainstreaming informed consent for genomic sequencing: a call for action. *Eur J Cancer* 2021;148:405–10.
- 2 Sturm A. Improving Access to Genetic Counselors under H.R. 3235, the "Access to Genetic Counselor Services Act" of 2019. American Society of Human Genetics. Available: <https://www.ashg.org/publications-news/ashg-news/nsgc-hr-3235/>
- 3 Villegas C, Haga SB. Access to Genetic Counselors in the southern United States. *J Pers Med* 2019;9. doi:10.3390/jpm9030033. [Epub ahead of print: 01 07 2019].
- 4 Ormond KE, Laurino MY, Barlow-Stewart K, *et al*. Genetic counseling globally: where are we now? *Am J Med Genet C Semin Med Genet* 2018;178:98–107.
- 5 Birch PH. Interactive e-counseling for genetics pre-test decisions: where are we now? *Clin Genet* 2015;87:209–17.
- 6 Bombard Y, Hayeems RZ. How digital tools can advance quality and equity in genomic medicine. *Nat Rev Genet* 2020;21:505–6.

- 7 McCuaig JM, Tone AA, Maganti M, *et al.* Modified panel-based genetic counseling for ovarian cancer susceptibility: a randomized non-inferiority study. *Gynecol Oncol* 2019;153:108–15.
- 8 Birch P, Adam S, Bansback N, *et al.* Decide: a decision support tool to facilitate parents' choices regarding genome-wide sequencing. *J Genet Couns* 2016;25:1298–308.
- 9 Bombard Y, Clausen M, Mighton C, *et al.* The Genomics ADVISER: development and usability testing of a decision aid for the selection of incidental sequencing results. *Eur J Hum Genet* 2018;26:984–95.
- 10 Adam S, Birch PH, Coe RR, *et al.* Assessing an interactive online tool to support parents' genomic testing decisions. *J Genet Couns* 2018. doi:10.1007/s10897-018-0281-1
- 11 Grimmett C, Brooks C, Recio-Saucedo A, *et al.* Development of breast cancer choices: a decision support tool for young women with breast cancer deciding whether to have genetic testing for BRCA1/2 mutations. *Support Care Cancer* 2019;27:297–309.
- 12 Shickh S, Rafferty SA, Clausen M, *et al.* The role of digital tools in the delivery of genomic medicine: enhancing patient-centered care. *Genet Med* 2021;23:1086–94.
- 13 Bombard Y, Clausen M, Shickh S, *et al.* Effectiveness of the Genomics ADVISER decision aid for the selection of secondary findings from genomic sequencing: a randomized clinical trial. *Genet Med* 2020;22:727–35.
- 14 Managing incidental and pertinent findings from WGS in the 100,000 Genomes Project, PHG Foundation (2013), ISBN 978-1-907198-12-0
- 15 Shickh S, Clausen M, Mighton C, *et al.* Evaluation of a decision aid for incidental genomic results, the Genomics ADVISER: protocol for a mixed methods randomised controlled trial. *BMJ Open* 2018;8:e021876.
- 16 Schoonenboom J, Johnson RB. How to Construct a Mixed Methods Research Design. *Kolner Z Soz Szopsychol* 2017;69:107–31.
- 17 Tashakkori A, Teddlie C. *Handbook of mixed methods in social & behavioral research*. SAGE Publications, 2003: xv, 768 p.
- 18 Chan A-W, Tetzlaff JM, Gotzsche PC, *et al.* Spirit 2013 explanation and elaboration: guidance for protocols of clinical trials. *BMJ* 2013;346:e7586.
- 19 Chan A-W, Tetzlaff JM, Altman DG, *et al.* Spirit 2013 statement: defining standard protocol items for clinical trials. *Ann Intern Med* 2013;158:200–7.
- 20 Shickh S, Clausen M, Mighton C, *et al.* Health outcomes, utility and costs of returning incidental results from genomic sequencing in a Canadian cancer population: protocol for a mixed-methods randomised controlled trial. *BMJ Open* 2019;9:e031092.
- 21 Wakefield CE, Meiser B, Homewood J, *et al.* Randomized trial of a decision aid for individuals considering genetic testing for hereditary nonpolyposis colorectal cancer risk. *Cancer* 2008;113:956–65.
- 22 Laupacis A, O'Connor AM, Drake ER, *et al.* A decision aid for autologous pre-donation in cardiac surgery—a randomized trial. *Patient Educ Couns* 2006;61:458–66.
- 23 Miller FA, Hayeems RZ, Bytautas JP, *et al.* Testing personalized medicine: patient and physician expectations of next-generation genomic sequencing in late-stage cancer care. *Eur J Hum Genet* 2014;22:391–5.
- 24 Sandelowski M. Sample size in qualitative research. *Res Nurs Health* 1995;18:179–83.
- 25 Morse JM. Designing funded qualitative research. In: Denzin NKL, ed. *Handbook of qualitative research*. Thousand Oaks, CA: Sage, 1994.
- 26 Miles M, Huberman AH. *Qualitative data analysis; an expanded sourcebook*. Newbury Park, CA: Sage, 1994.
- 27 Strauss A, Corbin J. *Basics of qualitative research: techniques and procedures for developing grounded theory*. Second ed. Sage Publications, 1998.
- 28 Coyne IT. Sampling in qualitative research. purposeful and theoretical sampling; merging or clear boundaries? *J Adv Nurs* 1997;26:623–30.
- 29 O'Connor AM. Validation of a decisional conflict scale. *Med Decis Making* 1995;15:25–30.
- 30 O'Connor AM, Tugwell P, Wells GA, *et al.* A decision aid for women considering hormone therapy after menopause: decision support framework and evaluation. *Patient Educ Couns* 1998;33:267–79.
- 31 O'Connor A. Ottawa decision support framework (ODSF). Available: <https://decisionaid.ohri.ca/odsf.html> [Accessed January 2 2022].
- 32 Connor AM. User Manual- decisional conflict scale, 2010. Available: https://decisionaid.ohri.ca/docs/develop/User_Manuals/UM_decisional_conflict.pdf [Accessed January 2 2022].
- 33 Kaphingst KA, Facio FM, Cheng M-R, *et al.* Effects of informed consent for individual genome sequencing on relevant knowledge. *Clin Genet* 2012;82:408–15.
- 34 Holmes-Rovner M, Kroll J, Schmitt N, *et al.* Patient satisfaction with health care decisions: the satisfaction with decision scale. *Med Decis Making* 1996;16:58–64.
- 35 Julian LJ. Measures of anxiety: State-Trait anxiety inventory (STAI), Beck anxiety inventory (BAI), and hospital anxiety and depression Scale-Anxiety (HADS-A). *Arthritis Care Res* 2011;63:S467–72.
- 36 Ware J, Kosinski M, Keller SD. A 12-Item short-form health survey: construction of scales and preliminary tests of reliability and validity. *Med Care* 1996;34:220–33.
- 37 Li M, Bennette CS, Amendola LM, *et al.* The feelings about genomic testing results (factor) questionnaire: development and preliminary validation. *J Genet Couns* 2019;28:477–90.
- 38 Carere DA, Kraft P, Kaphingst KA, *et al.* Consumers report lower confidence in their genetics knowledge following direct-to-consumer personal genomic testing. *Genet Med* 2016;18:65–72.
- 39 Kaphingst KA, McBride CM, Wade C, *et al.* Consumers' use of web-based information and their decisions about multiplex genetic susceptibility testing. *J Med Internet Res* 2010;12:e41.
- 40 Grant PE, Pampaka M, Payne K, *et al.* Developing a short-form of the genetic counselling outcome scale: the genomics outcome scale. *Eur J Med Genet* 2019;62:324–34.
- 41 Fan CW, Castonguay L, Rummell S, *et al.* Online module for carrier screening in Ashkenazi Jewish individuals compared with in-person genetics education: a randomized controlled trial. *J Genet Couns* 2018;27:426–38.
- 42 Haun J, Luther S, Dodd V, *et al.* Measurement variation across health literacy assessments: implications for assessment selection in research and practice. *J Health Commun* 2012;17 Suppl 3:141–59.
- 43 Norman CD, Skinner HA. eHEALS: the eHealth literacy scale. *J Med Internet Res* 2006;8:e27.
- 44 Shea JA, Micco E, Dean LT, *et al.* Development of a revised health care system distrust scale. *J Gen Intern Med* 2008;23:727–32.
- 45 Degner LF, Sloan JA, Venkatesh P. The control preferences scale. *Can J Nurs Res* 1997;29:21–43.
- 46 Braun V, Clarke V. Using thematic analysis in psychology. *Qual Res Psychol* 2006;3:77–101.
- 47 Morse JM. Approaches to qualitative-quantitative methodological triangulation. *Nurs Res* 1991;40:120–123.
- 48 Sandelowski M. Rigor or rigor mortis: the problem of rigor in qualitative research revisited. *ANS Adv Nurs Sci* 1993;16:1–8.

Supplementary file 1



SPIRIT 2013 Checklist: Recommended items to address in a clinical trial protocol and related documents*

Section/item	ItemNo	Description	Page number
Administrative information			
Title	1	Descriptive title identifying the study design, population, interventions, and, if applicable, trial acronym	1
Trial registration	2a	Trial identifier and registry name. If not yet registered, name of intended registry	1
	2b	All items from the World Health Organization Trial Registration Data Set	Yes (available in trial register NCT04725565)
Protocol version	3	Date and version identifier	N/A
Funding	4	Sources and types of financial, material, and other support	8
Roles and responsibilities	5a	Names, affiliations, and roles of protocol contributors	1,8
	5b	Name and contact information for the trial sponsor	N/A
	5c	Role of study sponsor and funders, if any, in study design; collection, management, analysis, and interpretation of data; writing of the report; and the decision to submit the report for publication, including whether they will have ultimate authority over any of these activities	8
	5d	Composition, roles, and responsibilities of the coordinating centre, steering committee, endpoint adjudication committee, data management team, and other individuals or groups overseeing the trial, if applicable (see Item 21a for data monitoring committee)	N/A
Introduction			
Background and rationale	6a	Description of research question and justification for undertaking the trial, including summary of relevant studies (published and unpublished) examining benefits and harms for each intervention	1-2
	6b	Explanation for choice of comparators	2-4

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Objectives	7	Specific objectives or hypotheses	2-4
Trial design	8	Description of trial design including type of trial (eg, parallel group, crossover, factorial, single group), allocation ratio, and framework (eg, superiority, equivalence, noninferiority, exploratory)	4
Methods: Participants, interventions, and outcomes			
Study setting	9	Description of study settings (eg, community clinic, academic hospital) and list of countries where data will be collected. Reference to where list of study sites can be obtained	4
Eligibility criteria	10	Inclusion and exclusion criteria for participants. If applicable, eligibility criteria for study centres and individuals who will perform the interventions (eg, surgeons, psychotherapists)	4
Interventions	11a	Interventions for each group with sufficient detail to allow replication, including how and when they will be administered	5
	11b	Criteria for discontinuing or modifying allocated interventions for a given trial participant (eg, drug dose change in response to harms, participant request, or improving/worsening disease)	6
	11c	Strategies to improve adherence to intervention protocols, and any procedures for monitoring adherence (eg, drug tablet return, laboratory tests)	6
	11d	Relevant concomitant care and interventions that are permitted or prohibited during the trial	N/A
Outcomes	12	Primary, secondary, and other outcomes, including the specific measurement variable (eg, systolic blood pressure), analysis metric (eg, change from baseline, final value, time to event), method of aggregation (eg, median, proportion), and time point for each outcome. Explanation of the clinical relevance of chosen efficacy and harm outcomes is strongly recommended	6, Table 1
Participant timeline	13	Time schedule of enrolment, interventions (including any run-ins and washouts), assessments, and visits for participants. A schematic diagram is highly recommended (see Figure)	Table 1, Figure 2
Sample size	14	Estimated number of participants needed to achieve study objectives and how it was determined, including clinical and statistical assumptions supporting any sample size calculations	4
Recruitment	15	Strategies for achieving adequate participant enrolment to reach target sample size	4,6

Methods: Assignment of interventions (for controlled trials)

Allocation:

Supplementary file 1

Sequence generation	16a	Method of generating the allocation sequence (eg, computer-generated random numbers), and list of any factors for stratification. To reduce predictability of a random sequence, details of any planned restriction (eg, blocking) should be provided in a separate document that is unavailable to those who enrol participants or assign interventions	5
Allocation concealment mechanism	16b	Mechanism of implementing the allocation sequence (eg, central telephone; sequentially numbered, opaque, sealed envelopes), describing any steps to conceal the sequence until interventions are assigned	5
Implementation	16c	Who will generate the allocation sequence, who will enrol participants, and who will assign participants to interventions	5
Blinding (masking)	17a	Who will be blinded after assignment to interventions (eg, trial participants, care providers, outcome assessors, data analysts), and how	N/A
	17b	If blinded, circumstances under which unblinding is permissible, and procedure for revealing a participant's allocated intervention during the trial	N/A

Methods: Data collection, management, and analysis

Data collection methods	18a	Plans for assessment and collection of outcome, baseline, and other trial data, including any related processes to promote data quality (eg, duplicate measurements, training of assessors) and a description of study instruments (eg, questionnaires, laboratory tests) along with their reliability and validity, if known. Reference to where data collection forms can be found, if not in the protocol	4-6
	18b	Plans to promote participant retention and complete follow-up, including list of any outcome data to be collected for participants who discontinue or deviate from intervention protocols	6
Data management	19	Plans for data entry, coding, security, and storage, including any related processes to promote data quality (eg, double data entry; range checks for data values). Reference to where details of data management procedures can be found, if not in the protocol	6
Statistical methods	20a	Statistical methods for analysing primary and secondary outcomes. Reference to where other details of the statistical analysis plan can be found, if not in the protocol	6-7
	20b	Methods for any additional analyses (eg, subgroup and adjusted analyses)	N/A

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20c	Definition of analysis population relating to protocol non-adherence (eg, as randomised analysis), and any statistical methods to handle missing data (eg, multiple imputation)	N/A
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Methods: Monitoring

Data monitoring	21a	Composition of data monitoring committee (DMC); summary of its role and reporting structure; statement of whether it is independent from the sponsor and competing interests; and reference to where further details about its charter can be found, if not in the protocol. Alternatively, an explanation of why a DMC is not needed	8
	21b	Description of any interim analyses and stopping guidelines, including who will have access to these interim results and make the final decision to terminate the trial	N/A
Harms	22	Plans for collecting, assessing, reporting, and managing solicited and spontaneously reported adverse events and other unintended effects of trial interventions or trial conduct	N/A
Auditing	23	Frequency and procedures for auditing trial conduct, if any, and whether the process will be independent from investigators and the sponsor	8

Ethics and dissemination

Research ethics approval	24	Plans for seeking research ethics committee/institutional review board (REC/IRB) approval	1, 7-8
Protocol amendments	25	Plans for communicating important protocol modifications (eg, changes to eligibility criteria, outcomes, analyses) to relevant parties (eg, investigators, REC/IRBs, trial participants, trial registries, journals, regulators)	7-8
Consent or assent	26a	Who will obtain informed consent or assent from potential trial participants or authorised surrogates, and how (see Item 32)	7-8
	26b	Additional consent provisions for collection and use of participant data and biological specimens in ancillary studies, if applicable	N/A
Confidentiality	27	How personal information about potential and enrolled participants will be collected, shared, and maintained in order to protect confidentiality before, during, and after the trial	6-8
Declaration of interests	28	Financial and other competing interests for principal investigators for the overall trial and each study site	8

Supplementary file 1

Access to data	29	Statement of who will have access to the final trial dataset, and disclosure of contractual agreements that limit such access for investigators	8
Ancillary and post-trial care	30	Provisions, if any, for ancillary and post-trial care, and for compensation to those who suffer harm from trial participation	N/A
Dissemination policy	31a	Plans for investigators and sponsor to communicate trial results to participants, healthcare professionals, the public, and other relevant groups (eg, via publication, reporting in results databases, or other data sharing arrangements), including any publication restrictions	8
	31b	Authorship eligibility guidelines and any intended use of professional writers	8
	31c	Plans, if any, for granting public access to the full protocol, participant-level dataset, and statistical code	N/A
Appendices			
Informed consent materials	32	Model consent form and other related documentation given to participants and authorised surrogates	Supplementary files
Biological specimens	33	Plans for collection, laboratory evaluation, and storage of biological specimens for genetic or molecular analysis in the current trial and for future use in ancillary studies, if applicable	N/A

*It is strongly recommended that this checklist be read in conjunction with the SPIRIT 2013 Explanation & Elaboration for important clarification on the items. Amendments to the protocol should be tracked and dated. The SPIRIT checklist is copyrighted by the SPIRIT Group under the Creative Commons “[Attribution-NonCommercial-NoDerivs 3.0 Unported](#)” license.

Supplementary file 2

Genetics Adviser: evaluating a digital decision support tool for genetic results
Appendix 12 – Qualitative Interview Guide**Qualitative Interview Guide****Instructions for interviewer:**

This section is a semi structured, open-ended interview. Use the questions here to guide the conversation. Probes are provided to help you explore the questions with the participant and to provide some bearing on what is important to explore in the conversation. Your questions may branch into other topics not covered in the interview questions. This information is important as well and it is ok to depart from the interview questions in order to explore these elements.

Before ending the interview review the questions provided here to be sure you discussed all of the topics outlined.

Hello [participant]. Thank you very much for your participation in this study. Your participation is completely voluntary, you can stop at any time and you can opt out of any questions you do not wish to answer or discuss. We ask you not to use your name, or the names of any relatives or other individuals, in this interview. Your answers are confidential. Once this interview is completed, we will have it transcribed, at which time we will remove any references to names or places that could identify you. Please note that if for any reason in this interview you inform us of your intent to harm yourself or other, we will have to report this information. Direct quotes from your responses to question in this interview may be used in reports or publications, but the quotes will not be attributed to you or contain any information that could be used to identify you. These quotes will be found in publications about the study results and most of these publications can be accessed on line.

The interview will take about 60 minutes to complete. Although we do not anticipate it, our discussion today may include topics that you may find sensitive and you might find some questions uncomfortable. You are free skip any question you prefer not to answer.

I am going to begin recording the interview now. [Turn on audio recorder]

We are interested in learning about your experience using the digital tool and learning your clinically significant findings from genomic sequencing.

Topic: Using the digital tool

First, I'd like to learn more about your experience using the digital tool.

1. Please tell me about your experience using the digital tool?

Probes:

- *What did you like about using the digital tool?*
- *What did you dislike about using the digital tool?*
- *What did you do after you had used the digital tool (e.g. call clinician, look online for more information)*
- *How did the digital tool influence your decision?*
- *What do you wish had been different about your decision making process?*

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Genetics Adviser: evaluating a digital decision support tool for genetic results
Appendix 12 – Qualitative Interview Guide

2. What were your thoughts about the volume of information presented in the digital tool?

Probes:

- *What other information would you have wanted?*
- *What information seemed unnecessary or not useful?*

3. What were your thoughts about how information was presented in the digital tool?

Probes:

- *What made it easy to understand?*
- *What made it difficult to understand?*
- *What changes would you suggest to formatting or to the presentation of information (e.g. audio, visual, text)?*

4. What made it easy to use to the digital tool to (e.g. accessing the digital tool, navigating the digital tool)?

- *E.g. easy to access, easy to navigate.*

5. What were challenges to using the digital tool?

6. What changes would you suggest be made to improve the digital tool?

Probes:

- *Additional features?*
- *Additional information?*
- *A different presentation of the information?*

Topic: Digital tool implementation

Now, I am going to ask some questions related to using digital tools more widely in clinical care.

7. What do you see as the benefits of a digital tool like this one being used regularly in clinical care to help patient make decisions about genetic testing?

8. What concerns do you have about a digital tool being used regularly in clinical care to provide updates to patients?

9. What do you see as facilitators to using digital tools in clinical care?

Probes:

- *Are the facilitators specific to the patient portal?*
- *Are the facilitators specific to the patients or health professionals?*
- *Who will use the patient portals and include them in the process of care?*

10. What do you see as being challenges to using portals in clinical care?

Probes:

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Genetics Adviser: evaluating a digital decision support tool for genetic results
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- *Are the barriers specific to the digital tool (e.g., requires computer access, literacy too high, too difficult to use, not accessible)?*
- *Are the barriers specific to the patients or health professionals (e.g. lack of awareness, limited knowledge/skills, attitudes, concerns, incompatible with current practice, lack of confidence)?*
- *Who will use digital tools and include them in the process of care?*

Topic: Learning results from genomic sequencing

Now, I would like to ask you some questions about what it was like to learn results from genomic sequencing.

11. What was your motivation for participating in this study?

12. Before you got your results back, what was your expectation of the kinds of information you would learn from genomic sequencing?

Probes:

- *How was the experience of waiting for your results?*
- *What did you do or who did you speak with to prepare for receiving your results? Did you find these helpful?*

13. Please tell me about your experience receiving your results from the exome sequencing study.

Probes:

- *What results did you learn?*
- *What was most important to you?*
- *How did the results make you feel initially?*
- *How did your thoughts about your results change over time?*

14. What did you find useful about your results?

Probes:

- *Why was that useful for you?*
- *[If participant states they did not find results useful] Why did you find the results to not be useful?*
- *[For positive primary/secondary or incidental results] What does this disease risk [Interviewer: state disease risk mean for you and your family?]*
- *How do you feel about learning these results?*
- *Since you have learned your results, how has it helped explain anything in your personal or family health history, if at all?*

15. As you learned in the study, all results come with some level of uncertainty. E.g. Even if you get a result, you won't necessarily get the disease. If you don't get a result, that doesn't mean you are not at

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Genetics Adviser: evaluating a digital decision support tool for genetic results
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risk for genetic diseases. What uncertainty did you experience with respect to your genome sequencing results?

Probes:

- *How did you feel about this uncertainty?*
- *[If applicable] Some of your results are in genes associated with a high risk of disease [Category 1, 3, 4], whereas others are associated with a low risk for disease [Category 2]. How does this affect how you think about your results?*
- *[If applicable] For some of your results, we can't say exactly what your risk of disease is, just that it is higher than average. What does this mean to you? How do you feel about this?*
- *Incidental findings may not be able to tell you how severe a disease will be, if you do develop it. What are your thoughts about this?*
- *What were you uncertain about when acting on your results?*

16. How did you decide to share or not share results with other people?

Probes:

- *What were your experiences sharing your results?*
- *What challenges did you face in sharing the results with people?*
- *What did you find helpful in sharing results with people?*
- *How did your family members feel about the results?*
- *How did your family members use the results?*
- *Who are you thinking about sharing the results with in the future?*

17. What actions did you take based on your results?

- *How have you or your healthcare providers used your results to manage your medical care? [Probe each result]*
- *How did you feel about changes in your care based on your results?*
- *Were there other things you wanted to do with your results, that your medical specialists would not do for you?*
- *What were challenges that you faced in acting on the results?*
- *What are challenges you faced in accessing health care (screening, surgery) related to your results?*
- *Have you discussed your results with your family doctor? If so, how did your family doctor manage your results? [If they have not discussed their results with their fam dr] Why have you not discussed your results with your family doctor?*
- *[If they had a referral to a specialty clinic] I understand you were referred to [clinic] because of your findings. Could you please tell me about that experience?*
- *What actions were taken, what did you learn, what ongoing follow up was recommended*
- *How do you feel about the process of receiving care?*
- *How do you feel about the outcomes of this care?*

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Genetics Adviser: evaluating a digital decision support tool for genetic results
Appendix 12 – Qualitative Interview Guide

- *[If they did not pursue the recommended referral] Why did you choose not to pursue a referral to [clinic] because of your result?*
- *How have you used the results in other aspects of your life? E.g. coping with disease risk, ability to plan for future (e.g. financial), change outlook on life, overall quality of life, value of having information about your health*
- *How are you planning to use your results in the future?*

18. What were any negative experiences that you had after receiving your results?

Probes:

- *Discrimination?*
- *Privacy issues?*
- *Stigma?*

19. What were any positive experiences that you had after receiving your results?

20. Over time, as we learn more about the genetics of disease, the meaning of your results could change.

Probes:

- *How do you feel about that?*
- *What are your expectations about being recontacted with updated results?*
- *What types of results would you want updates about?*
- *How would you want to be recontacted? By whom?*
- *How would you feel if your results were updated through an online portal?*
- *What would you like about this process?*
- *What would you be concerned about?*

21. Knowing what you know now, would you do this test again? Why or why not?

Topic: Closing Question

22. Is there anything you would like to share, that we have not yet covered?

Supplementary file 3

Genetics Adviser: evaluating a digital decision support tool for genetic results
Consent Form- Incidental Genomics Participants (SMH)**INFORMED CONSENT FORM FOR PARTICIPATION IN A RESEARCH STUDY**

Study Title	Genetics Adviser: evaluating a digital decision support tool for genetic results
Principal Investigator	Dr. Yvonne Bombard, St Michaels Hospital, Li Ka Shing Knowledge Institute. 416-864-6060 x 77378
Funder	Canadian Institute of Health Research
Contact Number:	416-864-6060 x 77397

INTRODUCTION

You are being asked to take part in a clinical trial (a type of study that involves research). You are being asked to consider taking part in this research study because you are were a participant in the Incidental Genomics study that took place at St. Michael's Hospital. For this study we are looking to enroll people for whom a new type of genetic test called "genomic sequencing" might discover a gene(s) related to their cancer. The purpose of the study is to understand if an online computer program can help people learn about genetic testing and select what type of results they would like to receive from genetic testing. This consent form provides you with information to help you make an informed choice about participating. Please read this document carefully and ask any questions you may have. All your questions should be answered to your satisfaction before you decide whether to participate in this research study.

Please take your time in making your decision. You may find it helpful to discuss it with your friends, family or your physician.

Taking part in this study is voluntary. Deciding not to take part or deciding to leave the study later will not affect current or future health care.

IS THERE A CONFLICT OF INTEREST?

Neither you nor the members of the study team will realize any financial gain directly from this study. Dr. Bombard and the other research team members have no conflict of interest to declare.

WHAT IS THE BACKGROUND INFORMATION FOR THIS STUDY?

Genetic testing is evolving and there is a new type of genetic test called "genomic sequencing".

- **Traditionally**, if a person has a disease, such as colorectal cancer, he or she may be referred to a genetics clinic to have a genetic test to learn if they have a genetic variation (or change in their DNA) that increases their risk to develop this type of cancer. This type of test only looks at specific genetic variations known to be linked with a specific type of cancer.

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- **Genomic sequencing** is another type of genetic test that looks more broadly at all genetic variations that a person has, rather than looking at specific variation as explained above.

Some (but not all) of the genetic changes or variations found in genomic sequencing may be linked to higher risks of diseases. When a person gets genomic sequencing they can learn about risks for a disease affecting them, such as colorectal cancer. But they may also have the option to learn extra genetic information about risks for diseases other than the original disease being investigated. This extra information is often referred to as “secondary” or “incidental results”. These incidental results can tell if a person has, or is at risk for, a rare disease, like Alzheimer’s disease, or common diseases, like heart disease, or even other cancers. It is also important to know that even if a person gets genomic sequencing, there is a chance that no changes related to disease risks will be found.

For this study we have created a decision aid to help people decide which type of incidental findings they would like to learn (if any). There are decision aids for many diseases and medical conditions and they are commonly used in the medical field to assist patients. The decision aid we have designed for incidental findings gives a person information about incidental findings, information about the different categories of incidental findings and provides information about the potential impact of this information. The decision aid then asks a set of questions to help a person decide what type of incidental findings (if any) they would like to receive. The decision aid will also help people get prepared for having their incidental results returned to them and will also let them see a summary of their results once they are available.

For this study we are interested in comparing the effectiveness of our decision aid against traditional genetic counseling. We anticipate that no more than 140 people in total will be enrolled in the study.

You will be actively involved in the study for 6 months. As a part of this study you will be receiving (or have already received) genomic sequencing and will be receiving actual incidental results.

WHY IS THIS STUDY BEING DONE?

The main purpose of this study is to understand how effective our decision aid is in helping patients select what type of incidental result they would like to receive from genomic sequencing.

WHAT OTHER CHOICES ARE THERE?

You do not have to take part in this study in order to receive standard treatment or care.

HOW MANY PEOPLE WILL TAKE PART IN THIS STUDY?

It is anticipated that about 140 people will take part in this study, from research sites located in Ontario.

WHAT WILL HAPPEN DURING THE STUDY?

If you decide to participate in the study you will be asked to verbally consent to participation in the study. A copy of the consent form will be given to you.

Once you consent to participate in the study, we will ask you a series of questions about your medical history and genetic testing, some questions about your current feelings, emotions and expectations about having genomic sequencing.

After you answer these questions, you will be “randomized” to participate in one of two study groups, described below. Randomization means that you are put into a group by chance (like

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flipping a coin). There is no way to predict which group you will be assigned to. You will have an equal chance of being placed in either group. Neither you, the study staff, nor the study doctors can choose which group you will be in.

If you are in group one you will use our online decision aid and speak with genetic counselor to learn about and select which incidental results you would like to learn. Group one participants will also use the decision aid to prepare for learning their results and to receive a preview of their results before they speak with genetic counselor about their results. If you are in group two you will speak with a genetic counselor to learn about and select which incidental results you would like to receive. Group two participants will also speak with a genetic counselor to prepare for learning their results and to learn about their results. Both groups will have genomic sequencing performed and both groups will receive results from genomic sequencing. Because you participated in a study with us previously where you received genomic sequencing results for your cancer, you will only receive incidental results and will not receive any further results related to your cancer. There is a chance that no results will be found. Below is an explanation of what you will be asked to do depending on which group you are randomized to participate in:

Group One (Using a decision aid and speaking with a genetic counselor about results)

- If you participate in group one, we will verbally provide you with a link to view the decision aid online. The decision aid will contain videos explaining genetic testing and the possible results you could learn. You will receive a user name and password for the decision aid from the study team verbally once you have been randomized. At the end of decision aid you will be asked to choose which results you would be interested in receiving
- After you are done using the decision aid we will ask you some survey questions related to using the decision aid.
- After you complete the decision aid and answer the survey questions you will speak with a genetic counsellor over the phone or via computer conferencing
- The genetic counselor will speak to you about your decision on what to learn from the genetic testing. The types of questions they will ask will be related to your understanding of the topic and your preferences for learning about genetic test results. During your genetic counselling session, you will also have an opportunity to ask any questions you may have after using the decision aid.
- Your session with your genetic counsellor will be audio recorded so that we can verify the session for consistency.
- After speaking with the genetic counsellor, they will ask you some survey questions about what you learned about genetic results, your feelings about receiving these results, your satisfaction with your decision and your general feelings.
- It will take you approximately 1 hour to view and complete the decision aid online, complete the follow-up questions and to complete the counseling session.
- During this consent process we will ask for your permission to re-analyze your exome sequence from the Incidental Genomics that you previously participated in. If you do not wish to use this sequence then we will take a saliva sample. From your saliva sample we will extract a sample of your DNA and this sample will be used for genomic sequencing. If you need to provide a saliva sample, we will send you a saliva sample kit to your

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home. The kit will contain instructions on how to prepare your sample and how to return the sample to the study team.

- After you have selected which results you would like to receive, we will re-analyze your exome sequence or arrange to have your DNA sample sequenced. An exome sequence is a type of genetic test that looks at most of the changes found in your DNA. Exome sequencing was the type of genetic test you had a part of the Incidental Genomics study. It is estimated that it will take 4-5 months to get your sequencing results, however it may take up to 6 months.
- Two weeks after you have selected which results you would like to receive, we will ask you to complete online survey questions about what you learned about incidental findings, your feelings about receiving these findings, your satisfaction with your decision and your general feelings. We will send you an email with a link the survey.
- Two months after your first meeting where you used the decision aid we will send you a message to log back into the decision aid to prepare you to learn your results. The decision aid will give you information about the possible results you could receive, ask you about your feelings about receiving results and provide resources to help prepare for your results.
- After using the decision aid we will ask you to answer some follow-up survey questions about what you learned about incidental findings, your feelings about receiving these findings, your satisfaction with your decision and your general feelings. We will send you an email with a link to the survey which we will ask you to fill out after you have used the decision aid.
- Using the decision aid to prepare for your results and answering follow up questions will take 20 min to complete.
- Once we have your results a genetic counsellor will contact you to set up a phone or computer conference call meeting to discuss your results.
- One week before your scheduled meeting with the genetic counselor you will be sent an email with instructions to log into the decision aid. In the decision aid you will be able to review a summary of your results. The summary will give you a brief description of any findings, the possible implications for your health and any recommended medical actions. After using the decision aid to preview your results we will ask you to answer some follow-up survey questions about what you learned about incidental findings, your feelings about receiving these findings, your satisfaction with your decision and your general feelings. We will send you an email with a link to the survey which we will ask you to fill out after you have used the decision aid.
- Using the decision aid for your results and answering the follow-up question will take 20 mins to complete.
- In the meeting with the genetic counselor one week later, the genetic counselor will review your result with you in detail and will discuss any further plans or referrals that are recommended. During this meeting, the genetic counselor will also share with you a detailed report on your results and after the meeting will mail or email you a copy of this detailed report.

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- If for any reason during the analysis processes we find results requiring urgent, immediate action, prior to the 4-5 month time for return of results, these results will be returned as soon as possible; you will not have to wait 4-5 months.
- At the end of the meeting where we discuss the results from your genomic sequencing, we will ask you to complete a questionnaire about your feelings about receiving your incidental results and your health actions. The meeting about your results and completing this questionnaire will take you approximately 1 hour to complete.
- After completing this final set of follow-up survey questions your participation in the study will be over.

Group Two (Speaking with a genetic counselor only about results):

If you are in group Two you will go through the same steps as group one with a couple of differences because you will not be using the decision aid. These differences are:

- You will not use the decision aid at any point in the study. Instead, you will speak with a genetic counselor over the phone or by computer conferencing to learn about and select genomics sequencing results.
- The two-month time point to prepare for receiving results will be conducted by a genetic counselor over the phone or by computer conferencing.
- You will not receive a preview of your results, rather you will learn about your results the first time when you have the final meeting with the genetic counselor.
- If you are in group two all the other steps are the same as outlined above in group one.
- After each meeting with the genetic counselor you will complete follow up survey questions.

Some participants from both groups 1 and 2 (approximately 40 in total) will be asked to complete a conversational interview after they have completed all the study visits. This interview will be conducted over the phone or via computer conferencing with our study staff. We will ask you about your thoughts and experiences using the decision aid, learning about your results and how you have used this information in your health decisions. This interview will take about an hour and can be scheduled at a date and time of your choosing. This visit will be audio-recorded and transcribed.

We will also audio record all of your genetic counseling sessions and a subset of these sessions will be transcribed. This is being done so we can do quality checks on the session and, as part of our research, we will look at what types of questions patients have about genomic sequencing and incidental results.

We will ask you not to use your name, or the name of any relatives during both the genetic counseling sessions and the conversational interview. Any names and identifiers will be deleted during the transcription process, which is called de-identification. Transcription is taking the words and dialogue on the audiotape and writing or typing it word for word. Transcription will be performed by Flying Fingers, an external transcription service that has a signed service provider and confidentiality agreement with our team.

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TIME		
	GROUP 1 (70 participants)	GROUP 2 (70 participants)
	Will use the decision aid and speak with a genetic counselor to select and learn about genomics testing results.	Will speak with a genetic counselor only to select and learn about genomics testing results.
Meeting 1: First meeting	<ul style="list-style-type: none"> Complete baseline questions and randomization with study coordinator over the phone or computer conferencing Use decision aid on computer, tablet or smart phone Select what type of results to learn Answer follow-up survey questions Speak with study GC Review any items that may need clarification Review and confirm results selection Answer follow-up survey questions 	<ul style="list-style-type: none"> Complete baseline questions and randomization with study coordinator over the phone or computer conferencing Phone call or computer conference call with study GC Select what type of results to learn Answer follow-up survey questions
	<ul style="list-style-type: none"> Sample sent for sequencing 	<ul style="list-style-type: none"> Sample sent for sequencing
Meeting 2: two weeks after first meeting	<ul style="list-style-type: none"> Complete online follow up survey 	<ul style="list-style-type: none"> Complete online follow up survey
Meeting 3: 2 months after sample sent for sequencing.	<ul style="list-style-type: none"> Use decision aid on computer, tablet or smart phone Prepare for your results Answer follow-up survey questions 	<ul style="list-style-type: none"> Phone call or computer conference call with study GC Prepare for your results Answer follow-up survey questions
Meeting 4: 1 week before final meeting with study GC (when results are ready – approx. 5 month from first meeting)	<ul style="list-style-type: none"> Use decision aid on computer, tablet or smart phone Preview results Answer follow-up survey questions 	No meeting or actions at this time point.
Meeting 5: When results are ready – approx. 5 months from first meeting)	<ul style="list-style-type: none"> Phone call or computer conference call with study GC Review genomic results in detail 	<ul style="list-style-type: none"> Phone call or computer conference call with study GC Review genomic results in detail

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	<ul style="list-style-type: none"> • Discuss any need for follow-up and referrals • Answer follow-up survey questions 	<ul style="list-style-type: none"> • Discuss any need for follow-up and referrals • Answer follow-up survey questions
Meeting 6: After last meeting with study GC	<ul style="list-style-type: none"> • Phone call with study team • Conversational interview (not for all participants, but only for those who are selected to participate - 40 participants in total) 	<ul style="list-style-type: none"> • Phone call with study team • Conversational interview (not for all participants, but only for those who are selected to participate - 40 participants in total)
	ACTIVE PARTICIPATION ENDS	ACTIVE PARTICIPATION ENDS

WHAT ELSE DO I NEED TO KNOW ABOUT THE STUDY?

This study is not the only way to have genomic sequencing. Genomic sequencing is available outside of the study for a cost. If you are interested in this outside of the study, you can talk to your physician.

If you participate in this study, we would like your permission to access your medical records at the genetics clinic where you were being seen for your cancer diagnosis. We will only collect the information we need for the study, which will include past cancer diagnoses, any past treatments for cancer, past genetic testing type and results. We will use this information to confirm your cancer history, any treatments received, and your genetic testing history.

In this study we will inform your clinicians at the genetics clinic where you were being seen for your cancer diagnosis about your participation in this study. Results from the study will not be placed in your medical file. All reports that are produced from this study will be clearly labeled as a research result. Because these are labeled as research results, this might mean that you will need follow-up genetic testing to confirm some results.

Also, as a part of this study we will audio record and analyse your sessions with our study genetic counsellor. We will use this information to study what sorts of questions and comments people have when learning about incidental results and genomic sequencing.

Finally, we would also like to collect the name and contact information of one of your family members to whom you would like your genomic sequencing results returned to. In the event that you pass away before receiving sequencing results and a life-threatening, actionable result is found that might impact other family members, this result would be shared with the family member you indicated. It is in their best interest to learn about it so that they may make decisions that could help them or other family members take actions to reduce their risk of developing a disease. Only life-threatening, medically actionable information would be shared; no other genetic information would be shared. You will have the opportunity to ask this family member their permission to share their name contact information with the study team before you provide this information to the study team. You also do not have to provide the contact information of a family member to share this information with.

☐ In the event that I die before I receive the results from my genomic sequence I do **not** give my permission for the study staff to share any life threatening genetic results with anyone.

☐ In the event that I die before I receive the results from my genomic sequence I **do** give my permission for the study staff to share any life threatening genetic results only with

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the person I have provided.

Participant's Name

Signature

Date**Use of Your Exome sequence**

If you previously had genomic sequencing with one of our studies, we would like to use this sequence for analysis in this study. If you do not agree to use your exome sequence for this study, then a saliva sample will be taken after your initial consent session. From your saliva a sample of DNA will be extracted. Your saliva sample will be sent to a laboratory at The Hospital for Sick Children's Centre for Applied Genomics (TCAG), where your DNA will be extracted and then it will be sequenced. DNA and saliva samples will not be stored or used for any other research purposes. DNA and saliva samples will be destroyed once sequencing has been done.

☐ I do **not** give my permission for my exome sequence from the Incidental genomics to be used in this study for analysis .

☐ I **do** give my permission for my exome sequence from the Incidental genomics to be in this study for analysis .

Participant's Name

Signature

Date**How will samples and my genetic sequence be identified?**

To protect your identity, the information that will be on your sample and or genetic sequence will be limited to your study ID number. Despite protections being in place, there is a risk of unintentional release of information. Due to technological advances in genetics, there may be a risk that the genetic information in the samples could be linked back to you.

Can I withdraw these samples?

If you no longer want your samples or sequence to be used in this research, you should tell the study coordinator, who will ensure the samples and sequence are destroyed.

If sequencing has already been done on your sample it will not be possible to withdraw your sample, since it will have been destroyed after sequencing.

WHAT KIND OF RESULTS COULD I LEARN?

If you chose to learn about medically actionable results, you might learn that you have a higher than average risk for certain types of heart problems like irregular heartbeats that can be life-threatening. You also might learn about how you react to some medications.

Other incidental findings that you might learn could be related to risk for common diseases like Type 1 diabetes. Or, you might learn about your risk for rare genetic disorders, like muscular dystrophy, or some types of progressive deafness. You might learn about risk for brain-diseases like Alzheimer's Disease. You might learn if you are a carrier for genetic diseases, like cystic fibrosis, that probably will not affect you, but that you might be able to pass on to your children. These are just a few examples of the types of results that you might learn. You will be able to choose what types of incidental findings you would like to learn, if any.

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Lots of information can be found from genomic sequencing. Some genomic sequencing results are known to be linked to risk for diseases. The meaning of some other results is not known. We will only give you results that are **known** to be linked to diseases.

Finally, there is always a chance that even if you have genomic sequencing, no results known to be linked to diseases will be found.

WHAT KINDS OF QUESTIONS WILL I BE ASKED?

Examples of the types of questions you will be asked in the study include:

“How important is it for you to learn about your risk for common diseases that you can reduce with a healthy diet & exercise?” or

“How important is it for you to learn that you may get an untreatable brain disease so you can tell or prepare your family?” or

“How strongly do you agree with this statement: I feel sure about what to choose.” or

“How strongly do you agree with this statement: This decision is easy for me to make.”

Examples of the types of questions you will be asked if you take part in the phone interview about decision making include:

“What information was most helpful in your own decision-making? What information did you think was unnecessary? What information most influenced your decision?”

“After using the decision aid, did you feel motivated or ready to make a decision? Did you feel you had the ability/skill to make this type of decision?”

WHAT SHOULD I KNOW ABOUT ANSWERING STUDY QUESTIONS ONLINE?

For those selected to participate in group 1, the decision aid you use is online, using the Internet. This will require the use of a computer or tablet or smartphone with access to the Internet. If you do not have access to a computer or the Internet, you can contact the study research coordinator and we will arrange to get you access to a computer and or the Internet. To access the decision aid you will need a link to the correct Internet address along with a unique login code. We will provide you with a link to the correct Internet address along with your unique login code over the phone or via video conferencing. None of the questions in the decision aid contain any personal information about you. The decision aid will gather data about what type of computing device you use to access the program (personal computer, phone or tablet). This information will not be able to identify you and it will not gather any other information about you from your computer session.

Also, if you are in study group 1 that is using the decision aid you will also be asked to answer some follow up questions online. The decision aid will automatically link you to these study questions and you will be able to log into this survey using the same unique login code you use for the decision aid.

WHAT WILL YOU DO WITH THE RESULTS OF MY GENOMIC SEQUENCING?

If you are in Group One you will be able to view your results in the decision aid and the study genetic counselor will discuss your results with you. If you are in Group Two, you will receive your results from the study genetic counselor only.

You will be referred to a specialist for any results that we find that may impact your health. The study genetic counsellor and medical geneticist will develop referrals and consult notes, which they will give to the genetics clinic where you were being seen for your cancer diagnosis, who

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will facilitate referrals to specialists. The type of specialist will depend on the nature of the disease risk found in your genomic sequence. For example, you may be referred to a cardiologist if results suggest that you are at increased risk for a heart condition. It is possible that we will find multiple results that will require referrals to multiple specialists. You also may receive some results that may not have a direct impact on your health, but may be important for you to be aware of. These types of results you will be able to share with your general practitioner. If you do not have a general practitioner, we will help locate one.

After the genetic counsellor gives your results to you in person or over the phone, we will mail you a full copy of the results which will indicate any referrals that have been made for you. You will also have the option of receiving your results by email via secure file transfer. You can change your mind about which incidental results you would like to receive at any time in the study up until the time when we return results to you. At the time when we return results, you may decide not to learn some of the information about those incidental results that you had previously decided to learn about. However, it is possible that we may learn some information about your health that we will still return to you because it will be very important for your health. This will only be information that we learn that is critical to your health. If you wish to add to the list of incidental results you would like to learn, you may do so up until the time you get your results back, but adding results will delay the return of your results as we will need to go back and reanalyze your information. As well, if you decide not to learn about certain categories of results, you will not be able to learn those results after the study is over. This is because we will have not analyzed these results originally and will not be analyzing them again after the study is over.

It is possible that scientists will learn more in the future about the meaning of your genomic sequencing results. At this time, we do not plan to contact you in the future to discuss any new knowledge. Also, genomic sequencing can detect changes in your DNA known to be related with a certain disease or condition. However, genome sequencing may also reveal DNA changes that are not known to be related with a particular disease or condition. These are known as “variants of uncertain significance”. Over time, as we learn more about DNA changes and variants of uncertain significance, we may find out that they are disease-causing or harmless. In this study where you are receiving incidental results, we will only look for and return results to you that are known to increase risk for a disease or condition. For incidental results we will not look for or return any “variants of uncertain significance”.

This research may tell us about the way you are related to your family. It may tell us that you or your family members are not related. If such information is found, we will not tell you or anyone else.

Finally, it is important to note that if you receive a positive result, it does not mean that you are guaranteed to develop that disease. The results you receive are estimates of risk and if you are found to have a genetic variant you may or may not develop that disease or condition in your lifetime. Also, if you are found not to have a variant for a disease or condition you may still develop the disease. It could be that our test did not detect the variant or that something else may cause you to develop the disease.

WHAT ARE THE RESPONSIBILITIES OF STUDY PARTICIPANTS?

If you choose to participate in this study, you will be expected to:

- Allow the study team to access your medical records at the genetics clinic where you were being seen for your cancer diagnosis.

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- Allow the study team to access a DNA sample stored at Mount Sinai Hospital or North York General Hospital, or provide a saliva sample.
- Use an online Decision Aid and make a decision about the type of incidental findings you would like to receive from genomic sequencing, if any (group one only)
- Allow the study team to communicate your genomic sequencing results and information about your participation with your clinicians at the genetics clinic where you were being seen for your cancer diagnosis.
- Complete questionnaires at the time-points listed above with members of the study staff, over the phone or online. Questionnaires will include questions about your demographics, your decision making, moods and feelings, medical history. You may decline to answer any questions you wish.
- Participate in a semi-structured interview with a member of the study team, over the phone. Not all participants will be contacted for this, about 40 will be in total.

HOW LONG WILL PARTICIPANTS BE IN THE STUDY?

The total time period for this study will 6 months. Depending on what group you are in you there will be either 4 or 6 study visits. The visits will be via computer program, conference calling software or conference call or over the phone. Study sessions are described in detail above.

CAN PARTICIPANTS CHOOSE TO LEAVE THE STUDY?

You can choose to end your participation in this research (called withdrawal) at any time without having to provide a reason. If you choose to withdraw from the study, you are encouraged to contact the study genetic counselor or study staff to inform them of your decision. Participation in this study, and the details of any decisions you make about your participation, will in no way affect any aspect of the care you or your family are receiving from St. Michael's Hospital, the genetics clinic where you were being seen for your cancer diagnosis, any hospital, health care facility or any medical staff

If you leave the study and your DNA or saliva sample has not yet been used for sequencing, your DNA or saliva sample will be withdrawn and destroyed. If your DNA has already been used for sequencing, any leftover sample will have been destroyed. If you leave the study after sequencing is complete, your raw genomic sequence data will be destroyed, unless it has already been uploaded for data sharing, after which it will not be possible to remove it from the database, however you will be able to remove the sequencing data from the study itself. The results of the analysis of your sequence data, and any other information recorded before you withdrew (e.g. questionnaire responses) will still be used by the researchers for the purposes of the study, but no information will be collected after you withdraw. Any data that we do hold onto will be kept confidentially and will not contain your name or any other identifying information.

CAN PARTICIPATION IN THIS STUDY END EARLY?

Participation will end if you choose to withdraw. If you are to become ill again and feel that will impact your ability to participate, you may choose to withdraw yourself.

WHAT ARE THE RISKS OR HARMS OF PARTICIPATING IN THE STUDY?

There are some possible risks to learning information from genomic sequencing and incidental findings. It is possible that you may experience distress from participating in this study or from learning about your genomic sequencing results. If you do experience any emotional distress or discomfort, we will help you get a referral to a psychologist or psychiatrist. In addition, you are always free to refuse to answer any particular questions at any time if you feel uncomfortable.

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If you experience distress related to study results (positive or negative) the study genetic counsellor will discuss this distress with you. If necessary, you will be provided online and phone contact information for patient support groups. If you seem overwhelmed, the genetic counsellor will ask if you would like a referral to a mental health specialist for more long-term support.

In these cases, the study genetic counsellor will work with the genetic counsellor at the clinic that referred you to this study to get you a referral to a psychologist or psychiatrist. The genetic counsellors will work with you through this process to ensure that you follow through with the referral and seek further care. We may also recommend you seek a referral through your family doctor / general practitioner. If the genetic counsellor feels that you need immediate mental health service, they will refer you to the emergency department at St. Michael's Hospital or your closest emergency room. In this case, the genetic counsellor will work with you to ensure you receive follow up care.

Since distress may occur at any time during the study, please contact the study team if at any time you experience any distress as a result of the study. We will put you in touch with the study genetic counsellor, who will ensure that the appropriate care is delivered.

The cost of counseling sessions or mental health services that are a result of participating in this study and are not covered by OHIP or private insurance will not be reimbursed by the study.

If you choose to share your results with your family members or others, it may affect how they feel about you, or how you feel about them. For these reasons, you and your family may wish to seek further counseling. In some cases you may want to see a mental health professional.

There is a chance that your genetic information may be used against you or your family members. This is a form of discrimination. Canada recently passed a legislation (Bill S-201) that makes genetic discrimination illegal. For instance, it is illegal for insurance companies, employers or other parties to use genetic testing results against you, or to force you to reveal the result of a genetic test. However, we cannot fully guarantee you that no one will ever use your research test results against you.

Your participation in this study is confidential; however there is a small chance that your genetic data (results from genomic sequencing) could identify you or your family members. This is because each person's genomic make-up is unique, similar to a fingerprint. Because your family's genetic make-up is very similar to yours this means that your sequencing data could potentially identify them. We will do everything to ensure that your identity is protected; but because of the uniqueness of your genetic data we cannot guarantee confidentiality for you or your family members.

WHAT ARE THE BENEFITS OF PARTICIPATING IN THIS STUDY?

You may not benefit from participating in this study. With your sequencing information you may learn new information about your risks for various diseases. You may or may not find this information helpful. Ultimately, this research will allow doctors and genetic counsellors to assess the effectiveness of a decision aid for selecting which results to learn from genetic testing.

IS MY PARTICIPATION VOLUNTARY?

Yes, your participation in this study is voluntary. You may decide not to be in this study, or to be in the study now and then change your mind later. You may leave the study at any time without affecting you or your family's care. You may refuse to answer any question(s) you do not want to answer, or not answer a question by saying "pass" or selecting "skip" when answering questions.

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Genetics Adviser: evaluating a digital decision support tool for genetic results
Consent Form- Incidental Genomics Participants (SMH)**WHAT IF I AM INJURED IN THIS STUDY?**

If you become ill, injured or harmed as a result of taking part in this study, you will receive care. The reasonable costs of such care will be covered for any injury, illness or harm that is directly a result of being in this study. In no way does signing this consent form waive your legal rights nor does it relieve the investigators, sponsors or involved institutions of their legal and professional responsibilities. You do not give up any of your legal rights by signing this consent form.

HOW WILL PARTICIPANT HEALTH INFORMATION BE KEPT CONFIDENTIAL?

If you decide to participate in this study, the study doctors and study staff will only collect the information they need for this study.

Records identifying you at St Michael's Hospital will be kept confidential and, to the extent permitted by the applicable laws, will not be disclosed or made publicly available, except as described in this consent document.

Authorized representatives of the following organizations may look at your original (identifiable) medical/clinical study records at the site where these records are held, to check that the information collected for the study is correct and follows proper laws and guidelines.

- The research ethics board who oversees the ethical conduct of this study in Ontario
- This institution and affiliated sites, to oversee the conduct of research at this location

The following organizations may/will also receive study data and/or your samples:

- St. Michael's Hospital
- The Centre for Applied Genomics at SickKids Hospital (who provides sequencing)
- Dr. Lerner-Ellis' laboratory at Mount Sinai Hospital (who analyses the sequencing data)
- The genomic analysis system used by Dr. Lerner-Ellis' laboratory

Representatives of Clinical Trials Ontario, a not-for-profit organization, may see study data that is sent to the research ethics board for this study. Your name, address, or other information that may directly identify you will not be used. The records received by these organizations may contain your *participant code*.

Studies involving humans sometimes collect information on race and ethnicity as well as other characteristics of individuals because these characteristics may influence how people respond to different interventions. Providing information on your race or ethnic origin is voluntary.

If the results of this study are published, your identity will remain confidential. It is expected that the information collected during this study will be used in analyses and will be published and presented to the scientific community at meetings and in journals.

Even though the likelihood that someone may identify you from the study data is very small, it can never be completely eliminated. It is important to note that the genomic sequencing data we gather from you is inherently identifiable because it contains your unique genetic make-up. In order to protect your genomic sequencing data, we will de-identify the information, meaning we will remove any identifiable information, such as name and date of birth, from the data set. However, because the data contains your unique genetic make-up, the data cannot ever be fully de-identified.

For group 1 one participant, your de-identified answers in the decision aid will be stored on a server that is located in the United States. This data will be removed from the server after the study has completed data collection. By signing this consent form, you agree to the use and

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transfer of your de-identified study data, outside of Canada where data protection laws differ from those of Canada. Once information is transferred outside Canada, it is subject to the data privacy laws of that country where it is stored. There are laws that allow government authorities access to personal information under certain circumstances. In the USA, for example, lawful disclosure of personal information to the government is permitted for certain national security purposes under the USA PATRIOT Act.

For all participants, your answers to questionnaires will be entered into an online data collection software called Redcap. The data collected will be stored on a server that resides at St. Michael's Hospital. This data will be removed from the server after the study has completed data collection.

Information will not be directly disclosed to insurance companies or employers.

Finally, we will ask for your email in order to communicate with you during the course of the study. We will only use email for communication purposes, we will not ask for and share any data via email. Please note that the security of email messages is not guaranteed. Messages may be forged, forwarded, kept indefinitely, or seen by others using the internet. Do not use email to discuss information you think is sensitive. Do not use email in an emergency since email may be delayed. If you do not wish to use email for communication, we will use phone and or mail to communicate with you.

HOW WILL THE RESEARCH DATA BE STORED?

There are two different types of data in this study that will be stored differently: Raw genomic sequencing data, and general study data.

Raw data from genomic sequencing has the most potential to identify you or your family. This data will be stored at St. Michael's Hospital in our study files and at the lab at Mount Sinai Hospital that will analyze your sequencing data. To analyze your genetic information we use a web based analysis software. To use this software we will have to upload your sequence information to their program. This will be the only information we will upload, and we will not upload any other information about you such as your name, date of birth or anything else that could identify you. Since we will only upload is actually only part of your genetic sequence (called an exome) and we will not provide the software with any other information about you, no one will be able to identify you using the data uploaded to the software. The servers that the software uses may be located outside of Canada, but we will ensure that software we use will store the data in way that is compliant with Canadian privacy protection standards. Only study staff will have access to the data uploaded on the software and software vendor will not own this data and once we are done analyzing your information it will be removed from the software's server.

It is also possible that this data will be uploaded to an external database that helps scientists learn more about how genetics are linked to disease (see section below, *Will the research data be shared with other researchers?*). If this data is uploaded, it will not contain any of your identifiable information. This data will not be included with the general study data.

Your genomic data will be analyzed to look for changes that might impact your health. The results of this analysis will be a list of all of the changes (variants) found in your DNA that you requested to learn. You cannot be identified from this type of data (the changes found). This data will be added to the general study data.

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All study data, files and material will be kept at St. Michael's Hospital, in a secure area. All computer files will be kept on servers at St Michael's Hospital and will conform to all privacy and confidentiality laws.

All of the study data (questionnaires, results of sequencing analysis) will have any identifiable information removed. Each participant and their answers (data) will be assigned a specific code and only the principal investigator will have the "code key" which can link the codes back to the data. The code key will be kept on a secure server at St. Michael's Hospital and will only be accessible to the principal investigator.

Information that we transfer from our study locations to our study offices at St. Michael's Hospital will be entered manually onto the secure server at St. Michael's Hospital by our study staff.

The information that is collected for the study will be kept in a locked and secure area by the study doctor for 10 years. Only the study team or the people or groups listed below will be allowed to look at your records. Study data, including contact information and sequencing data will be stored on the secure servers at St. Michael's Hospital. We will retain all study data for 10 years after the completion of the study.

The audio recordings that are a part of this study will be downloaded to servers at St Michael's Hospital. All conversational interviews will be transcribed and a subset of the genetic counselling sessions will also be transcribed for analysis purposes, which may include your session. Transcription is taking the words and dialogue on the audiotape and writing or typing it word for word. During transcription all names and identifiers will be deleted; this is called de-identifying. This transcription will be conducted by an external service. No identifiable information will be sent to the external company, we will only identify your interview by your study number. There will be a confidentially agreement with the outside transcription company. Once the transcription is complete and the content is verified, we will destroy any audio files. The deidentified transcripts will be uploaded to an encrypted online software called Dedoose for analysis. . The transcript uploaded to Dedoose will not contain any identified information about you. Once the analysis is complete your file will be removed from the Dedoose software. Dedoose software servers are located in the United States.

The decision aid used in the study will ask you questions but does not ask for or store any identifying information. There are parts of the decision aid that you are able to input your own answers. We ask that you not enter any information that could identify you or family members in these sections.

DNA samples will be destroyed after sequencing and will not be stored.

If you participate in this study, information about your genetic variants found as a result of this research project will not be stored in your hospital file at the genetics clinic where you were being seen for your cancer diagnosis] unless you ask the hospital to add this information to your file. If you do ask that this information is added to your file, some institutions involved in this study share the patient information stored on its computers with other hospitals and health care providers in Ontario so they can access the information if it is needed for your clinical care. This information would the type of genetic testing you had, the results of your genetic test and any referrals that were made. If you have any concerns about this, or have any questions, please contact the St. Michael's Hospital Privacy Office at 416-864-6060 (or by email at privacy@smh.ca).

WILL THE RESEARCH DATA BE SHARED WITH OTHER RESEARCHERS?

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All data related to the study, including genomic sequencing results and your clinical data, may be shared with other scientific investigators.

DNA and saliva samples will not be shared or used for any other research purposes.

1. Raw genomic sequence data and phenotype data (information about physical and clinical characteristics such as cancer diagnosis) may be shared with other researchers in two ways:

- a. **Directly by the study Principal Investigator:** Any researchers wishing the Principal Investigator to share this data for research purposes must seek approval from the Research Ethics Board at their own institution for their research study, would be bound to protect the data by a data sharing agreement and would not be allowed to share the data with other researchers.
- b. **Uploaded to a genetics databases for data sharing.** Your sequencing data and phenotype data may be put in a controlled-access database. This means that only researchers who apply for and get permission to use the information for a specific research project will be able to access the information. Your genomic data and health information will not be labeled with your name or other information that could be used to identify you. Researchers approved to access information in the database will agree not to attempt to identify you. The databases we would share genetic sequencing and phenotype data with are restricted to researchers investigating cancer and/ or genetic variations.

Sharing this data directly with other researchers and with the genetics data sharing databases would be done so other researchers can use this information to better understand genetic variations related to any disease (including cancer) and what genetic changes might cause disease. When we share this data, all direct identifiers (e.g. your name, date of birth) will be removed and only a code-key will be used to identify it. It is important for you to know that genetic data is unique and therefore non-confidential. There is a chance that you or your family may be identified by your sequence data. There is also the risk of accidental release of your information (other parties other than the intended researchers seeing your data). Although this risk is small, it can never be completely eliminated.

You may participate in the study without agreeing for us to share your genetic sequence and phenotype data. Please indicate your choice below.

☐ I do **not** give my permission for my genomic sequence and phenotype information to be shared with other researchers and uploaded to genetics data sharing databases.

☐ I give permission for my genomic sequence and phenotype information to be shared with other researchers and uploaded to genetics data sharing databases.

Participant's Name

Signature

Date

2. General research results (such as number of participants in the study, combined preferences for receiving incidental findings, average age of all the participants, etc.) may be shared with other researchers to support their research work. This data will be shared directly by the study Principal Investigator. Any of this type of data that we

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share will be de-identified and will not contain your personal identifiable information and cannot be linked back to you. We would provide this information to investigators who are studying similar topics to this study, such as cancer, genetic diseases, the usefulness of genomic sequencing or people's preferences for learning incidental findings. Data might be shared with researchers who want to learn about the usefulness of genomic sequencing information, or about how people feel about learning genomic sequencing information, or other types of similar research. Any investigators wishing to use this data would need to seek approval from the Research Ethics Board at their own institute, would be bound to protect the data by a data sharing agreement and would not be allowed to share the data with other researchers.

You may participate in the study without agreeing for us to share your research results/study data with other researchers. Please indicate your choice below.

☐ I do **not** give my permission for my research results/study data to be shared with other researchers.

☐ I give permission for my research results/study data to be shared with other researchers.

Participant's Name

Signature

Date

WILL FAMILY DOCTORS/GENERAL PRACTITIONERS KNOW WHO IS PARTICIPATING IN THIS STUDY?

Your family doctor / general practitioner may be informed that you are taking part in this study, as well, unless you choose to inform them yourself.

If you have results that are negative, inclusive or do not need any referrals, we will not share these results with your general practitioner / family doctor. However, you can share your results with your general practitioner / family doctor if you wish to do so. If you have results that require a referral for follow up testing with a specialist, we will, with your permission, send a copy of your results to your general practitioner / family doctor. We would like to do this as it may be important for your general practitioner / family doctor to know what actions are being taken regarding your health. Sharing these types of results with your general practitioner / family doctor is not mandatory, you can decide not to share this information if you wish.

☐ I do **not** give my permission for results that requires referral to be shared with my general practitioner / family doctor

☐ I give my permission for results that requires referral to be shared with my general practitioner / family doctor.

Participant's Name

Signature

Date

You results may require follow up in other specialist clinics, in which case referrals will be made to the healthcare providers in those clinics. The genetics clinic where you were being seen for your cancer diagnosis will make and manage referrals to specialist clinics.

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As we stated earlier, as part of this study we would like to access your medical records and your family history from the clinic that referred you to this study. This information is necessary so we can better analyze your DNA sample.

WILL INFORMATION ABOUT THIS STUDY BE AVAILABLE ONLINE?

A description of this clinical trial will be available on <https://www.clinicaltrials.gov/>. This website will not include information that can identify you. You can search this website at any time. When research results from the study are published, publications will be available online.

If you participate in the conversational interview part of the study, direct quotes from your responses may be used in reports or publications, but the quotes will not be attributed to you or contain any information that could be used to identify you. These quotes will be found in publications about the study results and most of these publications can be accessed on line.

WHAT ARE THE COSTS TO PARTICIPANTS?

You will not be charged for your participation in this study. We will cover the costs of the genomic sequencing and procedures (e.g. saliva sample) related to this study. You will not be charged for genetic counselling that is directly related to this study. We will reimburse you for out of pocket expenses incurred as a result of being in this study (for example meals, babysitters, parking and getting to and from St. Michael's Hospital for this study). If you withdraw from the study, we will pay you for your expenses for taking part in the study up until that point.

ARE STUDY PARTICIPANTS PAID TO BE IN THIS STUDY?

You will not be paid for taking part in this study.

It is possible that the research conducted using your samples and/or study data may eventually lead to the development of new diagnostic tests, new drugs or devices, or other commercial products. There are no plans to provide payment to you if this happens.

WHAT ARE THE RIGHTS OF PARTICIPANTS IN A RESEARCH STUDY?

You will be told, in a timely manner, about new information that may be relevant to your willingness to stay in this study.

You have the right to be informed of the results of this study once the entire study is complete. To receive results from the study, you can contact the research team.

Your rights to privacy are legally protected by federal and provincial laws that require safeguards to ensure that your privacy is respected.

By signing this form you do not give up any of your legal rights against the study doctor, sponsor or involved institutions for compensation, nor does this form relieve the study doctor, sponsor or their agents of their legal and professional responsibilities.

You will be given a copy of this signed and dated consent form prior to participating in this study.

WHAT IF RESEARCHERS DISCOVER SOMETHING ABOUT A RESEARCH PARTICIPANT?

If you choose not to learn about certain types of results, we will not disclose them to you against your wishes. Otherwise, any results you choose to receive will be revealed to you.

WILL I BE CONTACTED AFTER I HAVE COMPLETED THE STUDY?

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We would like your permission to re-contact you after the study has completed. We will not share your contact information with anyone. You would only be contacted by members of the study team via email or phone. You may be re-contacted and invited to participate in follow-up research to get your feedback on this consent process, the decision aid or genetic counselling parts of this study, how information about incidental findings was communicated to you, or other studies related to genetic testing. We might contact you to invite you to participate in follow-up research to this study, such as research about how you feel about your results of genomic sequencing in the long term. We may contact you to invite you to participate in other studies related to the topic of genetics and genomic sequencing. We will provide you with additional information about new research studies and provide you with a separate consent form when we contact you. You can decline to take part in any future research when you are approached and are not obliged to participate if you have agreed to be re-contacted. If you agree to be re-contacted you can remove yourself from this list at any time by contacting the principle investigator or the study coordinator. If you do not wish to be re-contacted you can still take part in this study. Your contact information will be kept at St. Michael's Hospital on a computer located on servers at St. Michael's Hospital and that conforms to all privacy and confidentiality laws. Only study staff will access to your contact information. We will keep your re-contact information for 10 years, after which time we will no longer contact you without your permission. If you do not wish to be contacted in the future, tell the person consenting you and they will ensure your name is not kept for future contact.

☐ I give permission to be contacted by study staff in the future.

☐ I do not wish to be contacted by study staff in the future.

Participant's Name

Signature

Date

WHOM DO PARTICIPANTS CONTACT FOR QUESTIONS?*Study Contact*

If you have questions about taking part in this study, or if you suffer a research-related injury, you can talk to the study investigator, or the investigator who is in charge of the study at this institution. That person is:

- Dr. Yvonne Bombard Ph.D., Principal Investigator, 416-864-6060 x 77378
- Marc Clausen, Research Coordinator 416-864-6060 x 77397

Research Ethics Board Contact

If you have questions about your rights as a participant or about ethical issues related to this study, you can talk to someone who is not involved in the study at all. That person is:

Unity Health Toronto Research Ethics Board Chair 416-864-6060 ext. 2557

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VERBAL INFORMED CONSENT FOR Genetics Adviser: evaluating a digital decision support tool for genetic results**For Consenting Study Staff**

Instructions for consenting study staff: Read out consenting statement on page 20 of the consent form. Complete checklist below.

VERBAL CONSENT CHECKLIST

Did the participant receive a copy of the consent form before or during the telephone conversation?

Yes ☐ No ☐

If yes, was the form sent by: Fax ☐ Email ☐

Name of Participant:

	CLEAR		RE-EXPLAINED
	YES	NO	YES
Voluntary			
1. Does the participant agree to participation in the research study?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Once they have verbally consented, does the participant have to stay in the research study until the end?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. If they decide not to consent to the study, will the way health care providers feel about the participant change in any way?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
About the Research Study			
4. What is the purpose of the study?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Risk and Benefits			
5. What are the benefits of being in the study for the participant?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. What are the risks of being in the study for the participant?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Confidentiality			
7. Will the participant's study files be kept confidential?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Time Required			
8. How long will the participant be required to participate in this study?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reimbursement			
9. Will you or the participant be paid for taking part in this study?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Questions			
10. If the participant has specific questions about this study, who should they ask?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. If the participant has questions about being involved in a research study in general, who should they ask?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Medical Records and DNA Sample Access			
12. Will the participant's medical record be accessed and for what reason?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Does the participant agree to have their genomic sequencing results shared with the genetics clinic where they were being seen for your cancer diagnosis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Does the participant allow the study team to re-analyze their exome sequence from the Incidental Genomics Study?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Does the participant agree share any results needing referral with their General practitioner / family doctor?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Does the participant agree to have genomic sequencing performed on their DNA sample if necessary?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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17.	Do Intervention participants understand that the decision aid data will be stored in the United states and are therefore subject to USA privacy laws while being stores in the USA.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		RESPONSE TO CONSENT OPTIONS		
		YES	NO	
Sharing Results and Data				
18.	In the event that the participant dies before they receive their genomic sequencing results, do they give permission for the study staff to share any life threatening genetic results with their designated family member?	<input type="checkbox"/>	<input type="checkbox"/>	
19.	Does the participant give permission for their raw genomic sequence and phenotype information to be shared with other researchers and uploaded to genetics data sharing databases?	<input type="checkbox"/>	<input type="checkbox"/>	
20.	Does the participant give permission for their research results/study data to be shared with other researchers?	<input type="checkbox"/>	<input type="checkbox"/>	
Permission for re-contact				
21.	Has re-contact been explained? Does the participant agree to being re-contacted by study staff?	<input type="checkbox"/>	<input type="checkbox"/>	

CONSENT STATEMENT I have explained to the patient the nature and purpose, the potential benefits, and possible risks associated with the participant's participation in this research study. I have answered all questions that have been raised by the participant.

Printed name of Person Conducting

Signature of Person Conducting

Date and Time (24h clock)