BMJ Open

The eTRIO trial: Study protocol of a randomised controlled trial of online education modules to facilitate effective family caregiver involvement in oncology

Journal:	*BMJ Open*
Manuscript ID	bmjopen-2020-043224
Article Type:	Protocol
Date Submitted by the Author:	30-Jul-2020
Complete List of Authors:	Juraskova, Ilona ; The University of Sydney Faculty of Science, School of Psychology Laidsaar-Powell, R; The University of Sydney Faculty of Science Keast, Rachael; The University of Sydney Faculty of Science Schofield, Penelope ; Swinburne University of Technology Costa, Daniel; The University of Sydney Faculty of Science Kay, Judy; The University of Sydney Turner, Sandra; The University of Sydney Koczwara, Bogda; Flinders University School of Medicine, Saunders, Christobel; The University of Western Australia, School of Surgery Jefford, Michael; Peter MacCallum Cancer Centre, Medical Oncology Yates, Patsy; Queensland University of Technology, School of Nursing Boyle, Frances ; The University of Sydney, White , Kate ; University of Sydney Faculty of Nursing, Miller, Annie; Cancer Council New South Wales Morton, Rachael; NHMRC Clinical Trials Centre, NHMRC Clinical Trials Centre, The University of Sydney Butt, Zoe; The University of Sydney Faculty of Science, School of Psychology Butow, Phyllis; The University of Sydney Faculty of Science, School of Psychology
Keywords:	World Wide Web technology < BIOTECHNOLOGY & BIOINFORMATICS, MEDICAL EDUCATION & TRAINING, ONCOLOGY

I, the Submitting Author has the right to grant and does grant on behalf of all authors of the Work (as defined in the below author licence), an exclusive licence and/or a non-exclusive licence for contributions from authors who are: i) UK Crown employees; ii) where BMJ has agreed a CC-BY licence shall apply, and/or iii) in accordance with the terms applicable for US Federal Government officers or employees acting as part of their official duties; on a worldwide, perpetual, irrevocable, royalty-free basis to BMJ Publishing Group Ltd ("BMJ") its licensees and where the relevant Journal is co-owned by BMJ to the co-owners of the Journal, to publish the Work in this journal and any other BMJ products and to exploit all rights, as set out in our licence.

The Submitting Author accepts and understands that any supply made under these terms is made by BMJ to the Submitting Author unless you are acting as an employee on behalf of your employer or a postgraduate student of an affiliated institution which is paying any applicable article publishing charge ("APC") for Open Access articles. Where the Submitting Author wishes to make the Work available on an Open Access basis (and intends to pay the relevant APC), the terms of reuse of such Open Access shall be governed by a Creative Commons licence – details of these licences and which Creative Commons licence will apply to this Work are set out in our licence referred to above.

Other than as permitted in any relevant BMJ Author's Self Archiving Policies, I confirm this Work has not been accepted for publication elsewhere, is not being considered for publication elsewhere and does not duplicate material already published. I confirm all authors consent to publication of this Work and authorise the granting of this licence.

Title: The *eTRIO* trial: Study protocol of a randomised controlled trial of online education modules to facilitate effective family caregiver involvement in oncology

Authors: Ilona Juraskova[1], Rebekah Laidsaar-Powell[1], Rachael Keast[1], Penelope Schofield[2], Daniel Costa[3,4], Judy Kay[5], Sandra Turner[6,7], Bogda Koczwara[8], Christobel Saunders[9], Michael Jefford[10,11], Patsy Yates[12], Frances Boyle[7,13], Kate White[14], Annie Miller[15], Rachael Morton[16], Zoe Butt[1], Phyllis Butow[1].

Corresponding author: Ilona Juraskova (ilona.juraskova@sydney.edu.au)

1. The University of Sydney, Faculty of Science, School of Psychology, Centre for Medical Psychology and Evidence-based Decision-making (CeMPED), Sydney, New South Wales, Australia

2. Department of Psychology, Swinburne University of Technology, Melbourne, Victoria, Australia

3. The University of Sydney, Faculty of Science, School of Psychology, Sydney, New South Wales, Australia

4. Pain Management Research Institute, Royal North Shore Hospital, St Leonards NSW Australia.

5. The University of Sydney, Faculty of Engineering, School of Computer Science, Sydney, New South Wales, Australia

6. Department of Radiation Oncology, Westmead Hospital, Westmead, New South Wales, Australia

7. The University of Sydney, Faculty of Medicine and Health, Sydney, New South Wales, Australia

8. Flinders Medical Centre and Flinders University, Adelaide, South Australia, Australia

9. Division of Surgery, School of Medicine, The University of Western Australia, Perth, Western Australia, Australia.

10. Department of Cancer Experiences Research, Peter MacCallum Cancer Centre, Melbourne, Victoria, Australia

11. Sir Peter MacCallum Department of Oncology, University of Melbourne, Melbourne, Victoria, Australia

12. Faculty of Health, Queensland University of Technology, Queensland, Australia

13. Patricia Ritchie Centre for Cancer Care & Research, Mater Hospital, Sydney, New South Wales, Australia

14. The University of Sydney, Faculty of Medicine and Health, Susan Wakil School of Nursing and Midwifery, Cancer Nursing Research Unit, Sydney, New South Wales, Australia

15. Cancer Information and Support Services Division, Cancer Council NSW, Sydney, New South Wales, Australia

16. The University of Sydney, Faculty of Medicine and Health, NHMRC Clinical Trials Centre, Sydney, New South Wales, Australia

Abstract

Objective: Informal family caregivers play a crucial role in cancer care. Effective caregiver involvement in cancer care can improve both patient and caregiver outcomes. Despite this, interventions improving the caregiver involvement are sparse. This protocol describes a randomised controlled trial evaluating the combined effectiveness of novel online caregiver communication education modules for: i) oncology clinicians (*eTRIO*) and ii) cancer patients and caregivers (*eTRIO-pc*).

Methods and Analysis: Thirty medical /radiation/surgical oncology or haematology doctors and nurses will be randomly allocated to either intervention (*eTRIO*) or control (*an Australian State Government Health Website on Caregivers*) education conditions. Following completion of education, each clinician will recruit nine patient-caregiver pairs, who will be allocated to the same condition as their recruiting clinician. Eligibility includes any new adult patient diagnosed with any type/stage cancer attending consultations with a caregiver. Approximately 270 patient-caregiver pairs will be recruited. The primary outcome is caregiver self-efficacy in triadic (clinician-patient-caregiver) communication. Patient and clinician self-efficacy in triadic communication are secondary outcomes. Additional secondary outcomes for clinicians include preferences for caregiver involvement, perceived module usability/acceptability, analysis of module use, satisfaction with the module, knowledge of strategies, and feedback interviews. Secondary outcomes for caregivers and patients include preferences for caregiver involvement, satisfaction with clinician communication, distress, quality of life, healthcare expenditure, perceived module usability/acceptability and analysis of module use. A subset of patients and caregivers will complete feedback interviews. Secondary outcomes for caregivers include preparedness for caregiving, patient-caregiver communication, and caring experience. Assessments will be conducted at baseline, and 1-week, 12-weeks, and 26-weeks post-intervention.

Ethics and dissemination: Ethical approval has been received by the Sydney Local Health District Human Research Ethics Committee. Findings will be disseminated via presentations and peer-reviewed publications. Engagement with clinicians, media, Government, consumers and peak cancer groups will facilitate widespread dissemination and long-term availability of the educational modules.

Trial registration: Australian and New Zealand Clinical Trial Registry: ACTRN12619001507178

Keywords: Family, caregivers, oncology, online intervention, communication skills, RCT, consultation behaviours, caregiver involvement

Strengths and limitations of this study

- A major strength of this study is that the eTRIO interventions concurrently address caregiver involvement among all key stakeholders (patients, caregivers, doctors, and nurses) in cancer consultations and care
- A key strength of this study is the use of web-based technology to ensure convenient, flexible, and scalable delivery of education.
- The inclusion of the user experience and engagement sub study will provide insights into *how* participants engage with online education, what aspects of the interactive modules are most useful, and how these features impact upon learning.
- COVID-19 has resulted in changes to cancer service delivery (e.g. telehealth consultations), caregiver involvement (e.g. restrictions around accompanying persons and visitors), and clinician capacity to participate in research, therefore trial progress may be slower than originally anticipated.

BACKGROUND

Informal family caregivers (a patient's partner, family member, or friend; known in this paper as 'caregivers') play a critical role in cancer patient care. They commonly attend consultations (1), provide emotional and informational support to patients (2), assist in treatment decision-making (3), support treatment adherence (4),provide home-based care including helping manage symptoms/side-effects (5), and facilitate healthy lifestyle behaviours (6).

However, reflecting their generally overlooked and under-supported position, caregivers tend to have greater unmet informational and psychosocial needs than patients themselves (7), as well as experiencing negative impacts on their physical health and quality of life (8). There is a demonstrated interrelationship between patient and caregivers (8, 9); caregiver psychological and physical morbidity (10, 11) may compromise their ability to provide effective patient care, thereby impacting patient outcomes (12), including survival (13). Thus, interventions to support cancer caregivers are warranted to improve both caregiver and patient outcomes.

Good clinician-patient-caregiver communication can guide, educate, and support caregivers in their roles (14). Empower caregivers as *partners-in-care* is increasingly important as cancer care shifts from inpatient to outpatient, and increasingly home-based, healthcare models. However, some caregivers report feeling disempowered, excluded and ill-equipped to support patients (15). Suboptimal clinician-caregiver communication is common; consultation analyses found that oncologists rarely initiated interaction with caregivers during consultations (16). As a result, caregivers may self-censor information, questions, and needs when communicating with clinicians. Furthermore, when not managed effectively, some caregivers can derail patient care by impeding discussions and informed decision-making (17) as well as potentially compromising patient autonomy (e.g. caregiver dominance) or privacy (e.g. lost opportunities for patient-clinician to discuss sensitive topics such as sexual functioning). Other challenging situations can include conflicting patient-caregiver treatment wishes and caregiver anger (18, 19). Skilful navigation of these complex triadic (clinician- patient-caregiver) situations is needed to optimise patient care as well as provide support and guidance to caregivers who may themselves be experiencing considerable distress.

Most clinicians report that they value caregiver input, but find aspects of caregiver involvement challenging, lack confidence in managing these challenges, and want help navigating these complex interactions (18, 20). Indeed, in a recent study, oncologists emphasised their lack of education in communicating with caregivers despite the very demanding family situations they frequently face (20). A 2019 Delphi consensus study among caregivers, researchers, and clinicians to identify priority topics for caregiver research in cancer care, found that *training for health care professionals working with caregivers* achieved consensus among all stakeholder panels (21). To date, very little training has been developed to help clinicians manage or enhance communication with caregivers.

One intervention that has been developed, Responding to Challenging Interactions with Families (RCIF) used a didactic presentation and experiential role-play to educate nurses in responding to stressful

family situations. Nurse's confidence significantly increased following the program (22). Another workshop-based intervention used didactic presentations, video clips, and role plays to educate clinicians in how to conduct family meetings. Pre-post measures found a significant increase in self-efficacy to conduct family meetings and high levels of workshop satisfaction (23). Within these studies, clinician self-efficacy (confidence in one's own capability to perform in a specific situation) has been a specific focus. Self-efficacy has been established as an efficient and reliable outcome for assessing the impact of clinician communication education (24), with associations between self-efficacy and actual performance found up to a year after a communication skills education program (25). Despite promising results, the feasibility and long-term sustainability of face-to-face workshops remains a central concern as they are costly to run, accessible to only a few, and difficult to sustain in the long term. Well-designed online education can be effective in teaching complex skills, and can be more time and cost efficient compared to traditional face-to-face formats (26).

Although clinician education has received little attention, an increasing number of interventions for cancer caregivers have been developed. Recent reviews have found existing interventions have focused primarily on information for caregivers (e.g. patient symptom management) and psychosocial support for caregivers (27-29). Two of these reviews focused on technology-based interventions (27, 28), and found high levels of acceptability, with caregivers appreciating the flexibility and personalisation of online interventions. These reviews also demonstrated that technology-based interventions can improve caregiver outcomes such as self-efficacy, burden, emotional wellbeing and QoL (28).

Despite its importance in the clinical context, only a small number of interventions have specifically focused on caregiver *communication*. One intervention that did aim to improve caregiver communication found that among a sample of 197 caregivers (patient illness not specified), a 2-hour webinar focusing on caregiver empowerment and consultation communication was effective in increasing caregiver self-efficacy and knowledge (30). Caregiver self-efficacy has been identified as an important component of a caregiver's coping, with higher caregiver self-efficacy associated with lower caregiver burnout and psychosocial distress as well improved patient wellbeing (31, 32). Wittenberg and colleagues (33) recently published a Delphi consensus curriculum for cancer caregivers identifying seven key areas for future intervention development, one of which focuses on caregivers *working with health professionals*, including preparing for consultations, sharing information, asking and prioritising questions, and communicating patient need. A paucity of targeted education for cancer caregivers to more confidently and skilfully engage with oncology clinicians remains.

Our team has been engaged in a research program over 10-years (TRIadic Oncology; TRIO) focusing on understanding and improving caregiver communication in triadic cancer consultations. This has involved: a systematic review (1), qualitative studies (2, 17, 18), analyses of consultation audiotapes (16),and development of a TRIO conceptual framework (34). This culminated in the first comprehensive TRIO Clinical Guidelines to help oncology physicians and nurses better communicate with, and support, caregivers (14, 35). The TRIO Guidelines comprise two sets of evidence-based strategies aiming to improve clinician engagement with caregivers (e.g. rapport building, meeting emotional/informational caregiver needs) (14) and management of challenging and complex caregiver situations (e.g. conflicting

patient-caregiver treatment wishes, caregiver anger or dominance) (35). Based on the TRIO Guidelines, as well as a web-review of online advice for caregivers regarding involvement in consultations (36), and a comprehensive review of existing caregiver communication evidence, we have developed two online interactive education modules: i) for oncology doctors and nurses (*eTRIO*), to help clinicians effectively communicate, support and engage with caregivers (and patients); and ii) the patient-caregiver module (*eTRIO-pc*) to empower, motivate, and educate caregivers in their caring role (37).

Study aims

The aim of this study is to evaluate the effectiveness of the combined clinician and patient-caregiver online education modules in improving caregiver confidence, engagement, and management, when compared to control websites (NSW Health *Support for Carers*), using a randomised controlled trial (RCT) design.

It is hypothesised that:

- The combined *eTRIO* and *eTRIO-pc* interventions, when compared with a control website, will result in improved caregiver self-efficacy in triadic consultation interactions ***(primary outcome)***
- Secondary hypotheses posit that
    - for ***clinicians*** the combined *eTRIO* and *eTRIO-pc* interventions will result in: improved clinician self-efficacy in triadic consultation interactions, increased preferences for caregiver involvement, improved knowledge of strategies, and improved use of caregiver inclusive policies/practices in the clinical setting.
    - for ***caregivers****,* the combined eTRIO and eTRIO-pc modules will result in higher preferences for caregiver involvement, greater satisfaction with clinician communication, lower distress, higher quality of life, greater preparedness for caregiving, improved patient-caregiver communication, and an improved caregiving experience.
    - for ***patients****,* the combined eTRIO and eTRIO-pc modules will result in improved patient self-efficacy in triadic consultation interactions, higher preferences for caregiver involvement, greater satisfaction with clinician communication, lower distress, and higher quality of life.

Exploratory aims for this trial include: 1) understanding the user experience, engagement, and acceptability of the *eTRIO* and *eTRIO-pc* modules among patients, caregivers, and clinicians (*User experience and engagement sub-study)*, 2) exploring the impact of the eTRIO modules on actual triadic consultation behaviours (*audio recording sub-study)* and 3) exploring whether the eTRIO and eTRIO-pc interventions impact upon patient and caregiver healthcare expenditure.

METHODS

Study Design

This is a Phase III, parallel group randomised controlled trial with 1:1 allocation ratio. In this RCT, 30 oncology clinicians will be randomly allocated. Randomization will be stratified within each centre to ensure roughly equal numbers of *eTRIO* intervention and control clinicians at each participating site. Each clinician will recruit 9 or 10 patient-caregiver pairs to participate. Patients and caregivers receive the same allocation as their clinician (i.e. those patients/caregivers whose clinician was randomised to receive e-TRIO will receive e-TRIO-pc, while those whose clinician was randomised to the control website will also be allocated to the control website) (see Figure 1). See Figures 2, 3, and 4 for caregiver, clinician, and patient timelines for enrolment, interventions, and assessments.

Optional audio-recording sub-study

An optional trial sub-study will involve audio-recoding triadic consultations before and after randomisation to ascertain any changes in triadic consultation behaviours. Pre-randomisation, clinicians will audio-record (with patient-caregiver permission) one substantive consultation (i.e. initial or treatment decision-making consultation; not brief review consultation) with each of two patient-caregiver pairs. These patients-caregivers will not complete the intervention or control condition and will only complete baseline measures. They will be known as the *"baseline recording"* group.

After randomisation and completing the intervention/control condition, clinicians will (with patient-caregiver permission) audio-record one substantive consultation with each patient-caregiver pair who have participated in the full trial (i.e. completed the patient-caregiver intervention/control condition).

[INSERT FIGURE 1 HERE]

[INSERT FIGURE 2 HERE]

[INSERT FIGURE 3 HERE]

[INSERT FIGURE 4 HERE]

Participants

Thirty oncology clinicians (oncology doctors and nurses) will be recruited by clinician champions at participating sites. Two hundred and seventy patient-caregiver pairs (i.e. adults with cancer and the caregiver who usually accompanies them to consultations) will also be recruited, by their participating clinician. The study will be conducted in medical/radiation/surgical oncology and haematology hospital clinics around Australia.

Eligibility Criteria

To be eligible, clinicians will i) be hospital-based medical/radiation/surgical oncology or haematology doctors (Registrar, Fellow, or Specialist) and nurses (specialised in oncology/haematology nursing) treating patients diagnosed with any cancer type, ii) have consultations with patients and caregivers to discuss cancer treatment, and iii) have ongoing and substantial patient and caregiver contact via face-to-face or Telehealth. Where doctors and nurses work together within the same consultations at a site, only one may participate in the study.

Patients will be screened for eligibility by their participating clinician and study staff. Patient eligibility criteria include: i) diagnosis of any type and any stage of cancer (excluding those receiving end-of-life care), ii) aged >18 years, iii) attending a first, second, or third oncology consultation with the *eTRIO* clinician, iv) willing to be accompanied to consultations by an informal caregiver v) have a suitable device (e.g. computer, tablet, smartphone) and internet access, and vi) cognitively and physically well enough to give informed consent to the study. Patients will be excluded if their clinician deems them too unwell or to have insufficient literacy and/or English language proficiency to complete the module/website and/or questionnaires.

Eligibility criteria for caregivers includes: i) be an informal caregiver- (family member, friend, or neighbour who supports the patient inside and outside a consultation), ii) aged > 18 years, iii) have a suitable device (e.g. computer, tablet, smartphone) and internet access, and iv) be willing to participate in the study. Caregivers will be excluded if they do not have sufficient literacy and/or English language proficiency to complete the module/website and/or questionnaires or if they are a paid, formal caregiver (such as a community support worker).

Description of the interventions

eTRIO (clinician module)

The *eTRIO* module is an evidence-based online learning platform. The content of the module is based on extensive prior research from our team (1, 2, 16-18), the wider evidence-base (e.g. 7, 19, 38, 39), and published consensus guidelines about communicating with caregivers (14, 35). Module content underwent extensive iterative review from a multidisciplinary expert advisory group comprising psycho-oncologists, medical, surgical, and radiation oncologists, oncology nurses, and experts in the development of medical education and online learning.

The eTRIO web platform was designed by a professional web-development company with experience in designing health professional training with interactive functionality. Usability was refined in two ways. A usability expert conducted a Heuristic Evaluation method (40) and the results were used to improve the interface. Then, testing was conducted using a Think-Aloud methodology with 5 health professionals naïve to the TRIO Guidelines (2 consultant-level doctors, 3 specialist oncology/palliative care nurses), with amendments made to the module based on their feedback. The final eTRIO module comprises 14 study units, of which clinicians must complete a minimum of eight. Depending on which eight units a clinician chooses to complete, the eTRIO module takes approximately 1.5 to 2 hours to complete. Table 1 displays a summary of the content and activities within the eTRIO module.

Table 1. Summary of each guideline in the online *eTRIO* clinician module.

Guideline	Summary of content and activities
Introduction to *eTRIO*	Overview of the module, navigation tips, benefits of caregiver involvement, caregiver burden. *Includes clinician self-reflection activity and true/false questions about the effects of caregiving.*
Guideline 1: Caregiver inclusive practices	Practical ways clinicians can include caregivers in clinic procedures and set up. *Includes photos of good and poor clinic room setups.*
Guideline 2: Encouraging caregiver attendance	How to actively encourage caregiver attendance. Exploring reasons why caregivers don't attend consultations. *Includes scenario question regarding encouraging caregiver attendance at an important consultation*
Guideline 3: Building rapport	Practical steps to build a positive relationship with caregivers. *Includes interactive short film activity where clinicians identify good rapport building.*
Guideline 4: Patient privacy and confidentiality	How to manage sensitive information when a caregiver is present. How to deal with caregiver requests for patient information. *Includes two short films exploring patient privacy and caregiver requests for information with reflective activity and feedback.*
Guideline 5: Observing relationships	Signs to watch for between the patient and caregiver which indicate potential problems. *Includes interactive image of non-verbal signs of family discord*.
Guideline 6: Emotional and informational needs	How to identify and manage the emotional and informational needs of caregivers. *Includes true/false questions about caregiver needs and an interactive activity teaching the top 5 unmet informational needs of caregivers.*
Guideline 7: Large families	How to deal with a large family in the waiting room, and strategies to sensitively navigate this situation. *Includes short film on managing many family caregivers, with multiple choice reflective activity and feedback.*
Guideline 8: Requests for nondisclosure	How to deal with the request of "don't tell my wife she has cancer", and strategies on how to sensitively and legally navigate these requests. *Includes short film on family request for non-disclosure, with open text reflective activity and feedback.*
Guideline 9: Family as interpreters	Reasons why patients/caregivers might resist professional language interprets, strategies to overcome these issues, and strategies to engage and use formal interpretation services. *Includes short film on managing resistance to formal interpretation services, with reflective activity and feedback.*
Guideline 10: Conflicting treatment preferences	How to manage a patient and caregiver who disagree on the treatment place, and strategies to negotiate a path forward in this stressful and emotional situation. *Includes short film on managing patient-family conflict, with open text reflective activity and feedback.*
Guideline 11: Caregiver dominance	How to identify the signs of unwanted caregiver dominance, and strategies to respectfully address and productively contain the caregiver's dominance. *Includes interactive short film activity where clinicians identify signs of dominance.*
Guideline 12: Caregiver anger	How to de-escalate the situation and strategies to establish a working relationship with the caregiver. *Includes short film on managing angry family member, with reflective activity and feedback.*
Guideline 13: Longstanding family conflict	How to manage longstanding conflict between a patient and caregiver, and strategies to address the conflict, whilst not allowing it to derail the consultation. *Includes short film on managing longstanding mother-daughter conflict, with reflective activity and feedback.*

eTRIO-pc (patient-caregiver modules)

The eTRIO-pc module is also an evidence-based online learning platform, informed by our group's (2, 17) and others' (15, 41) research, as well as an extensive review of available online guidance for caregivers (36) and interventions to improve caregiver engagement in consultations (29). The eTRIO-pc modules focus on providing informative and supportive content. Module content underwent extensive review by clinicians, patient and caregiver consumers, psychologists, and other experts in supportive care and web-based patient and caregiver resources. eTRIO-pc was designed by a professional web-development company and features many interactive activities. Usability and user experience testing was conducted in a similar way to that described above for the clinician module, with the Think-Aloud user studies involving 3 caregivers and 3 cancer patients/survivors naïve to the TRIO Guidelines. The module was iteratively refined based on user feedback.

Patient and caregiver modules are similar, however key differences include: i) caregiver module is worded for the caregiver, patient module is worded for the patient; ii) the caregiver module is instructive about key caregiver skills and goes into more depth across the various topics; iii) the patient module informs the patient about what their caregiver is learning. The caregiver module comprises 11 units and takes approximately 1 hour to complete. Caregivers need to complete a minimum of six units of their own choosing. The patient module comprises 7 units and takes approximately 40 minutes to complete. A minimum of four units of the patient's choosing need to be completed. The content of the patient and the caregiver modules is summarised in Table 2.

Table 2. Summary of each component of the online *eTRIO-pc* module.

Module/Section	Summary of content and activities
CAREGIVER module	
Introduction	Overview of the module, tips on navigation, definition of 'caregiver'.
Part 1: The importance of caregivers	How important a patient's caregiver is during the cancer process. *Includes video of a cancer patient outlining benefits of caregiver involvement, and interactivity activity creating a caregiving team.*
Part 2: Introduction to cancer care	Becoming familiar with different cancer care health professionals and the rights of patients and caregivers. *Includes video of a radiation oncologist discussing the importance of caregivers.*
Part 3: First meetings with clinicians	How to establish a good working relationship with health professionals. *Includes a short film modelling key caregiver behaviours in a first consultation.*
Part 4: Preparing for consultations	Ways to help caregivers prepare for a consultation with a health professional. *Includes interactive question list builder and checklist of caregiver roles.*
Part 5: Caregiver roles during a consultation	Effective ways for caregivers to be involved during cancer consultations. *Includes a short film modelling key caregiver behaviours in managing information (asking questions, taking notes) within a consultation.*
Part 6: After the consultation	Ways to help the patient debrief after a consultation with a health professional. *Includes experiences of real caregivers and patients.*

Part 7: Caregiver involvement in decision-making	How caregivers can help to support the patient when making decisions about their care. *Includes interactive activity about ways caregiver can be helpful during decision-making.*
Part 8: Advocating for the patient	How to speak up for the patient in the healthcare setting. *Includes a short film modelling key caregiver behaviours on how to speak up for a patient's needs.*
Part 9: If the caregiver feels ignored`	What to do if a caregiver feels ignored by a health professional.
Summary and conclusions	Summary of all sections of the module.
PATIENT module	
Introduction	Overview of the module, why complete this program, tips on navigation, who is considered a caregiver in this resource.
Part 1: The importance of caregivers	How important caregivers can be during cancer treatment. *Includes video of a cancer patient outlining benefits of caregiver involvement, and interactivity activity creating a caregiving team.*
Part 2: Introduction to cancer care	Becoming familiar with different health professionals patients may meet during cancer care and the rights of patients and caregivers. *Includes video of a radiation oncologist discussing the importance of caregivers.*
Part 3: Including caregivers in consultations	How a caregiver can introduce themselves to health professionals, and how patients can help to establish a good working relationship between caregivers and health professionals.
Part 4: How caregivers can help in consultations	Ways that caregivers can be involved before, during and after consultations with health professionals. *Includes interactive question list builder and interactive checklist of caregiver roles.*
Part 5: Caregiver involvement in medical decisions	Caregiver involvement in decisions about cancer care.
Conclusion	Summary of all sections of the module.

Description of the control condition: Clinicians

Entitled "*Support for carers in NSW*", available on an Australian State Government Health website https://www.health.nsw.gov.au/carers/Pages/default.aspx, this was selected as an attention control because it is a relevant Government webpage for clinicians, provides a range of additional resources for interested clinicians, and is likely to represent the extent of professional development on caregiver inclusivity that average clinicians would receive.

Description of the control condition: Patients/caregivers

The website the "*Walking with Carers in NSW*" website, publicly available on an Australian State Government Health website https://www.health.nsw.gov.au/carers/Publications/walking-with-carers-in-nsw.pdf, was selected as an attention control because it is a relevant Government webpage for patients and caregivers, provides a high level of supportive information for caregivers, and is likely to

represent the extent of caregiver support that average patients/caregivers would receive in standard care.

Procedures

Recruitment

Clinicians

Clinician champions (individual clinicians approached by the study team to assist with the trial at specific hospital sites) will assist in recruiting hospital-based surgical/medical/radiation/ haematology doctors and nurses with a range of experience at their respective sites. Interested clinicians will discuss the study with clinician champions and/or study staff and will be provided with a participant information statement and consent form. Clinician champions will be eligible to participate in the trial if they are not existing members of the study team and have not been involved in development of the *eTRIO* or *eTRIO-pc* modules.

Patients and Caregivers (Intervention/Control Group)

Nine patient-caregiver pairs per participating clinician will be recruited and complete either intervention or control procedures. Eligible patients of participating clinicians, and their caregivers, will be invited to participate in a study *"testing which of two different websites is most helpful in preparing and empowering caregivers to participate in cancer consultations".* Recruitment must take place prior to the third consultation with a participating clinician.

Potential patient and caregiver participants will be invited to the study via one of the following recruitment pathways. Each recruiting site can select the most appropriate and feasible option/s:

1. *Clinic Research Nurses/Staff:* Clinic research staff members will call eligible patients with an upcoming appointment with a participating clinician and introduce the study to them. Staff will assess interest, and if verbal consent gained, provide to the researchers, the patients'/caregivers' contact details.
2. *Participating clinicians:* Participating clinicians will introduce the study to patients/caregivers during their consultation and obtain permission to pass on the details of interested patients/caregivers to the research team.
3. *Study staff:* The researchers will check with participating clinicians whether any potentially eligible patient-caregiver pairs are attending the consultation. A study staff member will approach eligible and clinician-approved patients/caregivers before or after a consultation in the waiting room of the clinic and invite them to participate in the study.
4. *Invitation Letter:* Participating clinicians will send an invitation letter to eligible patients (and caregivers), providing patients and caregivers with the researchers' phone number and email address to contact if they are interested in participating in the study (opt in approach).

Interested patients and caregivers will be telephoned by a member of the research team to explain the study in detail and screen eligibility. If eligible and willing to participate, they will each be sent individual participant information sheets via email or post, depending on their preference. An electronic consent

form will be available at the start of the RedCap questionnaire (RedCap is a secure web application for managing online surveys and databases) or will be posted for those participants preferring to complete a hardcopy. Both the patient and the caregiver will need to provide consent to participate in the study.

Patients and Caregivers (OPTIONAL 'baseline recording' group)

An OPTIONAL sub-study will assess pre- and post- intervention communication. It is optional due to practical/logistical challenges of audio-recording suitable consultations as well as personal preferences of some clinicians, patients, and caregivers who do not wish to audio-record their consultations. A sub-group of patient-caregiver pairs, comprising two pairs per clinician, will be recruited for the purpose of collecting baseline data on participating clinicians' behaviours. This is an *optional* component of the study and will only be completed by clinicians opting to participate in the *optional audio-recording sub-study*. Patient/caregiver eligibility criteria for this sub-study are the same as for the main study. Eligible patients of participating clinicians and their caregivers will be invited to participate in a study *"observing the interaction between health professionals, patients and caregivers by audio-recording a cancer consultation".* Potential participants will be approached and invited to the study through recruitment pathways described in the *Patients and Caregivers (Intervention/Control Group)* section. Patients and caregivers recruited to the '*baseline recording*' subgroup will not go on to participate in the main *eTRIO* trial.

Randomisation

Participating clinicians will be directed to a link in an email invitation in order to receive a unique username and password to access the baseline questionnaire in the online survey platform RedCap. After completing the baseline questionnaire, clinicians will be randomly allocated (1:1), stratified by profession (doctor or nurse), to the intervention or control group. Randomisation will be electronically generated by the trial statistician (DC) using an Access database. Allocation will be concealed in sequentially numbered, opaque, sealed envelopes opened only during the randomisation process.

No patient or caregiver randomisation will be required, as the recruiting clinician's randomisation will determine to which website the patient and caregiver will be allocated. Given the nature of the intervention, blinding of researchers and participants is not possible.

Post randomisation procedures

Clinicians

All clinicians randomised to both intervention and control groups will be asked to visit their respective websites within 4 weeks post-randomisation. They will be emailed a link to their respective website (intervention participants will be required to create a user account). Three reminders via email and/or SMS (1, 2, 3 weeks post-randomisation) will be sent to prompt completion of the intervention/control websites.

Once they have completed the intervention/control, clinicians will recruit nine *new* patient-caregiver pairs. New patient-caregiver pairs are defined as attending a first, second, or third consultation. The

restriction to *new* patients and caregivers is because of the wide variability and potential confounding nature of existing clinician-patient-caregiver relationships which may have entrenched dynamics and patterns of communication. Clinicians participating in the audio-recording substudy will be asked to record one of these consultations for each participating patient-caregiver pair. All clinicians will complete follow-up questionnaires via the online survey platform RedCap at 1-week, 3-months and 6-months after intervention completion. Feedback interviews will be conducted with all clinicians to obtain feedback about their experience of either the *eTRIO* intervention or *Support for Carers* control.

Patients and caregivers

Once consented, all participating patients and caregivers will be emailed a link to complete relevant baseline questionnaires in RedCap. Each participant will then be emailed a link to the website they have been randomised to visit (either eTRIO-pc or NSW Health Support for Carers). Three reminders via email and/or SMS (1, 2, 3 weeks post-randomisation) will be sent to prompt completion of the intervention/control websites. All patient and caregiver participants will be prompted to separately complete follow up online questionnaires in RedCap at 1, 12 and 26 weeks after completion of the e-TRIO-pc module. Given the nature of the trial, adverse physical and psychological events are not anticipated. However, participants will be reassured of their ability to discontinue participation at any time and referrals for psychological support will be provided should any participants become distressed during the trial.

Participant retention

Once enrolled and randomised, every reasonable effort will be made by study staff to follow all participants for the entire study period. Participating clinicians will be offered a $50 gift card for participating in the study; to, in a small way, compensate them for time given to the study. In addition, clinicians could use the intervention to count towards continuing professional development points.

Measures

Caregiver Measures

Table 3 summarises the caregiver primary and secondary outcome measures, with time point/s of administration displayed in Figure 2. Caregiver demographics and clinical variables including age, gender, marital status, education level, occupation, ethnicity and postcode will also be measured at baseline.

Primary Outcome

The primary outcome of caregiver self-efficacy in interactions with the patient and their oncologist or nurse will be measured using a 14 item scale, based on the widely used, validated Perceived Efficacy in Patient-Physician Interactions scale (PEPPI-10) (42). Seven relevant PEPPI-10 items were appropriately transformed to be caregiver related, with an additional seven items purpose-designed to assess other topics such as caregiver confidence in: establishing a relationship with the clinician, contributing to

decision-making discussions, and speaking up (advocating) for the patient. All questions will ask respondents "*how confident are you in your ability to"* followed by 14 different caregiver behaviours/skills relating to consultation communication. As per PEPPI-10, ratings of strength of self-efficacy for each item will range from 1 (not at all confident) to 5 (very confident).

Secondary Outcomes

Secondary outcomes measured will include preferences for involvement of the caregiver in communication and decision-making (43), caregiver satisfaction with communication with their clinician (adapted from (44)), caregiver distress (45), preparedness for caregiving (46), patient-caregiver communication (47), quality of life (48), healthcare expenditure (purpose designed measure), caregiver time and caring experience (49).

Table 3. Summary of primary and secondary outcome measures

Measures	Items and assessed construct
Clinician measures	
Oncologist and nurse self-efficacy in triadic communication	13-item perceived self-efficacy in triadic communication scale based on Parle et al. (50).
Preferences for involvement of the caregiver in communication/ decision making	2 questions developed by Shin et al. (43) assessing clinician preferences of caregiver involvement in treatment decision making
Practical strategies/policies for including caregivers	12-item purpose-built questionnaire assessing how clinicians welcome and manage caregivers in their own workplace
Knowledge of strategies	14 purpose-designed situational vignette items assessing clinician knowledge/application of strategies to manage caregiver involvement.
Usability	2-item UMUX-LITE (51). Assesses overall usability (ease of use and system capability) of module.
Satisfaction with the module/website	11-item purpose designed questionnaire assessing participant satisfaction with features of eTRIO or NSW Health websites.
Caregiver measures	
Caregiver self-efficacy in interactions with their oncologist or nurse	14-item perceived self-efficacy in triadic consultation communication adapted from PEPPI-10 (42) with 7 additional items.
Caregiver satisfaction with communication with their oncologist and nurse	25-item purpose-designed Consultation Satisfaction Scale adapted from (44). Assesses caregiver satisfaction with clinician communication.
Health literacy	4 item health literacy measure (52).
Preferences for involvement of the caregiver in communication/ decision making	2-item scale (43) assessing caregiver preferences for involvement.
Caregiver Distress	21-item Depression, Anxiety and Stress Scale (DASS-21) (45).
Preparedness for Caregiving	8-item Preparedness for Caregiving Scale (46).

Patient-caregiver communication	2 subscales of the Health Literacy of Caregiver Scale -Cancer (47). Assesses cancer related patient-caregiver communication and needs and preferences.
Quality of Life (Health Utility)	12-item quality of life measure AQoL-4D (48).
Healthcare Expenditure	Purpose designed incurred cost questionnaire. Assesses patient GP/specialist visits, hospital stays, counselling and other support services.
Caregiver time	2-item scale. Valued using the market price of labour (i.e. wages or the aged pension).
Caring experience	The Carer Experience Scale (CES) (49).
Usability	2-item UMUX-LITE (51). Assesses overall usability (ease of use and system capability) of module.
Satisfaction with the module/website	11-item purpose designed questionnaire assessing participant satisfaction with features of eTRIO or NSW Health websites.
Patient measures	
Patient self-efficacy in interactions with their oncologist or nurse	11-item perceived self-efficacy triadic consultation communication adapted from PEPPI-10 (42) with 4 additional items. Assesses patient self-efficacy in triadic communication with their clinician and caregiver.
Patient satisfaction with communication with their oncologist and nurse	25-item purpose-designed Consultation Satisfaction Scale, adapted from (44). Assesses patient's satisfaction with communication with their clinician.
Health literacy	4 item health literacy measure (52).
Preferences for involvement of the caregiver in communication/ decision making	2 questions developed by Shin et al. (43). Assesses patient preferences of caregiver involvement in treatment decision-making.
Patient Distress	21-item Depression, Anxiety and Stress Scale (DASS-21) (45).
Quality of Life (Health Utility)	12-item quality of life measure AQoL-4D (48).
Healthcare Expenditure	8-item purpose designed incurred cost questionnaire. Assesses patient GP/specialist visits, hospital stays, counselling and other support services.
Usability	2-item UMUX-LITE (51). Assesses overall usability (ease of use and system capability) of module.
Satisfaction with the module/website	11-item purpose designed questionnaire assessing participant satisfaction with features of eTRIO or NSW Health websites.

Clinician Measures

Table 3 summarises the caregiver primary and secondary outcome measures, with time point/s of administration displayed in Figure 3. Clinician demographic and professional characteristics, including age, gender, years in practice, main cancers treated, and prior communication skills training will also be obtained at baseline.

Secondary Outcomes

Oncologist and nurse self-efficacy in triadic communication will be measured using a 13-item scale, based on the widely used Parle and colleagues' (50) clinician communication self-efficacy scale, adapted to capture *triadic* communication. Questions will ask respondents "*how confident are you in your ability to"* followed by 13 different clinician skills relating to triadic communication and management of caregivers. Ratings of strength of self-efficacy for each item will range from 1 (not at all confident) to 10 (very confident). Other secondary outcomes include preferences for involvement of the caregiver in communication/decision making (43), perceived module usability (51) as well as satisfaction with the module, knowledge of TRIO strategies, and practical strategies/policies clinicians currently have in place to include caregivers (purpose designed questionnaires).

Patient Measures

Table 3 summarises the caregiver primary and secondary outcome measures, with time point/s of administration displayed in Figure 4. At baseline, patients will disclose their demographic and clinical details including age, gender, marital status, education level, occupation, ethnicity, diagnosis, stage of disease, treatment type and post code.

Secondary Outcomes

Patient self-efficacy in interactions with their oncologist/nurse and caregiver will be measured using an 11 item scale, based on the widely used, validated Perceived Efficacy in Patient-Physician Interactions (PEPPI-10) (42). Seven relevant PEPPI-10 items were included, with an additional four items purpose-designed to assess other caregiver related topics such as patient confidence in establishing the caregiver's involvement in consultations. All questions will ask respondents "*how confident are you in your ability to"* followed by 11 different behaviours/skills relating to triadic consultation communication. As per PEPPI-10, ratings of strength of self-efficacy for each item will range from 1 (not at all confident) to 5 (very confident). Other secondary outcomes will include preferences for involvement of the caregiver in communication and decision-making (43), patient satisfaction with communication with their oncologist and nurse (adapted from (44)), patient distress (45), health literacy (52), quality of life (health utility) (48), and healthcare expenditure will also be measured.

User experience and engagement sub-study

This sub study seeks to gain insights into how participants used the eTRIO modules, to provide better understanding of its successes/failures, with the ultimate aim of providing lessons to others developing future online clinician, patient, or carer resources.

Both intervention and control participants will be asked to complete a measure of user experience (UMUX-LITE) (51) and a custom-designed feedback questionnaire assessing the usability and acceptability of either the eTRIO module or NSW Health Website. All intervention clinicians (n=15) and control clinicians (n=15) and a subset of intervention caregivers (n=15), control caregivers (n=15), and intervention (n=15) and control (n=15) patients will be invited to participate in semi-structured feedback interviews assessing the usability, acceptability, and practical application of the intervention/control training. These interviews will take place between 1-week and 1-month post-intervention and will be analysed using thematic analysis. Participants will also answer questions about the amount of time

spent on the website/module, the number of times they access the training, and percentage of the website/module they completed.

For intervention clinicians, caregivers, and patients, participant engagement will also be assessed through percentage of modules' content completed based on hits and Google diagnostics as well as user interaction with the modules analysed using captured log-data. This will include pages visited, time spent on each section, information viewed and downloaded, and engagement with interactive activities such as videos watched and participant responses to questions. Website analytics will be used to better understand user behaviours and interaction with the eTRIO sites, including order of use, areas of high vs. low engagement, and revisit behaviour as well as devices used (e.g. mobile, desktop). These insights may lead to improved understanding of how to engage with and educate clinicians, patients, and carers using online tools as well as the aspects of the website that affected the other outcomes.

Triadic consultation behaviour (audio-recording sub-study)

For those clinician, patient, and caregiver triads who *opt-in* to the audio-recording sub-study, their application of knowledge learnt throughout the intervention/control conditions will also be assessed pre- and post-intervention using an adapted version of the validated 80-item KINCode behavioural coding system (16). KINcode codes for the behaviours of the clinician, patient, and caregiver across 4 different consultation phases (history taking, information exchange, deliberation, and logistical arrangements) and assess for the presence/absence of specific behaviours (e.g. caregiver asks a question). Additionally, pre and post intervention behaviours captured in consultation audio-recordings (for those who have consented to do so) will also be qualitatively analysed using conversational analysis. Consultation data will be analysed and presented descriptively.

Sample Size

The sample size was calculated based on a standardised mean difference between intervention and control groups of 0.5, which is a moderate effect and is widely used in situations like this where there are no published estimates of effect size from similar studies and no minimally important difference for the primary outcome measure. Assuming a 1:1 randomisation for online training versus control, a two-sided test with alpha = 0.05, and 80% power, this gives a total sample of 126. To account for clustering by clinician we multiplied the number above by the design effect 1 + (m – 1)*ICC, where ICC is the intra-cluster correlation and m is the number of patient/caregivers per clinician (=7 expected after attrition). Based on reviews in psycho-oncology(53), we believe that using an ICC of 0.1 is appropriately conservative. Multiplying by the design effect, this gives a total required sample size of 202 patient-caregiver pairs. Based on attrition rates of studies described in a Cochrane review of caregiver psychosocial interventions (54), an attrition rate of 30% (10% at each timepoint) was considered appropriate. To account for this attrition rate, the required sample is 277 patient-carer dyads.

Data Analysis

Primary Outcome

Intervention efficacy of the *eTRIO* and *eTRIO-pc* modules will be determined by group differences in changes in caregiver self-efficacy in triadic communication scores. Analyses will consist of a random effects linear regression model (i.e. mixed effects model), with intervention vs. control as a clinician-level predictor. The random effect will account for multiple patients nested within each clinician. Assessment time will also be included as a factor, resulting in a three-level model (clinician-patient/caregiver-time). Potential confounders will be controlled for in all analyses.

Secondary Outcomes

Secondary outcomes will be examined using separate random effects regression models created for each outcome measure across testing points, the same as for the primary outcome. For the patient and caregiver outcome variables (i.e. satisfaction and distress), the clinician will be modelled as a random effect.

Feedback Interview Analysis

Feedback interviews will be transcribed verbatim and undergo thematic analysis. (55) Team based coding and thematic conceptualisation with experts in qualitative methods will ensure rigorous analysis.

Ethics and Dissemination

This protocol has received ethical approval from the Sydney Local Health District Human Research Ethics Committee (REGIS project ID number: 2019/PID09787), with site-specific approval from each recruitment site.

Findings will be disseminated via normal academic channels (presentations, peer-reviewed publications) as well as engagement with clinicians, media, Government and consumers. To ensure widespread dissemination of the *eTRIO* education, assuming it is found to be beneficial, the research team have partnered with two peak cancer groups in Australia, the Cancer Council NSW (Non-Government cancer information, advocacy, and support service for patients and caregivers) and Cancer Institute NSW (State Government health department which provides expert guidance on cancer control, including health professional education). Upon successful completion of the trial, the *eTRIO* modules will be incorporated into their respective online learning platforms for long-term availability to clinicians, patients, and caregivers. Our team have established links with peak oncology professional and consumer groups and will advocate endorsement and use of the eTRIO modules. Implementation of the clinician module into professional oncology association training and postgraduate medical curricula will be advocated, including application for the *eTRIO* program to have continuing professional development points.

Patient and Public Involvement

Our groups' early qualitative work on patients, caregivers, and clinicians' experiences of caregiver involvement prompted the development of the TRIO Guidelines and the eTRIO trial. A group of patient and caregiver consumer advisors (4 patients, 4 caregivers), as well as an oncology clinician advisory group (medical, radiation, and surgical oncology doctors and oncology nurses), have been actively involved in each stage of trial design and have provided iterative feedback on the design and content of the eTRIO and eTRIO-pc interventions.

DISCUSSION

To our knowledge, the *eTRIO* intervention is the first to concurrently address caregiver involvement among *all* key stakeholders in cancer consultations and care (patients, caregivers, nurses, and oncologists). The development and testing of the *eTRIO* modules signifies a critical step towards improved engagement with, and management of, caregivers in the cancer setting. The current Phase III data will indicate the effectiveness of the combined (e-TRIO and e-TRIO-pc) modules in improving stakeholder self-efficacy in communication and patient/caregiver psychosocial outcomes, and lowering patient/caregiver health costs. Namely, it is hoped that the modules will facilitate clinicians to be more inclusive of caregivers and more confident in managing the challenges of caregiver involvement. Additionally, it is hoped that caregivers will more effectively participate in consultations and support the patient, and cancer patients/caregivers will be better informed, supported and less psychologically distressed.

This study has been designed to gain insights into the ways that participants *use* and *engage with* the eTRIO programs, including the use of web analytics to understand actual user behaviours and qualitative interviews to elicit participant experiences of the modules. It is hoped that the user experience and engagement sub-study will contribute to a better understanding of what technical features and functions contribute to improved medical education and supportive patient care. This novel and timely research has at its core the translation of The TRIO Guidelines into improved health care performance, by addressing known challenges of engaging caregivers in cancer care in an accessible and effective way. The ultimate goal of this research is to shift the status of caregivers from an under-served, vulnerable, and disempowered cancer population to being confident, engaged, and supported participants in the cancer care process.

Trial Status: Patient recruitment is open.

DECLARATIONS

Ethics approval - This protocol has received ethical approval from the Sydney Local Health District Human Research Ethics Committee (REGIS project ID number: 2019/PID09787), with site-specific approval from each recruitment site. Protocol version 6 (dated 05/03/2020) is currently approved and reported in this manuscript.

Modifications/amendments: Any modifications to the protocol which may impact on the conduct of the study, potential benefit of the patient or may affect patient safety, including changes of study objectives, study design, patient population, sample sizes, study procedures, or significant administrative aspects will require a formal amendment to the protocol. Such amendment will be submitted to the Sydney Local Health District Human Research Ethics Committee.

Trial Sponsor: The University of Sydney. The trial sponsor provides infrastructure and enables the running of the trial. Has no influence over study design; collection, management, analysis, and interpretation of data; writing of the report; and the decision to submit the report for publication.

Consent for publication – Not applicable as no identifying information of participants will be published.

Availability of data and material – The datasets generated and/or analysed during the current study are available from the corresponding author on reasonable request and in accordance with ethical restrictions imposed by the Ethics Committees that approved this study.

Data management, monitoring, and participant confidentiality- Plans for how data is managed and monitored (including site monitoring) form part of the full trial Protocol and can be requested by contacting the corresponding author. Details about how participant confidentiality is maintained and how data is collected and shared can also be obtained by contacting the corresponding author.

Competing interests - The investigators/authors have no conflicts of interest to declare.

Funding - This trial is supported by Cancer Australia and Cancer Council NSW, through the Priority-driven Collaborative Cancer Research Scheme (Project number 1146383).
Funding will be managed by study sponsor: The University of Sydney under the guidance of PI Juraskova.

Authorship: For all published work resulting from this trial, the ICMJE principles of authorship (including the four criteria for authorship) will be upheld.

Authors' contributions

IJ and PB conceptualised the study and formed the project team. All authors are members of the steering committee and contributed to the design of the study. IJ, RL-P, and PB are the lead investigators of the study and the TRIO program more broadly. RL-P, RK, ZB, IJ, and PB drafted the study protocol and manuscript, which was reviewed, modified, and supplemented by all other authors. PS, DC, and PY form

the trial methodology advisory committee, with DC responsible for data analysis. JK provides IT expertise. ST, CS, BK, MJ, PY, FB, and KW form the clinician advisory committee. AM provides expertise in patient and caregiver supportive care and community delivery. RM will contribute specifically to design of the exploratory cost-effectiveness sub-study. All authors read and approved the final manuscript.

Acknowledgements - The authors wish to thank the members of the *eTRIO* consumer advisory groups for their input into the intervention and trial design.

References

1. Laidsaar-Powell R, Butow P, Bu S, Charles C, Gafni A, Lam W, et al. Physician–patient–companion communication and decision-making: a systematic review of triadic medical consultations. Patient Education and Counseling. 2013;91(1):3-13.
2. Laidsaar-Powell R, Butow P, Bu S, Fisher A, Juraskova I. Attitudes and experiences of family involvement in cancer consultations: a qualitative exploration of patient and family member perspectives. Supportive care in cancer. 2016;24(10):4131-40.
3. Dionne-Odom JN, Ejem D, Wells R, Barnato AE, Taylor RA, Rocque GB, et al. How family caregivers of persons with advanced cancer assist with upstream healthcare decision-making: A qualitative study. PloS one. 2019;14(3).
4. Roter DL, Narayanan S, Smith K, Bullman R, Rausch P, Wolff JL, et al. Family caregivers' facilitation of daily adult prescription medication use. Patient education and counseling. 2018;101(5):908-16.
5. Thomas C, Morris SM, Harman JC. Companions through cancer:: the care given by informal carers in cancer contexts. Soc Sci Med. 2002;54(4):529-44.
6. Ellis KR, Janevic MR, Kershaw T, Caldwell CH, Janz NK, Northouse L. Engagement in health-promoting behaviors and patient–caregiver interdependence in dyads facing advanced cancer: an exploratory study. Journal of behavioral medicine. 2017;40(3):506-19.
7. Sklenarova H, Krümpelmann A, Haun MW, Friederich HC, Huber J, Thomas M, et al. When do we need to care about the caregiver? Supportive care needs, anxiety, and depression among informal caregivers of patients with cancer and cancer survivors. Cancer. 2015.
8. Sun V, Raz DJ, Kim JY. Caring for the informal cancer caregiver. Current opinion in supportive and palliative care. 2019;13(3):238-42.
9. Streck BP, Wardell DW, LoBiondo-Wood G, Beauchamp JE. Interdependence of physical and psychological morbidity among patients with cancer and family caregivers: Review of the literature. Psycho-Oncology. 2020.
10. Rumpold T, Schur S, Amering M, Kirchheiner K, Masel E, Watzke H, et al. Informal caregivers of advanced-stage cancer patients: Every second is at risk for psychiatric morbidity. Supportive Care in Cancer. 2016;24(5):1975-82.
11. Shaffer KM, Kim Y, Carver CS. Physical and mental health trajectories of cancer patients and caregivers across the year post-diagnosis: a dyadic investigation. Psychology & health. 2016;31(6):655-74.
12. Litzelman K, Kent EE, Mollica M, Rowland JH. How does caregiver well-being relate to perceived quality of care in patients with cancer? Exploring associations and pathways. Journal of Clinical Oncology. 2016;34(29):3554.
13. Boele FW, Given CW, Given BA, Donovan HS, Schulz R, Weimer JM, et al. Family caregivers' level of mastery predicts survival of patients with glioblastoma: A preliminary report. Cancer. 2017;123(5):832-40.
14. Laidsaar-Powell R, Butow P, Boyle F, Juraskova I. Facilitating collaborative and effective family involvement in the cancer setting: guidelines for clinicians (TRIO Guidelines-1). Patient education and counseling. 2018;101(6):970-82.
15. McCarthy B. Family members of patients with cancer: what they know, how they know and what they want to know. European Journal of Oncology Nursing. 2011;15(5):428-41.

16. Laidsaar-Powell R, Butow P, Bu S, Dear R, Fisher A, Coll J, et al. Exploring the communication of oncologists, patients and family members in cancer consultations: development and application of a coding system capturing family-relevant behaviours (KINcode). Psycho-Oncology. 2015.
17. Laidsaar-Powell R, Butow P, Bu S, Charles C, Gafni A, Fisher A, et al. Family involvement in cancer treatment decision-making: A qualitative study of patient, family, and clinician attitudes and experiences. Patient education and counseling. 2016;99(7):1146-55.
18. Laidsaar-Powell R, Butow P, Bu S, Fisher A, Juraskova I. Oncologists' and oncology nurses' attitudes and practices toward family involvement in cancer consultations. European Journal of Cancer Care. 2016.
19. Speice J, Harkness J, Laneri H, Frankel R, Roter D, Kornblith A, et al. Involving family members in cancer care: focus group considerations of patients and oncological providers. Psycho-Oncology. 2000;9(2):101-12.
20. Røen I, Stifoss-Hanssen H, Grande G, Kaasa S, Sand K, Knudsen AK. Supporting carers: health care professionals in need of system improvements and education-a qualitative study. BMC palliative care. 2019;18(1):58.
21. Lambert SD, Brahim LO, Morrison M, Girgis A, Yaffe M, Belzile E, et al. Priorities for caregiver research in cancer care: an international Delphi survey of caregivers, clinicians, managers, and researchers. Supportive Care in Cancer. 2019;27(3):805-17.
22. Zaider TI, Banerjee SC, Manna R, Coyle N, Pehrson C, Hammonds S, et al. Responding to challenging interactions with families: A training module for inpatient oncology nurses. Families, Systems, & Health. 2016;34(3):204.
23. Gueguen JA, Bylund CL, Brown RF, Levin TT, Kissane DW. Conducting family meetings in palliative care: themes, techniques, and preliminary evaluation of a communication skills module. Palliative & supportive care. 2009;7(2):171-9.
24. Nørgaard B, Ammentorp J, Ohm Kyvik K, Kofoed PE. Communication skills training increases self-efficacy of health care professionals. Journal of Continuing Education in the Health Professions. 2012;32(2):90-7.
25. Gulbrandsen P, Jensen BF, Finset A, Blanch-Hartigan D. Long-term effect of communication training on the relationship between physicians' self-efficacy and performance. Patient education and counseling. 2013;91(2):180-5.
26. Cook DA, Levinson AJ, Garside S, Dupras DM, Erwin PJ, Montori VM. Internet-based learning in the health professions: a meta-analysis. Jama. 2008;300(10):1181-96.
27. Heynsbergh N, Botti M, Heckel L, Livingston PM. Caring for the person with cancer: Information and support needs and the role of technology. Psycho-oncology. 2018;27(6):1650-5.
28. Shin JY, Kang TI, Noll RB, Choi SW. Supporting Caregivers of Patients With Cancer: A Summary of Technology-Mediated Interventions and Future Directions. American Society of Clinical Oncology Educational Book. 2018;38:838-49.
29. Ferrell B, Wittenberg E. A review of family caregiving intervention trials in oncology. CA: a cancer journal for clinicians. 2017;67(4):318-25.
30. Moore CD, Cook KM. Promoting and measuring family caregiver self-efficacy in caregiver-physician interactions. Social Work in Health Care. 2011;50(10):801-14.

31. Merluzzi TV, Philip EJ, Vachon DO, Heitzmann CA. Assessment of self-efficacy for caregiving: The critical role of self-care in caregiver stress and burden. Palliative & Supportive Care. 2011;9(1):15.
32. Keefe FJ, Ahles TA, Porter LS, Sutton LM, McBride CM, Pope MS, et al. The self-efficacy of family caregivers for helping cancer patients manage pain at end-of-life. PAIN®. 2003;103(1-2):157-62.
33. Wittenberg E, Goldsmith J, Parnell TA. Development of a communication and health literacy curriculum: Optimizing the informal cancer caregiver role. Psycho-Oncology. 2020;29(4):766-74.
34. Laidsaar-Powell R, Butow P, Charles C, Gafni A, Entwistle V, Epstein R, et al. The TRIO Framework: Conceptual insights into family caregiver involvement and influence throughout cancer treatment decision-making. Patient education and counseling. 2017;100(11):2035-46.
35. Laidsaar-Powell R, Butow P, Boyle F, Juraskova I. Managing challenging interactions with family caregivers in the cancer setting: Guidelines for clinicians (TRIO Guidelines-2). Patient education and counseling. 2018;101(6):983-94.
36. Keast R, Butow PN, Juraskova I, Laidsaar-Powell R. Online resources for family caregivers of cognitively competent patients: A review of user-driven reputable health website content on caregiver communication with health professionals. Patient Education and Counseling. 2020.
37. Juraskova I, Laidsaar-Powell R, Butow P, Keast R, Boyle F, Costa D, et al. Facilitating effective family carer engagement in cancer care: Development of the eTRIO education modules. Asia-Pacific Journal of Clinical Oncology. 2019;15:90-.
38. Lown BA. Difficult conversations: anger in the clinician-patient/family relationship. Southern Medical Journal. 2007;100(1):33-9; quiz 40-2, 62.
39. Hallenbeck J, Arnold R. A request for nondisclosure: Don't tell mother. Journal of Clinical Oncology. 2007;25(31):5030-4.
40. Nielsen J. Usability engineering: Morgan Kaufmann; 1994.
41. Northouse L, Schafenacker A, Barr K, Katapodi M, Yoon H, Brittain K, et al. A tailored Web-based psychoeducational intervention for cancer patients and their family caregivers. Cancer nursing. 2013;37(5):321-30.
42. Maly RC, Frank JC, Marshall GN, DiMatteo MR, Reuben DB. Perceived Efficacy in Patient-Physician Interactions (PEPPI): Validation of an Instrument in Older Persons. Journal of the American Geriatrics Society. 1998;46(7):889-94.
43. Shin DW, Cho J, Roter DL, Kim SY, Sohn SK, Yoon MS, et al. Preferences for and experiences of family involvement in cancer treatment decision-making: patient–caregiver dyads study. Psycho-Oncology. 2013;22(11):2624-31.
44. Brown R, Dunn S, Butow P. Meeting patient expectations in the cancer consultation. Annals of oncology. 1997;8(9):877-82.
45. Lovibond PF, Lovibond SH. The structure of negative emotional states: Comparison of the Depression Anxiety Stress Scales (DASS) with the Beck Depression and Anxiety Inventories. Behaviour research and therapy. 1995;33(3):335-43.
46. Archbold PG, Stewart BJ, Greenlick MR, Harvath T. Mutuality and preparedness as predictors of caregiver role strain. Research in nursing & health. 1990;13(6):375-84.

47. Yuen E, Knight T, Dodson S, Chirgwin J, Busija L, Ricciardelli LA, et al. Measuring cancer caregiver health literacy: Validation of the Health Literacy of Caregivers Scale–Cancer (HLCS-C) in an Australian population. Health & social care in the community. 2018;26(3):330-44.
48. Hawthorne G, Richardson J, Osborne R. The Assessment of Quality of Life (AQoL) instrument: a psychometric measure of health-related quality of life. Quality of Life Research. 1999;8(3):209-24.
49. Al-Janabi H, Coast J, Flynn TN. What do people value when they provide unpaid care for an older person? A meta-ethnography with interview follow-up. Social science & medicine. 2008;67(1):111-21.
50. Parle M, Maguire P, Heaven C. The development of a training model to improve health professionals' skills, self-efficacy and outcome expectancies when communicating with cancer patients. Social science & medicine. 1997;44(2):231-40.
51. Lewis JR, Utesch BS, Maher DE, editors. UMUX-LITE: when there's no time for the SUS. Proceedings of the SIGCHI Conference on Human Factors in Computing Systems; 2013.
52. Halverson JL, Martinez-Donate AP, Palta M, Leal T, Lubner S, Walsh MC, et al. Health literacy and health-related quality of life among a population-based sample of cancer patients. Journal of health communication. 2015;20(11):1320-9.
53. Bell ML, McKenzie JE. Designing psycho-oncology randomised trials and cluster randomised trials: variance components and intra-cluster correlation of commonly used psychosocial measures. Psycho-oncology. 2013;22(8):1738-47.
54. Treanor CJ, Santin O, Prue G, Coleman H, Cardwell CR, O'Halloran P, et al. Psychosocial interventions for informal caregivers of people living with cancer. Cochrane Database Syst Rev. 2019(6).
55. Braun V, Clarke V. Using thematic analysis in psychology. Qualitative research in psychology. 2006;3(2):77-101.

Figure 1. eTRIO Trial Study Design.

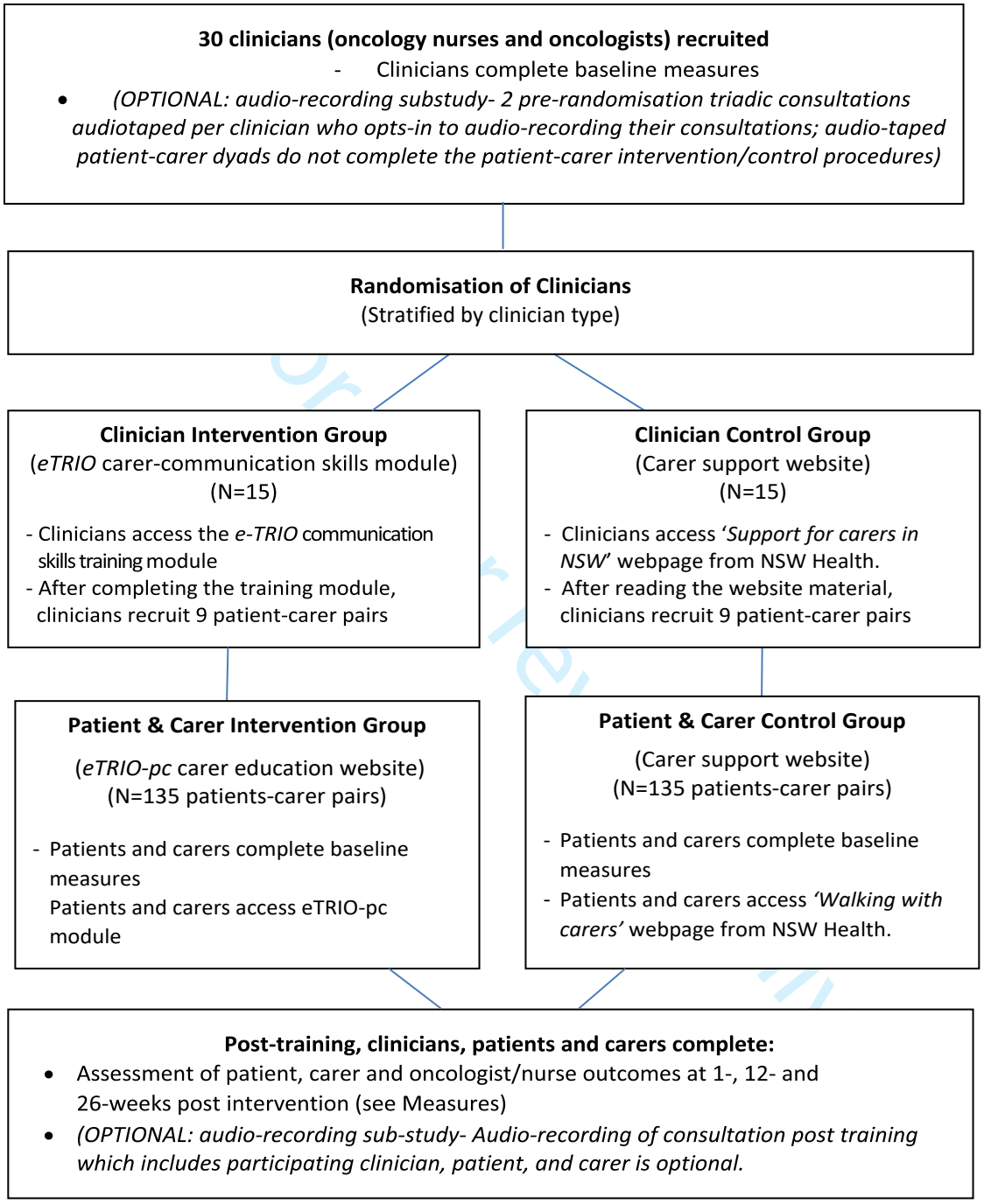

Figure 2: SPIRIT schedule of enrolment, interventions, and assessments for participating ***caregivers***

	Screening	Baseline	Intervention	Post-intervention		
TIMEPOINT				***1 week***	***12 weeks***	***26 weeks***
ENROLMENT:						
Eligibility screen	**X**					
Informed consent	**X**					
INTERVENTIONS:						
Intervention- eTRIO			◆———			
Control- NSW Health Website			◆———			
ASSESSMENTS:						
Caregiver demographics		**X**				
Caregiver clinical characteristics		**X**				
***PRIMARY OUTCOME**: Caregiver self-efficacy in triadic communication*		**X**		**X**	**X**	**X**
***SECONDARY OUTCOMES**: Caregiver satisfaction with clinician communication*		**X**		**X**	**X**	**X**
Preferences for caregiver involvement		**X**		**X**	**X**	**X**
Distress		**X**		**X**	**X**	**X**
Preparedness for caregiving		**X**		**X**	**X**	**X**
Patient-caregiver communication		**X**		**X**	**X**	**X**
Quality of Life		**X**		**X**	**X**	**X**
Healthcare expenditure				**X**	**X**	**X**
Caring experience				**X**	**X**	**X**
OPTIONAL Post intervention consultation recording				**X**		
Usability				**X**		
Satisfaction with module/website				**X**		
User engagement			**X**			

Figure 3: SPIRIT schedule of enrolment, interventions, and assessments for oncology ***clinicians***

	Screening	Baseline	Allocation	Intervention	Post-intervention		
TIMEPOINT**					*1 week*	*12 weeks*	*26 weeks*
ENROLMENT:							
Eligibility screen	X						
Informed consent	X						
OPTIONAL Baseline consultation recording		X					
Allocation			X				
INTERVENTIONS:							
Intervention- eTRIO				◆——			
Control- NSW Health Website				◆——			
ASSESSMENTS:							
Clinician demographics		X					
Clinician professional characteristics		X					
PRIMARY OUTCOME: *Clinician self-efficacy in triadic communication*		X			X	X	X
SECONDARY OUTCOMES: *Preferences for carer involvement*		X			X	X	X
Carer relevant strategies and policies		X				X	X
Knowledge of strategies		X			X		
OPTIONAL Post intervention consultation recording					X		
Usability					X		
Satisfaction with module/website					X		
User engagement				X			

Figure 4: SPIRIT schedule of enrolment, interventions, and assessments for participating ***patients***

	Screening	Baseline	Intervention	Post-intervention		
TIMEPOINT**				*1 week*	*12 weeks*	*26 weeks*
ENROLMENT:						
Eligibility screen	X					
Informed consent	X					
INTERVENTIONS:						
Intervention- eTRIO			◆———			
Control- NSW Health Website			◆———			
ASSESSMENTS:						
Patient demographics		X				
Patient clinical characteristics		X				
***PRIMARY OUTCOME**: Patient self-efficacy in triadic communication*		X		X	X	X
***SECONDARY OUTCOMES**: Patient satisfaction with clinician communication*		X		X	X	X
Preferences for caregiver involvement		X		X	X	X
Distress		X		X	X	X
Quality of Life		X		X	X	X
Healthcare expenditure				X	X	X
OPTIONAL Post intervention consultation recording				X		
Usability				X		
Satisfaction with module/website				X		
User engagement			X			

SPIRIT
STANDARD PROTOCOL ITEMS: RECOMMENDATIONS FOR INTERVENTIONAL TRIALS

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

Section/item	Item No	Description	Addressed on 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	2
	2b	All items from the World Health Organization Trial Registration Data Set	N/A
Protocol version	3	Date and version identifier	21
Funding	4	Sources and types of financial, material, and other support	21
Roles and responsibilities	5a	Names, affiliations, and roles of protocol contributors	21
	5b	Name and contact information for the trial sponsor	21
	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	21
	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)	21

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	4-6
	6b	Explanation for choice of comparators	11
Objectives	7	Specific objectives or hypotheses	6
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)	7
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	7
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)	8
Interventions	11a	Interventions for each group with sufficient detail to allow replication, including how and when they will be administered	8-11
	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)	14
	11c	Strategies to improve adherence to intervention protocols, and any procedures for monitoring adherence (eg, drug tablet return, laboratory tests)	14
	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	14-17
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)	Figures 2, 3, and 4

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	18
Recruitment	15	Strategies for achieving adequate participant enrolment to reach target sample size	12
Methods: Assignment of interventions (for controlled trials)			
Allocation:			
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	13
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	13
Implementation	16c	Who will generate the allocation sequence, who will enrol participants, and who will assign participants to interventions	13
Blinding (masking)	17a	Who will be blinded after assignment to interventions (eg, trial participants, care providers, outcome assessors, data analysts), and how	13
	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	14-17, Table 3
	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	14

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	21
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	19
	20b	Methods for any additional analyses (eg, subgroup and adjusted analyses)	19
	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)	19
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	21
	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	21
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	21
Auditing	23	Frequency and procedures for auditing trial conduct, if any, and whether the process will be independent from investigators and the sponsor	21
Ethics and dissemination			
Research ethics approval	24	Plans for seeking research ethics committee/institutional review board (REC/IRB) approval	21
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)	21

Consent or assent	26a	Who will obtain informed consent or assent from potential trial participants or authorised surrogates, and how (see Item 32)	12-13
	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	21
Declaration of interests	28	Financial and other competing interests for principal investigators for the overall trial and each study site	21
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	21
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	14
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	19
	31b	Authorship eligibility guidelines and any intended use of professional writers	21
	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	Appendix 1
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.

BMJ Open

The eTRIO trial: Study protocol of a randomised controlled trial of online education modules to facilitate effective family caregiver involvement in oncology

Journal:	*BMJ Open*
Manuscript ID	bmjopen-2020-043224.R1
Article Type:	Protocol
Date Submitted by the Author:	26-Apr-2021
Complete List of Authors:	Juraskova, Ilona ; The University of Sydney Faculty of Science, School of Psychology Laidsaar-Powell, R; The University of Sydney Faculty of Science Keast, Rachael; The University of Sydney Faculty of Science Schofield, Penelope ; Swinburne University of Technology Costa, Daniel; The University of Sydney Faculty of Science Kay, Judy; The University of Sydney Turner, Sandra; The University of Sydney Koczwara, Bogda; Flinders University School of Medicine, Saunders, Christobel; The University of Western Australia, School of Surgery Jefford, Michael; Peter MacCallum Cancer Centre, Medical Oncology Yates, Patsy; Queensland University of Technology, School of Nursing Boyle, Frances ; The University of Sydney, White , Kate ; University of Sydney Faculty of Nursing, Miller, Annie; Cancer Council New South Wales Morton, Rachael; NHMRC Clinical Trials Centre, NHMRC Clinical Trials Centre, The University of Sydney Butt, Zoe; The University of Sydney Faculty of Science, School of Psychology Butow, Phyllis; The University of Sydney Faculty of Science, School of Psychology
Primary Subject Heading:	Medical education and training
Secondary Subject Heading:	Oncology
Keywords:	World Wide Web technology < BIOTECHNOLOGY & BIOINFORMATICS, MEDICAL EDUCATION & TRAINING, ONCOLOGY

I, the Submitting Author has the right to grant and does grant on behalf of all authors of the Work (as defined in the below author licence), an exclusive licence and/or a non-exclusive licence for contributions from authors who are: i) UK Crown employees; ii) where BMJ has agreed a CC-BY licence shall apply, and/or iii) in accordance with the terms applicable for US Federal Government officers or employees acting as part of their official duties; on a worldwide, perpetual, irrevocable, royalty-free basis to BMJ Publishing Group Ltd ("BMJ") its licensees and where the relevant Journal is co-owned by BMJ to the co-owners of the Journal, to publish the Work in this journal and any other BMJ products and to exploit all rights, as set out in our licence.

The Submitting Author accepts and understands that any supply made under these terms is made by BMJ to the Submitting Author unless you are acting as an employee on behalf of your employer or a postgraduate student of an affiliated institution which is paying any applicable article publishing charge ("APC") for Open Access articles. Where the Submitting Author wishes to make the Work available on an Open Access basis (and intends to pay the relevant APC), the terms of reuse of such Open Access shall be governed by a Creative Commons licence – details of these licences and which Creative Commons licence will apply to this Work are set out in our licence referred to above.

Other than as permitted in any relevant BMJ Author's Self Archiving Policies, I confirm this Work has not been accepted for publication elsewhere, is not being considered for publication elsewhere and does not duplicate material already published. I confirm all authors consent to publication of this Work and authorise the granting of this licence.

Title: The *eTRIO* trial: Study protocol of a randomised controlled trial of online education modules to facilitate effective family caregiver involvement in oncology

Authors: Ilona Juraskova[1], Rebekah Laidsaar-Powell[1], Rachael Keast[1], Penelope Schofield[2], Daniel Costa[3,4], Judy Kay[5], Sandra Turner[6,7], Bogda Koczwara[8], Christobel Saunders[9], Michael Jefford[10,11], Patsy Yates[12], Frances Boyle[7,13], Kate White[14], Annie Miller[15], Rachael Morton[16], Zoe Butt[1], Phyllis Butow[1].

Corresponding author: Ilona Juraskova (ilona.juraskova@sydney.edu.au)

1. The University of Sydney, Faculty of Science, School of Psychology, Centre for Medical Psychology and Evidence-based Decision-making (CeMPED), Sydney, New South Wales, Australia

2. Department of Psychology, Swinburne University of Technology, Melbourne, Victoria, Australia

3. The University of Sydney, Faculty of Science, School of Psychology, Sydney, New South Wales, Australia

4. Pain Management Research Institute, Royal North Shore Hospital, St Leonards NSW Australia.

5. The University of Sydney, Faculty of Engineering, School of Computer Science, Sydney, New South Wales, Australia

6. Department of Radiation Oncology, Westmead Hospital, Westmead, New South Wales, Australia

7. The University of Sydney, Faculty of Medicine and Health, Sydney, New South Wales, Australia

8. Flinders Medical Centre and Flinders University, Adelaide, South Australia, Australia

9. Division of Surgery, School of Medicine, The University of Western Australia, Perth, Western Australia, Australia.

10. Department of Cancer Experiences Research, Peter MacCallum Cancer Centre, Melbourne, Victoria, Australia

11. Sir Peter MacCallum Department of Oncology, University of Melbourne, Melbourne, Victoria, Australia

12. Faculty of Health, Queensland University of Technology, Queensland, Australia

13. Patricia Ritchie Centre for Cancer Care & Research, Mater Hospital, Sydney, New South Wales, Australia

14. The University of Sydney, Faculty of Medicine and Health, Susan Wakil School of Nursing and Midwifery, Cancer Nursing Research Unit, Sydney, New South Wales, Australia

15. Cancer Information and Support Services Division, Cancer Council NSW, Sydney, New South Wales, Australia

16. The University of Sydney, Faculty of Medicine and Health, NHMRC Clinical Trials Centre, Sydney, New South Wales, Australia

Abstract

Objective: Informal family caregivers play a crucial role in cancer care. Effective caregiver involvement in cancer care can improve both patient and caregiver outcomes. Despite this, interventions improving the caregiver involvement are sparse. This protocol describes a randomised controlled trial evaluating the combined effectiveness of novel online caregiver communication education modules for: i) oncology clinicians (*eTRIO*) and ii) cancer patients and caregivers (*eTRIO-pc*).

Methods and Analysis: Thirty medical /radiation/surgical oncology or haematology doctors and nurses will be randomly allocated to either intervention (*eTRIO*) or control (*an Australian State Government Health Website on Caregivers*) education conditions. Following completion of education, each clinician will recruit nine patient-caregiver pairs, who will be allocated to the same condition as their recruiting clinician. Eligibility includes any new adult patient diagnosed with any type/stage cancer attending consultations with a caregiver. Approximately 270 patient-caregiver pairs will be recruited. The primary outcome is caregiver self-efficacy in triadic (clinician-patient-caregiver) communication. Patient and clinician self-efficacy in triadic communication are secondary outcomes. Additional secondary outcomes for clinicians include preferences for caregiver involvement, perceived module usability/acceptability, analysis of module use, satisfaction with the module, knowledge of strategies, and feedback interviews. Secondary outcomes for caregivers and patients include preferences for caregiver involvement, satisfaction with clinician communication, distress, quality of life, healthcare expenditure, perceived module usability/acceptability and analysis of module use. A subset of patients and caregivers will complete feedback interviews. Secondary outcomes for caregivers include preparedness for caregiving, patient-caregiver communication, and caring experience. Assessments will be conducted at baseline, and 1-week, 12-weeks, and 26-weeks post-intervention.

Ethics and dissemination: Ethical approval has been received by the Sydney Local Health District Human Research Ethics Committee. Findings will be disseminated via presentations and peer-reviewed publications. Engagement with clinicians, media, Government, consumers and peak cancer groups will facilitate widespread dissemination and long-term availability of the educational modules.

Trial registration: Australian and New Zealand Clinical Trial Registry: ACTRN12619001507178

Keywords: Family, caregivers, oncology, online intervention, communication skills, RCT, consultation behaviours, caregiver involvement

Strengths and limitations of this study

- A major strength of this study is that the eTRIO interventions concurrently address caregiver involvement among all key stakeholders (patients, caregivers, doctors, and nurses) in cancer consultations and care
- A key strength of this study is the use of web-based technology to ensure convenient, flexible, and scalable delivery of education.
- The inclusion of the user experience and engagement sub study will provide insights into *how* participants engage with online education, what aspects of the interactive modules are most useful, and how these features impact upon learning.
- COVID-19 has resulted in changes to cancer service delivery (e.g. telehealth consultations), caregiver involvement (e.g. restrictions around accompanying persons and visitors), and clinician capacity to participate in research, therefore trial progress may be slower than originally anticipated.

BACKGROUND

Informal family caregivers (a patient's partner, family member, or friend; known in this paper as 'caregivers') play a critical role in cancer patient care. They commonly attend consultations (1), provide emotional and informational support to patients (2), assist in treatment decision-making (3), support treatment adherence (4),provide home-based care including helping manage symptoms/side-effects (5), and facilitate healthy lifestyle behaviours (6).

However, reflecting their generally overlooked and under-supported position, caregivers tend to have greater unmet informational and psychosocial needs than patients themselves (7), as well as experiencing negative impacts on their physical health and quality of life (8). There is a demonstrated interrelationship between patient and caregivers (8, 9); caregiver psychological and physical morbidity (10, 11) may compromise their ability to provide effective patient care, thereby impacting patient outcomes (12), including survival (13). Thus, interventions to support cancer caregivers are warranted to improve both caregiver and patient outcomes.

Good clinician-patient-caregiver communication can guide, educate, and support caregivers in their roles (14). Empower caregivers as *partners-in-care* is increasingly important as cancer care shifts from inpatient to outpatient, and increasingly home-based, healthcare models. However, some caregivers report feeling disempowered, excluded and ill-equipped to support patients (15). Suboptimal clinician-caregiver communication is common; consultation analyses found that oncologists rarely initiated interaction with caregivers during consultations (16). As a result, caregivers may self-censor information, questions, and needs when communicating with clinicians. Furthermore, when not managed effectively, some caregivers can derail patient care by impeding discussions and informed decision-making (17) as well as potentially compromising patient autonomy (e.g. caregiver dominance) or privacy (e.g. lost opportunities for patient-clinician to discuss sensitive topics such as sexual functioning). Other challenging situations can include conflicting patient-caregiver treatment wishes and caregiver anger (18, 19). Skilful navigation of these complex triadic (clinician- patient-caregiver) situations is needed to optimise patient care as well as provide support and guidance to caregivers who may themselves be experiencing considerable distress.

Most clinicians report that they value caregiver input, but find aspects of caregiver involvement challenging, lack confidence in managing these challenges, and want help navigating these complex interactions (18, 20). Indeed, in a recent study, oncologists emphasised their lack of education in communicating with caregivers despite the very demanding family situations they frequently face (20). A 2019 Delphi consensus study among caregivers, researchers, and clinicians to identify priority topics for caregiver research in cancer care, found that *training for health care professionals working with caregivers* achieved consensus among all stakeholder panels (21). To date, very little training has been developed to help clinicians manage or enhance communication with caregivers.

One intervention that has been developed, Responding to Challenging Interactions with Families (RCIF) used a didactic presentation and experiential role-play to educate nurses in responding to stressful family situations. Nurse's confidence significantly increased following the program (22). Another workshop-based intervention used didactic presentations, video clips, and role plays to

educate clinicians in how to conduct family meetings. Pre-post measures found a significant increase in self-efficacy to conduct family meetings and high levels of workshop satisfaction (23). Within these studies, clinician self-efficacy (confidence in one's own capability to perform in a specific situation) has been a specific focus. Self-efficacy has been established as an efficient and reliable outcome for assessing the impact of clinician communication education (24), with associations between self-efficacy and actual performance found up to a year after a communication skills education program (25). Despite promising results, the feasibility and long-term sustainability of face-to-face workshops remains a central concern as they are costly to run, accessible to only a few, and difficult to sustain in the long term. Well-designed online education can be effective in teaching complex skills, and can be more time and cost efficient compared to traditional face-to-face formats (26).

Although clinician education has received little attention, an increasing number of interventions for cancer caregivers have been developed. Recent reviews have found existing interventions have focused primarily on information for caregivers (e.g. patient symptom management) and psychosocial support for caregivers (27-29). Two of these reviews focused on technology-based interventions (27, 28), and found high levels of acceptability, with caregivers appreciating the flexibility and personalisation of online interventions. These reviews also demonstrated that technology-based interventions can improve caregiver outcomes such as self-efficacy, burden, emotional wellbeing and QoL (28).

Despite its importance in the clinical context, only a small number of interventions have specifically focused on caregiver *communication*. One intervention that did aim to improve caregiver communication found that among a sample of 197 caregivers (patient illness not specified), a 2-hour webinar focusing on caregiver empowerment and consultation communication was effective in increasing caregiver self-efficacy and knowledge (30). Caregiver self-efficacy has been identified as an important component of a caregiver's coping, with higher caregiver self-efficacy associated with lower caregiver burnout and psychosocial distress as well improved patient wellbeing (31, 32). Wittenberg and colleagues (33) recently published a Delphi consensus curriculum for cancer caregivers identifying seven key areas for future intervention development, one of which focuses on caregivers *working with health professionals*, including preparing for consultations, sharing information, asking and prioritising questions, and communicating patient need. A paucity of targeted education for cancer caregivers to more confidently and skilfully engage with oncology clinicians remains.

Our team has been engaged in a research program over 10-years (TRIadic Oncology; TRIO) focusing on understanding and improving caregiver communication in triadic cancer consultations. This has involved: a systematic review (1), qualitative studies (2, 17, 18), analyses of consultation audiotapes (16), and development of a TRIO conceptual framework (34). This culminated in the first comprehensive TRIO Clinical Guidelines to help oncology physicians and nurses better communicate with, and support, caregivers (14, 35). The TRIO Guidelines comprise two sets of evidence-based strategies aiming to improve clinician engagement with caregivers (e.g. rapport building, meeting emotional/informational caregiver needs) (14) and management of challenging and complex caregiver situations (e.g. conflicting patient-caregiver treatment wishes, caregiver anger or dominance) (35). Based on the TRIO Guidelines, as well as a web-review of online advice for

caregivers regarding involvement in consultations (36), and a comprehensive review of existing caregiver communication evidence, we have developed two online interactive education modules: i) for oncology doctors and nurses (*eTRIO*), to help clinicians effectively communicate, support and engage with caregivers (and patients); and ii) the patient-caregiver module (*eTRIO-pc*) to empower, motivate, and educate caregivers in their caring role (37).

Study aims

The aim of this study is to evaluate the effectiveness of the combined clinician and patient-caregiver online education modules in improving caregiver confidence, engagement, and management, when compared to control websites (NSW Health *Support for Carers*), using a randomised controlled trial (RCT) design.

It is hypothesised that:

- The combined *eTRIO* and *eTRIO-pc* interventions, when compared with a control website, will result in improved caregiver self-efficacy in triadic consultation interactions ***(primary outcome)***
- Secondary hypotheses posit that
    - for ***clinicians*** the combined *eTRIO* and *eTRIO-pc* interventions will result in: improved clinician self-efficacy in triadic consultation interactions, increased preferences for caregiver involvement, improved knowledge of strategies, and improved use of caregiver inclusive policies/practices in the clinical setting.
    - for ***caregivers,*** the combined eTRIO and eTRIO-pc modules will result in higher preferences for caregiver involvement, greater satisfaction with clinician communication, lower distress, higher quality of life, greater preparedness for caregiving, improved patient-caregiver communication, and an improved caregiving experience.
    - for ***patients,*** the combined eTRIO and eTRIO-pc modules will result in improved patient self-efficacy in triadic consultation interactions, higher preferences for caregiver involvement, greater satisfaction with clinician communication, lower distress, and higher quality of life.

Exploratory aims for this trial include: 1) understanding the user experience, engagement, and acceptability of the *eTRIO* and *eTRIO-pc* modules among patients, caregivers, and clinicians (*User experience and engagement sub-study)*, 2) exploring the impact of the eTRIO modules on actual triadic consultation behaviours (*audio recording sub-study)* and 3) exploring whether the eTRIO and eTRIO-pc interventions impact upon patient and caregiver healthcare expenditure.

METHODS

Study Design

This is a Phase III, parallel group randomised controlled trial with 1:1 allocation ratio. In this RCT, 30 oncology clinicians will be randomly allocated. Randomization will be stratified within each centre to ensure roughly equal numbers of *eTRIO* intervention and control clinicians at each participating site. Each clinician will recruit 9 or 10 patient-caregiver pairs to participate. Patients and caregivers receive the same allocation as their clinician (i.e. those patients/caregivers whose clinician was

randomised to receive e-TRIO will receive e-TRIO-pc, while those whose clinician was randomised to the control website will also be allocated to the control website) (see Figure 1). See Figures 2, 3, and 4 for caregiver, clinician, and patient timelines for enrolment, interventions, and assessments.

Optional audio-recording sub-study

An optional trial sub-study will involve audio-recoding triadic consultations before and after randomisation to ascertain any changes in triadic consultation behaviours. Pre-randomisation, clinicians will audio-record (with patient-caregiver permission) one substantive consultation (i.e. initial or treatment decision-making consultation; not brief review consultation) with each of two patient-caregiver pairs. These patients-caregivers will not complete the intervention or control condition and will only complete baseline measures. They will be known as the *"baseline recording"* group.

After randomisation and completing the intervention/control condition, clinicians will (with patient-caregiver permission) audio-record one substantive consultation with each patient-caregiver pair who have participated in the full trial (i.e. completed the patient-caregiver intervention/control condition).

[INSERT FIGURE 1 HERE]

[INSERT FIGURE 2 HERE]

[INSERT FIGURE 3 HERE]

[INSERT FIGURE 4 HERE]

Participants

Thirty oncology clinicians (oncology doctors and nurses) will be recruited by clinician champions at participating sites. Two hundred and seventy patient-caregiver pairs (i.e. adults with cancer and the caregiver who usually accompanies them to consultations) will also be recruited, by their participating clinician. The study will be conducted in medical/radiation/surgical oncology and haematology hospital clinics around Australia.

Eligibility Criteria

To be eligible, clinicians will i) be hospital-based medical/radiation/surgical oncology or haematology doctors (Registrar, Fellow, or Specialist) and nurses (specialised in oncology/haematology nursing) treating patients diagnosed with any cancer type, ii) have consultations with patients and caregivers to discuss cancer treatment, and iii) have ongoing and substantial patient and caregiver contact via face-to-face or Telehealth. Where doctors and nurses work together within the same consultations at a site, only one may participate in the study.

Patients will be screened for eligibility by their participating clinician and study staff. Patient eligibility criteria include: i) diagnosis of any type and any stage of cancer (excluding those receiving end-of-life care), ii) aged >18 years, iii) attending a first, second, or third oncology consultation with the *eTRIO* clinician, iv) willing to be accompanied to consultations by an informal caregiver v) have a suitable device (e.g. computer, tablet, smartphone) and internet access, and vi) cognitively and physically well enough to give informed consent to the study. Patients will be excluded if their clinician deems them too unwell or to have insufficient literacy and/or English language proficiency to complete the module/website and/or questionnaires.

Eligibility criteria for caregivers includes: i) be an informal caregiver- (family member, friend, or neighbour who supports the patient inside and outside a consultation), ii) aged > 18 years, iii) have a suitable device (e.g. computer, tablet, smartphone) and internet access, and iv) be willing to participate in the study. Caregivers will be excluded if they do not have sufficient literacy and/or English language proficiency to complete the module/website and/or questionnaires or if they are a paid, formal caregiver (such as a community support worker).

Description of the interventions

eTRIO (clinician module)

The *eTRIO* module is an evidence-based online learning platform. The content of the module is based on extensive prior research from our team (1, 2, 16-18), the wider evidence-base (e.g. 7, 19, 38, 39), and published consensus guidelines about communicating with caregivers (14, 35). Module content underwent extensive iterative review from a multidisciplinary expert advisory group comprising psycho-oncologists, medical, surgical, and radiation oncologists, oncology nurses, and experts in the development of medical education and online learning.

The eTRIO web platform was designed by a professional web-development company with experience in designing health professional training with interactive functionality. Usability was refined in two ways. A usability expert conducted a Heuristic Evaluation method (40) and the results were used to improve the interface. Then, testing was conducted using a Think-Aloud methodology with 5 health professionals naïve to the TRIO Guidelines (2 consultant-level doctors, 3 specialist oncology/palliative care nurses), with amendments made to the module based on their feedback. Additionally, a targeted module based on the TRIO guidelines, developed with the McGrath Breast Cancer Foundation to specifically address the training needs of nurses facing complex situations with family carers such as dominance, anger or conflict was piloted (41). This pilot intervention was found to increase nurses' confidence in managing interactions with carers. Qualitative feedback provided by participants helped to inform the features and functionality of the eTRIO module.

The final eTRIO module comprises 14 study units, of which clinicians must complete a minimum of eight. Depending on which eight units a clinician chooses to complete, the eTRIO module takes approximately 1.5 to 2 hours to complete. Table 1 displays a summary of the content and activities within the eTRIO module.

Table 1. Summary of each guideline in the online *eTRIO* clinician module.

Guideline	Summary of content and activities

Introduction to *eTRIO*	Overview of the module, navigation tips, benefits of caregiver involvement, caregiver burden. *Includes clinician self-reflection activity and true/false questions about the effects of caregiving.*
Guideline 1: Caregiver inclusive practices	Practical ways clinicians can include caregivers in clinic procedures and set up. *Includes photos of good and poor clinic room setups.*
Guideline 2: Encouraging caregiver attendance	How to actively encourage caregiver attendance. Exploring reasons why caregivers don't attend consultations. *Includes scenario question regarding encouraging caregiver attendance at an important consultation*
Guideline 3: Building rapport	Practical steps to build a positive relationship with caregivers. *Includes interactive short film activity where clinicians identify good rapport building.*
Guideline 4: Patient privacy and confidentiality	How to manage sensitive information when a caregiver is present. How to deal with caregiver requests for patient information. *Includes two short films exploring patient privacy and caregiver requests for information with reflective activity and feedback.*
Guideline 5: Observing relationships	Signs to watch for between the patient and caregiver which indicate potential problems. *Includes interactive image of non-verbal signs of family discord*.
Guideline 6: Emotional and informational needs	How to identify and manage the emotional and informational needs of caregivers. *Includes true/false questions about caregiver needs and an interactive activity teaching the top 5 unmet informational needs of caregivers.*
Guideline 7: Large families	How to deal with a large family in the waiting room, and strategies to sensitively navigate this situation. *Includes short film on managing many family caregivers, with multiple choice reflective activity and feedback.*
Guideline 8: Requests for nondisclosure	How to deal with the request of "don't tell my wife she has cancer", and strategies on how to sensitively and legally navigate these requests. *Includes short film on family request for non-disclosure, with open text reflective activity and feedback.*
Guideline 9: Family as interpreters	Reasons why patients/caregivers might resist professional language interprets, strategies to overcome these issues, and strategies to engage and use formal interpretation services. *Includes short film on managing resistance to formal interpretation services, with reflective activity and feedback.*
Guideline 10: Conflicting treatment preferences	How to manage a patient and caregiver who disagree on the treatment place, and strategies to negotiate a path forward in this stressful and emotional situation. *Includes short film on managing patient-family conflict, with open text reflective activity and feedback.*
Guideline 11: Caregiver dominance	How to identify the signs of unwanted caregiver dominance, and strategies to respectfully address and productively contain the caregiver's dominance. *Includes interactive short film activity where clinicians identify signs of dominance.*
Guideline 12: Caregiver anger	How to de-escalate the situation and strategies to establish a working relationship with the caregiver. *Includes short film on managing angry family member, with reflective activity and feedback.*
Guideline 13: Longstanding family conflict	How to manage longstanding conflict between a patient and caregiver, and strategies to address the conflict, whilst not allowing it to derail the consultation. *Includes short film on managing longstanding mother-daughter conflict, with reflective activity and feedback.*

eTRIO-pc (patient-caregiver modules)

The eTRIO-pc module is also an evidence-based online learning platform, informed by our group's (2, 17) and others' (15, 42) research, as well as an extensive review of available online guidance for caregivers (36) and interventions to improve caregiver engagement in consultations (29). The eTRIO-pc modules focus on providing informative and supportive content. Module content underwent extensive review by clinicians, patient and caregiver consumers, psychologists, and other experts in

supportive care and web-based patient and caregiver resources. eTRIO-pc was designed by a professional web-development company and features many interactive activities. Usability and user experience testing was conducted in a similar way to that described above for the clinician module, with the Think-Aloud user studies involving 3 caregivers and 3 cancer patients/survivors naïve to the TRIO Guidelines. The module was iteratively refined based on user feedback.

Patient and caregiver modules are similar, however key differences include: i) caregiver module is worded for the caregiver, patient module is worded for the patient; ii) the caregiver module is instructive about key caregiver skills and goes into more depth across the various topics; iii) the patient module informs the patient about what their caregiver is learning. The caregiver module comprises 11 units and takes approximately 1 hour to complete. Caregivers need to complete a minimum of six units of their own choosing. The patient module comprises 7 units and takes approximately 40 minutes to complete. A minimum of four units of the patient's choosing need to be completed. The content of the patient and the caregiver modules is summarised in Table 2.

Table 2. Summary of each component of the online *eTRIO-pc* module.

Module/Section	Summary of content and activities
CAREGIVER module	
Introduction	Overview of the module, tips on navigation, definition of 'caregiver'.
Part 1: The importance of caregivers	How important a patient's caregiver is during the cancer process. *Includes video of a cancer patient outlining benefits of caregiver involvement, and interactivity activity creating a caregiving team.*
Part 2: Introduction to cancer care	Becoming familiar with different cancer care health professionals and the rights of patients and caregivers. *Includes video of a radiation oncologist discussing the importance of caregivers.*
Part 3: First meetings with clinicians	How to establish a good working relationship with health professionals. *Includes a short film modelling key caregiver behaviours in a first consultation.*
Part 4: Preparing for consultations	Ways to help caregivers prepare for a consultation with a health professional. *Includes interactive question list builder and checklist of caregiver roles.*
Part 5: Caregiver roles during a consultation	Effective ways for caregivers to be involved during cancer consultations. *Includes a short film modelling key caregiver behaviours in managing information (asking questions, taking notes) within a consultation.*
Part 6: After the consultation	Ways to help the patient debrief after a consultation with a health professional. *Includes experiences of real caregivers and patients.*
Part 7: Caregiver involvement in decision-making	How caregivers can help to support the patient when making decisions about their care. *Includes interactive activity about ways caregiver can be helpful during decision-making.*
Part 8: Advocating for the patient	How to speak up for the patient in the healthcare setting. *Includes a short film modelling key caregiver behaviours on how to speak up for a patient's needs.*
Part 9: If the caregiver feels ignored`	What to do if a caregiver feels ignored by a health professional.
Summary and conclusions	Summary of all sections of the module.
PATIENT module	

Introduction	Overview of the module, why complete this program, tips on navigation, who is considered a caregiver in this resource.
Part 1: The importance of caregivers	How important caregivers can be during cancer treatment. *Includes video of a cancer patient outlining benefits of caregiver involvement, and interactivity activity creating a caregiving team.*
Part 2: Introduction to cancer care	Becoming familiar with different health professionals patients may meet during cancer care and the rights of patients and caregivers. *Includes video of a radiation oncologist discussing the importance of caregivers.*
Part 3: Including caregivers in consultations	How a caregiver can introduce themselves to health professionals, and how patients can help to establish a good working relationship between caregivers and health professionals.
Part 4: How caregivers can help in consultations	Ways that caregivers can be involved before, during and after consultations with health professionals. *Includes interactive question list builder and interactive checklist of caregiver roles.*
Part 5: Caregiver involvement in medical decisions	Caregiver involvement in decisions about cancer care.
Conclusion	Summary of all sections of the module.

Description of the control condition: Clinicians

Entitled "*Support for carers in NSW*", available on an Australian State Government Health website https://www.health.nsw.gov.au/carers/Pages/default.aspx, this was selected as an attention control because it is a relevant Government webpage for clinicians, provides a range of additional resources for interested clinicians, and is likely to represent the extent of professional development on caregiver inclusivity that average clinicians would receive.

Description of the control condition: Patients/caregivers

The website the "*Walking with Carers in NSW*" website, publicly available on an Australian State Government Health website https://www.health.nsw.gov.au/carers/Publications/walking-with-carers-in-nsw.pdf, was selected as an attention control because it is a relevant Government webpage for patients and caregivers, provides a high level of supportive information for caregivers, and is likely to represent the extent of caregiver support that average patients/caregivers would receive in standard care.

Procedures

Recruitment

Clinicians

Clinician champions (individual clinicians approached by the study team to assist with the trial at specific hospital sites) will assist in recruiting hospital-based surgical/medical/radiation/ haematology doctors and nurses with a range of experience at their respective sites. Interested clinicians will discuss the study with clinician champions and/or study staff and will be provided with a participant information statement and consent form. Clinician champions will be eligible to participate in the trial if they are not existing members of the study team and have not been

involved in development of the *eTRIO* or *eTRIO-pc* modules. We expect to recruit five clinicians per month over the course of six months.

Patients and Caregivers (Intervention/Control Group)

Nine patient-caregiver pairs per participating clinician will be recruited and complete either intervention or control procedures. Eligible patients of participating clinicians, and their caregivers, will be invited to participate in a study *"testing which of two different websites is most helpful in preparing and empowering caregivers to participate in cancer consultations".* Recruitment must take place prior to the third consultation with a participating clinician. We expect to recruit approximately 31 patient-carer dyads per month over the course of nine months.

Potential patient and caregiver participants will be invited to the study via one of the following recruitment pathways. Each recruiting clinician can select the most appropriate and feasible option/s:

1. *Clinic Research Nurses/Staff:* Clinic research staff members will call eligible patients with an upcoming appointment with a participating clinician and introduce the study to them. Staff will assess interest, and if verbal consent gained, provide to the researchers, the patients'/caregivers' contact details.
2. *Participating clinicians:* Participating clinicians will introduce the study to patients/caregivers during their consultation and obtain permission to pass on the details of interested patients/caregivers to the research team.
3. *Study staff:* The researchers will check with participating clinicians whether any potentially eligible patient-caregiver pairs are attending the consultation. A study staff member will approach eligible and clinician-approved patients/caregivers before or after a consultation in the waiting room of the clinic and invite them to participate in the study.
4. *Invitation Letter:* Participating clinicians will send an invitation letter to eligible patients (and caregivers), providing patients and caregivers with the researchers' phone number and email address to contact if they are interested in participating in the study (opt in approach).

Interested patients and caregivers will be telephoned by a member of the research team to explain the study in detail and screen eligibility. If eligible and willing to participate, they will each be sent individual participant information sheets via email or post, depending on their preference. An electronic consent form will be available at the start of the RedCap questionnaire (RedCap is a secure web application for managing online surveys and databases) or will be posted for those participants preferring to complete a hardcopy. Both the patient and the caregiver will need to provide consent to participate in the study.

Patients and Caregivers (OPTIONAL 'baseline recording' group)

An OPTIONAL sub-study will assess pre- and post- intervention communication. It is optional due to practical/logistical challenges of audio-recording suitable consultations as well as personal preferences of some clinicians, patients, and caregivers who do not wish to audio-record their consultations. A sub-group of patient-caregiver pairs, comprising two pairs per clinician, will be recruited for the purpose of collecting baseline data on participating clinicians' behaviours. This is an *optional* component of the study and will only be completed by clinicians opting to participate in the *optional audio-recording sub-study*. Patient/caregiver eligibility criteria for this sub-study are the

same as for the main study. Eligible patients of participating clinicians and their caregivers will be invited to participate in a study *"observing the interaction between health professionals, patients and caregivers by audio-recording a cancer consultation".* Potential participants will be approached and invited to the study through recruitment pathways described in the *Patients and Caregivers (Intervention/Control Group)* section. Patients and caregivers recruited to the '*baseline recording'* subgroup will not go on to participate in the main *eTRIO* trial.

Randomisation

Participating clinicians will be directed to a link in an email invitation in order to receive a unique username and password to access the baseline questionnaire in the online survey platform RedCap. After completing the baseline questionnaire, clinicians will be randomly allocated (1:1), stratified by profession (doctor or nurse), to the intervention or control group. Randomisation will be electronically generated by the trial statistician (DC) using an Access database. Allocation will be concealed in sequentially numbered, opaque, sealed envelopes which will be opened by a research assistant not involved in the enrolment of clinicians, during the randomisation process.

No patient or caregiver randomisation will be required, as the recruiting clinician's randomisation will determine to which website the patient and caregiver will be allocated. Given the nature of the intervention, blinding of researchers and participants is not possible.

Post randomisation procedures

Clinicians

All clinicians randomised to both intervention and control groups will be asked to visit their respective websites within 4 weeks post-randomisation. They will be emailed a link to their respective website (intervention participants will be required to create a user account). Three reminders via email and/or SMS (1, 2, 3 weeks post-randomisation) will be sent to prompt completion of the intervention/control websites.

Once they have completed the intervention/control, clinicians will recruit nine *new* patient-caregiver pairs. New patient-caregiver pairs are defined as attending a first, second, or third consultation. The restriction to *new* patients and caregivers is because of the wide variability and potential confounding nature of existing clinician-patient-caregiver relationships which may have entrenched dynamics and patterns of communication. Clinicians participating in the audio-recording substudy will be asked to record one of these consultations for each participating patient-caregiver pair. All clinicians will complete follow-up questionnaires via the online survey platform RedCap at 1, 12 and 26 weeks after intervention completion. Feedback interviews will be conducted with all clinicians to obtain feedback about their experience of either the *eTRIO* intervention or *Support for Carers* control.

Patients and caregivers

Once consented, all participating patients and caregivers will be emailed a link to complete relevant baseline questionnaires in RedCap. Each participant will then be emailed a link to the website they have been randomised to visit (either eTRIO-pc or NSW Health Support for Carers). Three reminders via email and/or SMS (1, 2, 3 weeks post-randomisation) will be sent to prompt completion of the intervention/control websites. All patient and caregiver participants will be prompted to separately

complete follow up online questionnaires in RedCap at 1, 12 and 26 weeks after completion of the e-TRIO-pc module. Given the nature of the trial, adverse physical and psychological events are not anticipated. However, participants will be reassured of their ability to discontinue participation at any time and referrals for psychological support will be provided should any participants become distressed during the trial. Feedback interviews will be conducted with a subset of patients and carers to obtain feedback about their experience of either the *eTRIO* intervention or *Walking with Carers* control.

Participant retention

Once enrolled and randomised, every reasonable effort will be made by study staff to follow all participants for the entire study period. Clinicians will be sent encouraging emails throughout the study. Participating clinicians will also be offered a $50 gift card for participating in the study; to, in a small way, compensate them for time given to the study. In addition, clinicians could use the intervention to count towards continuing professional development points.

Patients and carers will be followed up three times at different times of the day by phone or email if questionnaires are not completed.

Measures

Caregiver Measures

Table 3 summarises the caregiver primary and secondary outcome measures, with time point/s of administration displayed in Figure 2. Caregiver demographics and clinical variables including age, gender, marital status, education level, occupation, ethnicity and postcode will also be measured at baseline.

Primary Outcome

The primary outcome of caregiver self-efficacy in interactions with the patient and their oncologist or nurse will be measured using a 14 item scale, based on the widely used, validated Perceived Efficacy in Patient-Physician Interactions scale (PEPPI-10) (43). Seven relevant PEPPI-10 items were appropriately transformed to be caregiver related, with an additional seven items purpose-designed to assess other topics such as caregiver confidence in: establishing a relationship with the clinician, contributing to decision-making discussions, and speaking up (advocating) for the patient. All questions will ask respondents "*how confident are you in your ability to"* followed by 14 different caregiver behaviours/skills relating to consultation communication. As per PEPPI-10, ratings of strength of self-efficacy for each item will range from 1 (not at all confident) to 5 (very confident).

Secondary Outcomes

Secondary outcomes measured will include preferences for involvement of the caregiver in communication and decision-making (44), caregiver satisfaction with communication with their clinician (adapted from (45)), caregiver distress (46), preparedness for caregiving (47), patient-caregiver communication (48), quality of life (49), healthcare expenditure (purpose designed measure), caregiver time and caring experience (50).

Table 3. Summary of primary and secondary outcome measures

Measures	Items and assessed construct
Clinician measures	
Oncologist and nurse self-efficacy in triadic communication	13-item perceived self-efficacy in triadic communication scale based on Parle et al. (51).
Preferences for involvement of the caregiver in communication/ decision making	2 questions developed by Shin et al. (44) assessing clinician preferences of caregiver involvement in treatment decision making
Practical strategies/policies for including caregivers	12-item purpose-built questionnaire assessing how clinicians welcome and manage caregivers in their own workplace
Knowledge of strategies	14 purpose-designed situational vignette items assessing clinician knowledge/application of strategies to manage caregiver involvement.
Usability	2-item UMUX-LITE (52). Assesses overall usability (ease of use and system capability) of module.
Satisfaction with the module/website	11-item purpose designed questionnaire assessing participant satisfaction with features of eTRIO or NSW Health websites.
Caregiver measures	
Caregiver self-efficacy in interactions with their oncologist or nurse	14-item perceived self-efficacy in triadic consultation communication adapted from PEPPI-10 (43) with 7 additional items.
Caregiver satisfaction with communication with their oncologist and nurse	25-item purpose-designed Consultation Satisfaction Scale adapted from (45). Assesses caregiver satisfaction with clinician communication.
Health literacy	4 item health literacy measure (53).
Preferences for involvement of the caregiver in communication/ decision making	2-item scale (44) assessing caregiver preferences for involvement.
Caregiver Distress	21-item Depression, Anxiety and Stress Scale (DASS-21) (46).
Preparedness for Caregiving	8-item Preparedness for Caregiving Scale (47).
Patient-caregiver communication	2 subscales of the Health Literacy of Caregiver Scale -Cancer (48). Assesses cancer related patient-caregiver communication and needs and preferences.
Quality of Life (Health Utility)	12-item quality of life measure AQoL-4D (49).
Healthcare Expenditure	Purpose designed incurred cost questionnaire. Assesses patient GP/specialist visits, hospital stays, counselling and other support services.
Caregiver time	2-item scale. Valued using the market price of labour (i.e. wages or the aged pension).
Caring experience	The Carer Experience Scale (CES) (50).
Usability	2-item UMUX-LITE (52). Assesses overall usability (ease of use and system capability) of module.
Satisfaction with the module/website	11-item purpose designed questionnaire assessing participant satisfaction with features of eTRIO or NSW Health websites.
Patient measures	

Patient self-efficacy in interactions with their oncologist or nurse	11-item perceived self-efficacy triadic consultation communication adapted from PEPPI-10 (43) with 4 additional items. Assesses patient self-efficacy in triadic communication with their clinician and caregiver.
Patient satisfaction with communication with their oncologist and nurse	25-item purpose-designed Consultation Satisfaction Scale, adapted from (45). Assesses patient's satisfaction with communication with their clinician.
Health literacy	4 item health literacy measure (53).
Preferences for involvement of the caregiver in communication/ decision making	2 questions developed by Shin et al. (44). Assesses patient preferences of caregiver involvement in treatment decision-making.
Patient Distress	21-item Depression, Anxiety and Stress Scale (DASS-21) (46).
Quality of Life (Health Utility)	12-item quality of life measure AQoL-4D (49).
Healthcare Expenditure	8-item purpose designed incurred cost questionnaire. Assesses patient GP/specialist visits, hospital stays, counselling and other support services.
Usability	2-item UMUX-LITE (52). Assesses overall usability (ease of use and system capability) of module.
Satisfaction with the module/website	11-item purpose designed questionnaire assessing participant satisfaction with features of eTRIO or NSW Health websites.

Clinician Measures

Table 3 summarises the caregiver primary and secondary outcome measures, with time point/s of administration displayed in Figure 3. Clinician demographic and professional characteristics, including age, gender, years in practice, main cancers treated, and prior communication skills training will also be obtained at baseline.

Secondary Outcomes

Oncologist and nurse self-efficacy in triadic communication will be measured using a 13-item scale, based on the widely used Parle and colleagues' (51) clinician communication self-efficacy scale, adapted to capture *triadic* communication. Questions will ask respondents "*how confident are you in your ability to"* followed by 13 different clinician skills relating to triadic communication and management of caregivers. Ratings of strength of self-efficacy for each item will range from 1 (not at all confident) to 10 (very confident). Other secondary outcomes include preferences for involvement of the caregiver in communication/decision making (44), perceived module usability (52) as well as satisfaction with the module, knowledge of TRIO strategies, and practical strategies/policies clinicians currently have in place to include caregivers (purpose designed questionnaires).

Patient Measures

Table 3 summarises the caregiver primary and secondary outcome measures, with time point/s of administration displayed in Figure 4. At baseline, patients will disclose their demographic and clinical details including age, gender, marital status, education level, occupation, ethnicity, diagnosis, stage of disease, treatment type and post code.

Secondary Outcomes

Patient self-efficacy in interactions with their oncologist/nurse and caregiver will be measured using an 11 item scale, based on the widely used, validated Perceived Efficacy in Patient-Physician Interactions (PEPPI-10) (43). Seven relevant PEPPI-10 items were included, with an additional four items purpose-designed to assess other caregiver related topics such as patient confidence in establishing the caregiver's involvement in consultations. All questions will ask respondents "*how confident are you in your ability to"* followed by 11 different behaviours/skills relating to triadic consultation communication. As per PEPPI-10, ratings of strength of self-efficacy for each item will range from 1 (not at all confident) to 5 (very confident). Other secondary outcomes will include preferences for involvement of the caregiver in communication and decision-making (44), patient satisfaction with communication with their oncologist and nurse (adapted from (45)), patient distress (46), health literacy (53), quality of life (health utility) (49), and healthcare expenditure will also be measured.

User experience and engagement sub-study

This sub study seeks to gain insights into how participants used the eTRIO modules, to provide better understanding of its successes/failures, with the ultimate aim of providing lessons to others developing future online clinician, patient, or carer resources.

Both intervention and control participants will be asked to complete a measure of user experience (UMUX-LITE) (52) and a custom-designed feedback questionnaire assessing the usability and acceptability of either the eTRIO module or NSW Health Website. All intervention clinicians (n=15) and control clinicians (n=15) and a subset of intervention caregivers (n=15), control caregivers (n=15), and intervention (n=15) and control (n=15) patients will be invited to participate in semi-structured feedback interviews assessing the usability, acceptability, and practical application of the intervention/control training. These interviews will take place between 1-week and 1-month post-intervention and will be analysed using thematic analysis. Participants will also answer questions about the amount of time spent on the website/module, the number of times they access the training, and percentage of the website/module they completed.

For intervention clinicians, caregivers, and patients, participant engagement will also be assessed through percentage of modules' content completed based on hits and Google diagnostics as well as user interaction with the modules analysed using captured log-data. This will include pages visited, time spent on each section, information viewed and downloaded, and engagement with interactive activities such as videos watched and participant responses to questions. Website analytics will be used to better understand user behaviours and interaction with the eTRIO sites, including order of use, areas of high vs. low engagement, and revisit behaviour as well as devices used (e.g. mobile, desktop). These insights may lead to improved understanding of how to engage with and educate clinicians, patients, and carers using online tools as well as the aspects of the website that affected the other outcomes.

Triadic consultation behaviour (audio-recording sub-study)

For those clinician, patient, and caregiver triads who *opt-in* to the audio-recording sub-study, their application of knowledge learnt throughout the intervention/control conditions will also be assessed pre- and post-intervention using an adapted version of the validated 80-item KINCode behavioural coding system (16). KINcode codes for the behaviours of the clinician, patient, and caregiver across 4

different consultation phases (history taking, information exchange, deliberation, and logistical arrangements) and assess for the presence/absence of specific behaviours (e.g. caregiver asks a question). Additionally, pre and post intervention behaviours captured in consultation audio-recordings (for those who have consented to do so) will also be qualitatively analysed using conversational analysis. Consultation data will be analysed and presented descriptively.

Sample Size

The sample size was calculated based on a standardised mean difference between intervention and control groups of 0.5, which is a moderate effect and is widely used in situations like this where there are no published estimates of effect size from similar studies and no minimally important difference for the primary outcome measure. Assuming a 1:1 randomisation for online training versus control, a two-sided test with alpha = 0.05, and 80% power, this gives a total sample of 126. To account for clustering by clinician we multiplied the number above by the design effect 1 + (m – 1)*ICC, where ICC is the intra-cluster correlation and m is the number of patient/caregivers per clinician (=7 expected after attrition). Based on reviews in psycho-oncology (54), we believe that using an ICC of 0.1 is appropriately conservative. Multiplying by the design effect, this gives a total required sample size of 202 patient-caregiver pairs. Based on attrition rates of studies described in a Cochrane review of caregiver psychosocial interventions (55), an attrition rate of 30% (10% at each timepoint) was considered appropriate. To account for this attrition rate, the required sample is 277 patient-carer dyads.

Data Collection

Quantitative data will be collected through REDCap, a secure online survey platform which will allow close adherence to the study protocol. All primary outcome measures have been designed within the questionnaires to require a response, thereby minimising issues of missing data.

Research personnel have completed training in Good Clinical Practice Guidelines (internationally accepted standards for conducting clinical trials). They also completed training in REDCap questionnaire formation, data collection, storage, and retrieval.

Data Analysis

Primary Outcome

Intervention efficacy of the *eTRIO* and *eTRIO-pc* modules will be determined by group differences in changes in caregiver self-efficacy in triadic communication scores. Analyses will consist of a random effects linear regression model (i.e. mixed effects model), with caregivers as the unit of analysis and intervention vs. control as a clinician-level predictor. The random effect will account for multiple patients nested within each clinician. Assessment time will also be included as a factor, resulting in a three-level model (clinician-patient/caregiver-time). Potential confounders will be controlled for in all analyses. All caregivers who provide data at any time point will be included in the analysis. At the item level, missing data will be mean-imputed if at least half of the data are not missing. For aggregated variables (i.e., those included in analysis), we will examine patterns of missingness, and the random effects model handles missing data by using all available information, i.e., no explicit imputation.

Secondary Outcomes

Secondary outcomes will be examined using separate random effects regression models created for each outcome measure across testing points, the same as for the primary outcome. For the patient and caregiver outcome variables (i.e. satisfaction and distress), the clinician will be modelled as a random effect.

Feedback Interview Analysis

Feedback interviews will be transcribed verbatim and undergo thematic analysis. (56) Team based coding and thematic conceptualisation with experts in qualitative methods will ensure rigorous analysis.

Ethics and Dissemination

This protocol has received ethical approval from the Sydney Local Health District Human Research Ethics Committee (REGIS project ID number: 2019/PID09787), with site-specific approval from each recruitment site.

Findings will be disseminated via normal academic channels (presentations, peer-reviewed publications) as well as engagement with clinicians, media, Government and consumers. To ensure widespread dissemination of the *eTRIO* education, assuming it is found to be beneficial, the research team have partnered with two peak cancer groups in Australia, the Cancer Council NSW (Non-Government cancer information, advocacy, and support service for patients and caregivers) and Cancer Institute NSW (State Government health department which provides expert guidance on cancer control, including health professional education). Upon successful completion of the trial, the *eTRIO* modules will be incorporated into their respective online learning platforms for long-term availability to clinicians, patients, and caregivers. Our team have established links with peak oncology professional and consumer groups and will advocate endorsement and use of the eTRIO modules. Implementation of the clinician module into professional oncology association training and postgraduate medical curricula will be advocated, including application for the *eTRIO* program to have continuing professional development points.

Careful consideration has been given to the practical implementation and use of the modules in cancer care. The modules have been designed based on iterative feedback from stakeholders and principles of e-learning in medical education and training (57). The modules can be completed in small chunks over a period of time (58), include interactive activities and the presentation of information in various modalities (59), opportunities for revision and the ability to navigate back to topic areas of interest, while users direct their own learning by choosing the scope, pace and sequence of their learning (60). These features ensure the modules will be able to be scaled up for wider dissemination.

Patient and Public Involvement

Our groups' early qualitative work on patients, caregivers, and clinicians' experiences of caregiver involvement prompted the development of the TRIO Guidelines and the eTRIO trial. A group of patient and caregiver consumer advisors (4 patients, 4 caregivers), as well as an oncology clinician advisory group (medical, radiation, and surgical oncology doctors and oncology nurses), have been

actively involved in each stage of trial design and have provided iterative feedback on the design and content of the eTRIO and eTRIO-pc interventions.

DISCUSSION

To our knowledge, the *eTRIO* intervention is the first to concurrently address caregiver involvement among *all* key stakeholders in cancer consultations and care (patients, caregivers, nurses, and oncologists). The development and testing of the *eTRIO* modules signifies a critical step towards improved engagement with, and management of, caregivers in the cancer setting. The current Phase III data will indicate the effectiveness of the combined (e-TRIO and e-TRIO-pc) modules in improving stakeholder self-efficacy in communication and patient/caregiver psychosocial outcomes, and lowering patient/caregiver health costs. Namely, it is hoped that the modules will facilitate clinicians to be more inclusive of caregivers and more confident in managing the challenges of caregiver involvement. Additionally, it is hoped that caregivers will more effectively participate in consultations and support the patient, and cancer patients/caregivers will be better informed, supported and less psychologically distressed.

This study has been designed to gain insights into the ways that participants *use* and *engage with* the eTRIO programs, including the use of web analytics to understand actual user behaviours and qualitative interviews to elicit participant experiences of the modules. It is hoped that the user experience and engagement sub-study will contribute to a better understanding of what technical features and functions contribute to improved medical education and supportive patient care. This novel and timely research has at its core the translation of The TRIO Guidelines into improved health care performance, by addressing known challenges of engaging caregivers in cancer care in an accessible and effective way. The ultimate goal of this research is to shift the status of caregivers from an under-served, vulnerable, and disempowered cancer population to being confident, engaged, and supported participants in the cancer care process.

Trial Status: Patient recruitment is open.

Figures

Figure 1: eTRIO Trial Study Design
Figure 2: SPIRIT schedule of enrolment, interventions, and assessments for participating ***caregivers***
Figure 3: SPIRIT schedule of enrolment, interventions, and assessments for oncology ***clinicians***
Figure 4: SPIRIT schedule of enrolment, interventions, and assessments for participating ***patients***

DECLARATIONS

Ethics approval - This protocol has received ethical approval from the Sydney Local Health District Human Research Ethics Committee (REGIS project ID number: 2019/PID09787), with site-specific approval from each recruitment site. Protocol version 7 (dated 01/09/2020) is currently approved and reported in this manuscript.

Modifications/amendments: Any modifications to the protocol which may impact on the conduct of the study, potential benefit of the patient or may affect patient safety, including changes of study objectives, study design, patient population, sample sizes, study procedures, or significant administrative aspects will require a formal amendment to the protocol. Such amendment will be submitted to the Sydney Local Health District Human Research Ethics Committee.

Trial Sponsor: The University of Sydney. The trial sponsor provides infrastructure and enables the running of the trial. Has no influence over study design; collection, management, analysis, and interpretation of data; writing of the report; and the decision to submit the report for publication.

Consent for publication – Not applicable as no identifying information of participants will be published.

Availability of data and material – The datasets generated and/or analysed during the current study are available from the corresponding author on reasonable request and in accordance with ethical restrictions imposed by the Ethics Committees that approved this study.

Data management, monitoring, and participant confidentiality- Plans for how data is managed and monitored (including site monitoring) form part of the full trial Protocol and can be requested by contacting the corresponding author. Details about how participant confidentiality is maintained and how data is collected and shared can also be obtained by contacting the corresponding author.

Competing interests - The investigators/authors have no conflicts of interest to declare.

Funding - This trial is supported by Cancer Australia and Cancer Council NSW, through the Priority-driven Collaborative Cancer Research Scheme (Project number 1146383).
Funding will be managed by study sponsor: The University of Sydney under the guidance of PI Juraskova.

Authorship: For all published work resulting from this trial, the ICMJE principles of authorship (including the four criteria for authorship) will be upheld.

Authors' contributions

IJ and PB conceptualised the study and formed the project team. All authors are members of the steering committee and contributed to the design of the study. IJ, RL-P, and PB are the lead investigators of the study and the TRIO program more broadly. RL-P, RK, ZB, IJ, and PB drafted the study protocol and manuscript, which was reviewed, modified, and supplemented by all other authors. PS, DC, and PY form the trial methodology advisory committee, with DC responsible for

data analysis. JK provides IT expertise. ST, CS, BK, MJ, PY, FB, and KW form the clinician advisory committee. AM provides expertise in patient and caregiver supportive care and community delivery. RM will contribute specifically to design of the exploratory cost-effectiveness sub-study. All authors read and approved the final manuscript.

Acknowledgements - The authors wish to thank the members of the *eTRIO* consumer advisory groups for their input into the intervention and trial design.

References

1. Laidsaar-Powell R, Butow P, Bu S, Charles C, Gafni A, Lam W, et al. Physician–patient–companion communication and decision-making: a systematic review of triadic medical consultations. Patient Education and Counseling. 2013;91(1):3-13.
2. Laidsaar-Powell R, Butow P, Bu S, Fisher A, Juraskova I. Attitudes and experiences of family involvement in cancer consultations: a qualitative exploration of patient and family member perspectives. Supportive care in cancer. 2016;24(10):4131-40.
3. Dionne-Odom JN, Ejem D, Wells R, Barnato AE, Taylor RA, Rocque GB, et al. How family caregivers of persons with advanced cancer assist with upstream healthcare decision-making: A qualitative study. PloS one. 2019;14(3).
4. Roter DL, Narayanan S, Smith K, Bullman R, Rausch P, Wolff JL, et al. Family caregivers' facilitation of daily adult prescription medication use. Patient education and counseling. 2018;101(5):908-16.
5. Thomas C, Morris SM, Harman JC. Companions through cancer:: the care given by informal carers in cancer contexts. Soc Sci Med. 2002;54(4):529-44.
6. Ellis KR, Janevic MR, Kershaw T, Caldwell CH, Janz NK, Northouse L. Engagement in health-promoting behaviors and patient–caregiver interdependence in dyads facing advanced cancer: an exploratory study. Journal of behavioral medicine. 2017;40(3):506-19.
7. Sklenarova H, Krümpelmann A, Haun MW, Friederich HC, Huber J, Thomas M, et al. When do we need to care about the caregiver? Supportive care needs, anxiety, and depression among informal caregivers of patients with cancer and cancer survivors. Cancer. 2015.
8. Sun V, Raz DJ, Kim JY. Caring for the informal cancer caregiver. Current opinion in supportive and palliative care. 2019;13(3):238-42.
9. Streck BP, Wardell DW, LoBiondo-Wood G, Beauchamp JE. Interdependence of physical and psychological morbidity among patients with cancer and family caregivers: Review of the literature. Psycho-Oncology. 2020.
10. Rumpold T, Schur S, Amering M, Kirchheiner K, Masel E, Watzke H, et al. Informal caregivers of advanced-stage cancer patients: Every second is at risk for psychiatric morbidity. Supportive Care in Cancer. 2016;24(5):1975-82.
11. Shaffer KM, Kim Y, Carver CS. Physical and mental health trajectories of cancer patients and caregivers across the year post-diagnosis: a dyadic investigation. Psychology & health. 2016;31(6):655-74.
12. Litzelman K, Kent EE, Mollica M, Rowland JH. How does caregiver well-being relate to perceived quality of care in patients with cancer? Exploring associations and pathways. Journal of Clinical Oncology. 2016;34(29):3554.
13. Boele FW, Given CW, Given BA, Donovan HS, Schulz R, Weimer JM, et al. Family caregivers' level of mastery predicts survival of patients with glioblastoma: A preliminary report. Cancer. 2017;123(5):832-40.
14. Laidsaar-Powell R, Butow P, Boyle F, Juraskova I. Facilitating collaborative and effective family involvement in the cancer setting: guidelines for clinicians (TRIO Guidelines-1). Patient education and counseling. 2018;101(6):970-82.

15. McCarthy B. Family members of patients with cancer: what they know, how they know and what they want to know. European Journal of Oncology Nursing. 2011;15(5):428-41.

16. Laidsaar-Powell R, Butow P, Bu S, Dear R, Fisher A, Coll J, et al. Exploring the communication of oncologists, patients and family members in cancer consultations: development and application of a coding system capturing family-relevant behaviours (KINcode). Psycho-Oncology. 2015.

17. Laidsaar-Powell R, Butow P, Bu S, Charles C, Gafni A, Fisher A, et al. Family involvement in cancer treatment decision-making: A qualitative study of patient, family, and clinician attitudes and experiences. Patient education and counseling. 2016;99(7):1146-55.

18. Laidsaar-Powell R, Butow P, Bu S, Fisher A, Juraskova I. Oncologists' and oncology nurses' attitudes and practices toward family involvement in cancer consultations. European Journal of Cancer Care. 2016.

19. Speice J, Harkness J, Laneri H, Frankel R, Roter D, Kornblith A, et al. Involving family members in cancer care: focus group considerations of patients and oncological providers. Psycho-Oncology. 2000;9(2):101-12.

20. Røen I, Stifoss-Hanssen H, Grande G, Kaasa S, Sand K, Knudsen AK. Supporting carers: health care professionals in need of system improvements and education-a qualitative study. BMC palliative care. 2019;18(1):58.

21. Lambert SD, Brahim LO, Morrison M, Girgis A, Yaffe M, Belzile E, et al. Priorities for caregiver research in cancer care: an international Delphi survey of caregivers, clinicians, managers, and researchers. Supportive Care in Cancer. 2019;27(3):805-17.

22. Zaider TI, Banerjee SC, Manna R, Coyle N, Pehrson C, Hammonds S, et al. Responding to challenging interactions with families: A training module for inpatient oncology nurses. Families, Systems, & Health. 2016;34(3):204.

23. Gueguen JA, Bylund CL, Brown RF, Levin TT, Kissane DW. Conducting family meetings in palliative care: themes, techniques, and preliminary evaluation of a communication skills module. Palliative & supportive care. 2009;7(2):171-9.

24. Nørgaard B, Ammentorp J, Ohm Kyvik K, Kofoed PE. Communication skills training increases self-efficacy of health care professionals. Journal of Continuing Education in the Health Professions. 2012;32(2):90-7.

25. Gulbrandsen P, Jensen BF, Finset A, Blanch-Hartigan D. Long-term effect of communication training on the relationship between physicians' self-efficacy and performance. Patient education and counseling. 2013;91(2):180-5.

26. Cook DA, Levinson AJ, Garside S, Dupras DM, Erwin PJ, Montori VM. Internet-based learning in the health professions: a meta-analysis. Jama. 2008;300(10):1181-96.

27. Heynsbergh N, Botti M, Heckel L, Livingston PM. Caring for the person with cancer: Information and support needs and the role of technology. Psycho-oncology. 2018;27(6):1650-5.

28. Shin JY, Kang TI, Noll RB, Choi SW. Supporting Caregivers of Patients With Cancer: A Summary of Technology-Mediated Interventions and Future Directions. American Society of Clinical Oncology Educational Book. 2018;38:838-49.

29. Ferrell B, Wittenberg E. A review of family caregiving intervention trials in oncology. CA: a cancer journal for clinicians. 2017;67(4):318-25.

30. Moore CD, Cook KM. Promoting and measuring family caregiver self-efficacy in caregiver-physician interactions. Social Work in Health Care. 2011;50(10):801-14.

31. Merluzzi TV, Philip EJ, Vachon DO, Heitzmann CA. Assessment of self-efficacy for caregiving: The critical role of self-care in caregiver stress and burden. Palliative & Supportive Care. 2011;9(1):15.

32. Keefe FJ, Ahles TA, Porter LS, Sutton LM, McBride CM, Pope MS, et al. The self-efficacy of family caregivers for helping cancer patients manage pain at end-of-life. PAIN®. 2003;103(1-2):157-62.

33. Wittenberg E, Goldsmith J, Parnell TA. Development of a communication and health literacy curriculum: Optimizing the informal cancer caregiver role. Psycho-Oncology. 2020;29(4):766-74.

34. Laidsaar-Powell R, Butow P, Charles C, Gafni A, Entwistle V, Epstein R, et al. The TRIO Framework: Conceptual insights into family caregiver involvement and influence throughout cancer treatment decision-making. Patient education and counseling. 2017;100(11):2035-46.

35. Laidsaar-Powell R, Butow P, Boyle F, Juraskova I. Managing challenging interactions with family caregivers in the cancer setting: Guidelines for clinicians (TRIO Guidelines-2). Patient education and counseling. 2018;101(6):983-94.

36. Keast R, Butow PN, Juraskova I, Laidsaar-Powell R. Online resources for family caregivers of cognitively competent patients: A review of user-driven reputable health website content on caregiver communication with health professionals. Patient Education and Counseling. 2020.

37. Juraskova I, Laidsaar-Powell R, Butow P, Keast R, Boyle F, Costa D, et al. Facilitating effective family carer engagement in cancer care: Development of the eTRIO education modules. Asia-Pacific Journal of Clinical Oncology. 2019;15:90.

38. Lown BA. Difficult conversations: anger in the clinician-patient/family relationship. Southern Medical Journal. 2007;100(1):33-9; quiz 40-2, 62.

39. Hallenbeck J, Arnold R. A request for nondisclosure: Don't tell mother. Journal of Clinical Oncology. 2007;25(31):5030-4.

40. Nielsen J. Usability engineering: Morgan Kaufmann; 1994.

41. Laidsaar-Powell R, Keast R, Butow P, Mahony J, Hagerty F, Townsend J, et al. [in press] Improving breast cancer nurses' management of challenging situations involving family carers: Pilot evaluation of a brief targeted online education module (TRIO-Conflict). *Patient Education and Counseling.* 2021.

42. Northouse L, Schafenacker A, Barr K, Katapodi M, Yoon H, Brittain K, et al. A tailored Web-based psychoeducational intervention for cancer patients and their family caregivers. Cancer nursing. 2013;37(5):321-30.

43. Maly RC, Frank JC, Marshall GN, DiMatteo MR, Reuben DB. Perceived Efficacy in Patient-Physician Interactions (PEPPI): Validation of an Instrument in Older Persons. Journal of the American Geriatrics Society. 1998;46(7):889-94.

44. Shin DW, Cho J, Roter DL, Kim SY, Sohn SK, Yoon MS, et al. Preferences for and experiences of family involvement in cancer treatment decision-making: patient–caregiver dyads study. Psycho-Oncology. 2013;22(11):2624-31.

45. Brown R, Dunn S, Butow P. Meeting patient expectations in the cancer consultation. Annals of oncology. 1997;8(9):877-82.

46. Lovibond PF, Lovibond SH. The structure of negative emotional states: Comparison of the Depression Anxiety Stress Scales (DASS) with the Beck Depression and Anxiety Inventories. Behaviour research and therapy. 1995;33(3):335-43.

47. Archbold PG, Stewart BJ, Greenlick MR, Harvath T. Mutuality and preparedness as predictors of caregiver role strain. Research in nursing & health. 1990;13(6):375-84.

48. Yuen E, Knight T, Dodson S, Chirgwin J, Busija L, Ricciardelli LA, et al. Measuring cancer caregiver health literacy: Validation of the Health Literacy of Caregivers Scale–Cancer (HLCS-C) in an Australian population. Health & social care in the community. 2018;26(3):330-44.

49. Hawthorne G, Richardson J, Osborne R. The Assessment of Quality of Life (AQoL) instrument: a psychometric measure of health-related quality of life. Quality of Life Research. 1999;8(3):209-24.

50. Al-Janabi H, Coast J, Flynn TN. What do people value when they provide unpaid care for an older person? A meta-ethnography with interview follow-up. Social science & medicine. 2008;67(1):111-21.

51. Parle M, Maguire P, Heaven C. The development of a training model to improve health professionals' skills, self-efficacy and outcome expectancies when communicating with cancer patients. Social science & medicine. 1997;44(2):231-40.

52. Lewis JR, Utesch BS, Maher DE, editors. UMUX-LITE: when there's no time for the SUS. Proceedings of the SIGCHI Conference on Human Factors in Computing Systems; 2013.

53. Halverson JL, Martinez-Donate AP, Palta M, Leal T, Lubner S, Walsh MC, et al. Health literacy and health-related quality of life among a population-based sample of cancer patients. Journal of health communication. 2015;20(11):1320-9.

54. Bell ML, McKenzie JE. Designing psycho-oncology randomised trials and cluster randomised trials: variance components and intra-cluster correlation of commonly used psychosocial measures. Psycho-Oncology. 2013;22(8):1738-47.

55. Treanor CJ, Santin O, Prue G, Coleman H, Cardwell CR, O'Halloran P, et al. Psychosocial interventions for informal caregivers of people living with cancer. Cochrane Database Syst Rev. 2019(6).

56. Braun V, Clarke V. Using thematic analysis in psychology. Qualitative research in psychology. 2006;3(2):77-101.

57. Masters K, Ellaway R. e-Learning in medical education Guide 32 Part 2: Technology, management and design. Medical teacher. 2008;30(5):474-89.

58. Atack L. Becoming a web-based learner: registered nurses' experiences. Journal of advanced nursing. 2003;44(3):289-97.

59. Scott KM, Baur L, Barrett J. Evidence-based principles for using technology-enhanced learning in the continuing professional development of health professionals. Journal of Continuing Education in the Health Professions. 2017;37(1):61-6.

60. Lau KHV. Computer-based teaching module design: principles derived from learning theories. Medical education. 2014;48(3):247-54.

Figure 1. eTRIO Trial Study Design.

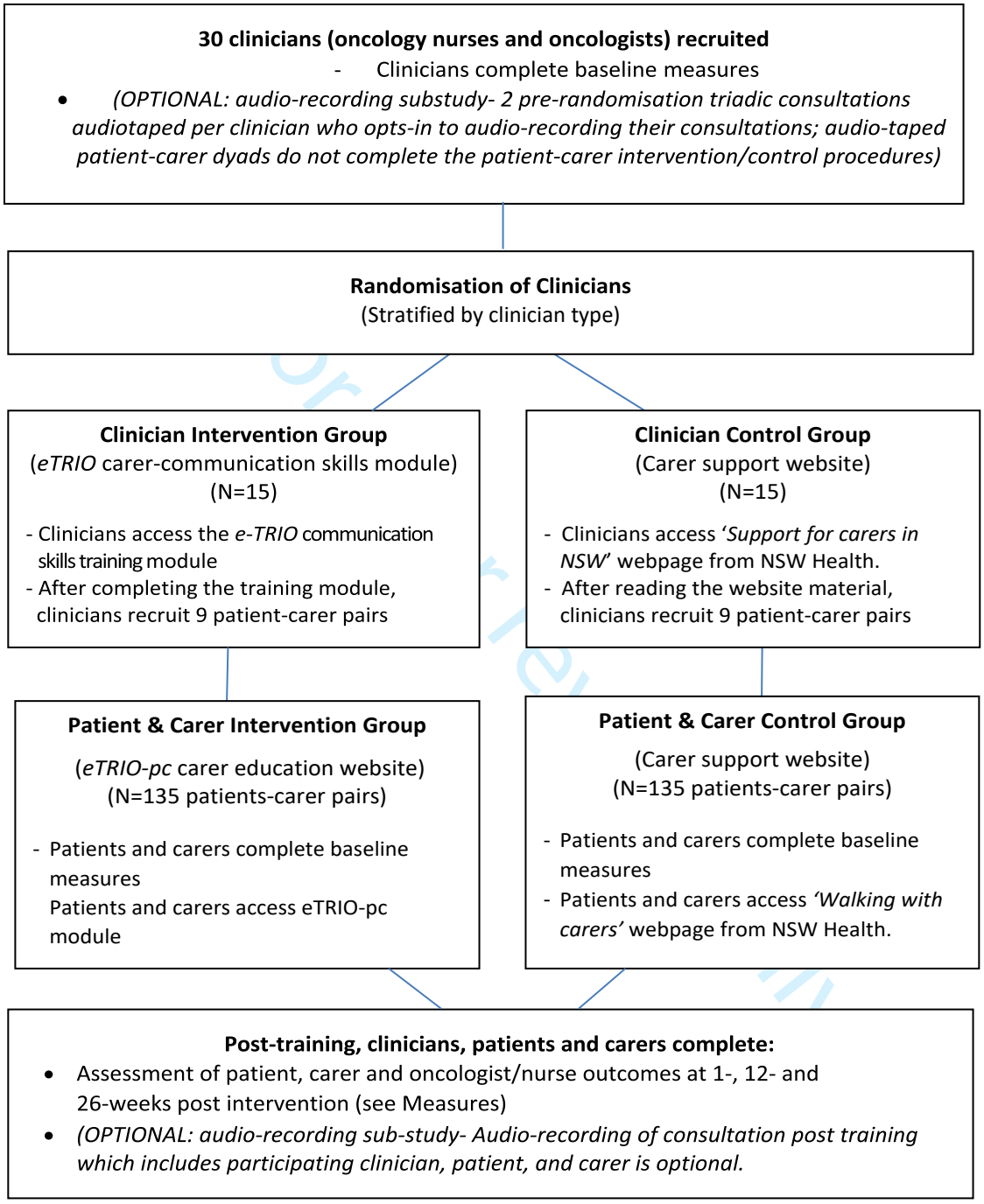

Figure 2: SPIRIT schedule of enrolment, interventions, and assessments for participating ***caregivers***

	Screening	Baseline	Intervention	Post-intervention		
TIMEPOINT				***1 week***	***12 weeks***	***26 weeks***
ENROLMENT:						
Eligibility screen	**X**					
Informed consent	**X**					
INTERVENTIONS:						
Intervention- eTRIO			◆———			
Control- NSW Health Website			◆———			
ASSESSMENTS:						
Caregiver demographics		**X**				
Caregiver clinical characteristics		**X**				
***PRIMARY OUTCOME**: Caregiver self-efficacy in triadic communication*		**X**		**X**	**X**	**X**
***SECONDARY OUTCOMES**: Caregiver satisfaction with clinician communication*		**X**		**X**	**X**	**X**
Preferences for caregiver involvement		**X**		**X**	**X**	**X**
Distress		**X**		**X**	**X**	**X**
Preparedness for caregiving		**X**		**X**	**X**	**X**
Patient-caregiver communication		**X**		**X**	**X**	**X**
Quality of Life		**X**		**X**	**X**	**X**
Healthcare expenditure				**X**	**X**	**X**
Caring experience				**X**	**X**	**X**
OPTIONAL Post intervention consultation recording				**X**		
Usability				**X**		
Satisfaction with module/website				**X**		
User engagement			**X**			

Figure 3: SPIRIT schedule of enrolment, interventions, and assessments for oncology ***clinicians***

	Screening	Baseline	Allocation	Intervention	Post-intervention		
TIMEPOINT**					*1 week*	*12 weeks*	*26 weeks*
ENROLMENT:							
Eligibility screen	X						
Informed consent	X						
OPTIONAL Baseline consultation recording		X					
Allocation			X				
INTERVENTIONS:							
Intervention- eTRIO				◆——			
Control- NSW Health Website				◆——			
ASSESSMENTS:							
Clinician demographics		X					
Clinician professional characteristics		X					
PRIMARY OUTCOME: *Clinician self-efficacy in triadic communication*		X			X	X	X
SECONDARY OUTCOMES: *Preferences for carer involvement*		X			X	X	X
Carer relevant strategies and policies		X				X	X
Knowledge of strategies		X			X		
OPTIONAL Post intervention consultation recording					X		
Usability					X		
Satisfaction with module/website					X		
User engagement				X			

Figure 4: SPIRIT schedule of enrolment, interventions, and assessments for participating ***patients***

	Screening	Baseline	Intervention	Post-intervention		
TIMEPOINT**				*1 week*	*12 weeks*	*26 weeks*
ENROLMENT:						
Eligibility screen	X					
Informed consent	X					
INTERVENTIONS:						
Intervention- eTRIO			◆———			
Control- NSW Health Website			◆———			
ASSESSMENTS:						
Patient demographics		X				
Patient clinical characteristics		X				
***PRIMARY OUTCOME**: Patient self-efficacy in triadic communication*		X		X	X	X
***SECONDARY OUTCOMES**: Patient satisfaction with clinician communication*		X		X	X	X
Preferences for caregiver involvement		X		X	X	X
Distress		X		X	X	X
Quality of Life		X		X	X	X
Healthcare expenditure				X	X	X
OPTIONAL Post intervention consultation recording				X		
Usability				X		
Satisfaction with module/website				X		
User engagement			X			

SPIRIT

STANDARD PROTOCOL ITEMS: RECOMMENDATIONS FOR INTERVENTIONAL TRIALS

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

Section/item	Item No	Description	Addressed on 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	2
	2b	All items from the World Health Organization Trial Registration Data Set	N/A
Protocol version	3	Date and version identifier	21
Funding	4	Sources and types of financial, material, and other support	21
Roles and responsibilities	5a	Names, affiliations, and roles of protocol contributors	21
	5b	Name and contact information for the trial sponsor	21
	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	21
	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)	21

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	4-6
	6b	Explanation for choice of comparators	11
Objectives	7	Specific objectives or hypotheses	6
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)	7
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	7
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)	8
Interventions	11a	Interventions for each group with sufficient detail to allow replication, including how and when they will be administered	8-11
	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)	14
	11c	Strategies to improve adherence to intervention protocols, and any procedures for monitoring adherence (eg, drug tablet return, laboratory tests)	14
	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	14-17
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)	Figures 2, 3, and 4

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	18
Recruitment	15	Strategies for achieving adequate participant enrolment to reach target sample size	12-14
Methods: Assignment of interventions (for controlled trials)			
Allocation:			
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	13
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	13
Implementation	16c	Who will generate the allocation sequence, who will enrol participants, and who will assign participants to interventions	13
Blinding (masking)	17a	Who will be blinded after assignment to interventions (eg, trial participants, care providers, outcome assessors, data analysts), and how	13
	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	14-17, 19, Table 3
	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	14

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	21
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	19
	20b	Methods for any additional analyses (eg, subgroup and adjusted analyses)	19
	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)	19
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	21
	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	21
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	21
Auditing	23	Frequency and procedures for auditing trial conduct, if any, and whether the process will be independent from investigators and the sponsor	21
Ethics and dissemination			
Research ethics approval	24	Plans for seeking research ethics committee/institutional review board (REC/IRB) approval	21
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)	21

Consent or assent	26a	Who will obtain informed consent or assent from potential trial participants or authorised surrogates, and how (see Item 32)	12-13
	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	21
Declaration of interests	28	Financial and other competing interests for principal investigators for the overall trial and each study site	21
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	21
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	14
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	19
	31b	Authorship eligibility guidelines and any intended use of professional writers	21
	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	Appendix 1
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.