How can Real-World Evidence be incorporated into cancer drug funding decisions in Canada? A qualitative study of stakeholders' perspectives

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Authorship statement: Yvonne Bombard, Kelvin Chan, Marc Clausen, Wei Fang Dai, Rebecca Mercer, and Jaclyn Beca conceptualized and designed the study. Marc Clausen and Ruhi Kiflen collected the data. Marc Clausen, Ruhi Kiflen, Chloe Mighton, Agnes Sebastian, Wei Fang Dai, Rebecca Mercer, Jaclyn Beca, Wanrudee Isaranuwatchai, Kelvin Chan and Yvonne Bombard contributed to data analysis and interpretation. Marc Clausen, Chloe Mighton, Ruhi Kiflen Agnes Sebastian and Yvonne Bombard drafted and revised the manuscript. Wei Fang Dai, Rebecca Mercer, Jaclyn Beca, Wanrudee Isaranuwatchai and Kelvin Chan provided critical feedback on the manuscript and made revisions. All authors approved the final version of the work to be published, and agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Funding: This study was funded by the Canadian Institutes of Health Research (CIHR) through an Operating Grant: Partnerships for Health System Improvement for Cancer Control (CIHR-PHSI HRC-154126). Y.B. was supported by a CIHR New Investigator Award during this study. C.M. was supported by a CIHR Frederick Banting and Charles Best Canada Graduate Scholarships Doctoral Award (GSD-164222) and a studentship funded by the Canadian Centre for Applied Research in Cancer Control (ARCC). ARCC receives core funding from the Canadian Cancer Society (Grant #2015-703549).

Word count: 2608 words

ABSTRACT

Background: Real-world evidence (RWE) can provide post-market data to inform whether funded cancer drugs yield expected outcomes and value for money, however, it is unclear how to incorporate RWE into Canadian cancer funding decisions. As part of the Canadian Real-world Evidence Value for Cancer Drugs (CanREValue) Collaboration, this study aimed to explore stakeholder perspectives on the current state of RWE in Canada to inform a Canadian framework for use of RWE in cancer drug funding decisions.

Methods: This was a qualitative description study. Qualitative semi-structured interviews were conducted from April-July 2018. Participants (n=30) were Canadian and international stakeholders, who were included in the study if they had experience with RWE and drug funding decision-making Thematic analysis were used to analyze data.

Results: Stakeholders were interested in using RWE to fill gaps in cancer drug funding decision processes and to achieve better patient and economic outcomes. However, stakeholders identified barriers that must be addressed, including the reliance on RCT data, the present patchy state of data, a lack of capacity to generate RWE, and a lack of collaboration between the public and private sectors.

Interpretation: This study provides novel insight into stakeholders' perspectives on the effective implementation of a framework for the use of RWE in cancer drug decision-making. This study, together with local stakeholder engagement, is valuable for understanding the attitudes and barriers to adoption in other health systems planning to incorporate RWE into decision-making.

INTRODUCTION

The costs of cancer drugs are rising rapidly[1, 2]. While some new drugs provide substantial therapeutic improvements, others confer only marginal survival benefits or improve quality of life. Assessing the overall cost-benefit of a cancer drug is essential for resource allocation.

Drug funding decisions typically rely on clinical trial data to supply clinical and economic evidence[3, 4]. However, randomized controlled trials (RCTs) have highly selected populations which limit real-world generalizability[5-9]. Funding decisions are not revisited, and cost- and clinical-effectiveness are not re-assessed after entry into the Canadian market. Decision-makers have little information on whether drug investments yield expected outcomes.

Real-world evidence (RWE) –evidence from post-market evaluations not derived from traditional clinical trials[10] – could fill these gaps. RWE can provide information on clinical effectiveness, safety, cost-effectiveness and budget impact outside of the highly controlled trial environment[3, 5, 6, 11]. While RWE is used for pharmacovigilance and academic research in several jurisdictions, use of RWE in health technology assessment (HTA), decision making, pricing negotiation or early access schemes is less common[12].

A framework is needed to provide a standardized approach to uptake of RWE into decision making and fully realize its potential benefit. The Canadian Real-World Evidence for Value of Cancer Drugs (CanREValue) Collaboration, consisting of stakeholders in cancer control across and outside Canada, was formed to create an RWE framework to apply to Canadian cancer drug funding.

This study aimed to inform CanREValue framework development through exploring Canadian and international stakeholders' views and experiences with RWE, such that the

framework would address end-users' needs and facilitate RWE uptake into cancer drug funding decision-making.

METHODS

Qualitative descriptive methodology with thematic analysis was used to explore stakeholders' views and experiences regarding incorporation of RWE into cancer drug funding decisions.[13]

Recruitment

We aimed to recruit stakeholders or RWE, that is individuals who were involved in using RWE in the context of drug evaluation or decision-making, or individuals assessing the value and implications of RWE across academia, industry, HTA and government. We aimed to recruit a pan-Canadian sample; participants from all provinces and territories working in cancer drug evaluation. We recruited individuals who had exposure to RWE in the context of drug evaluation, for example individuals who had used RWE in decision-making, or individuals who worked in an academic setting assessing the value and implications of RWE. An initial convenience sample was identified by the research team via referral, an environmental scan on RWE, and websites listing memberships of HTA and advisory committees. Snowball sampling was then used to recruit other stakeholders, whereby participants were asked to recommend individuals with relevant experience with RWE and cancer drug evaluation. Patient representatives with experience on cancer drug advisory groups were also recruited. International experts (individuals from outside of Canada with experience implementing RWE in decision-making at a national or regional level) were recruited in order to understand lessons learned from actually implementing RWE. International experts were recruited by recommendations from included study participants.

Participants were emailed a study invite by KC with study information and a copy of the consent form; this was the only relationship established prior to study commencement. Participants were sampled until thematic saturation was reached[14, 15].

Data Collection

Participants took part in one-on-one semi-structured interviews over the phone or in-person (at their workplace), conducted by research coordinators, RK (female) or MC (male). Both interviewers had training and experience in qualitative research. Interviews took place between April 2018 and July 2018. Informed by a literature search and feedback from the CanREValue team (YB, WFD, REM, JMB, WI, KKWC), an interview guide (English) was developed by MC, RK, and YB which explored thoughts and experiences with RWE, perceived barriers and facilitators for uptake, and readiness for the incorporation of RWE into decision making (Appendix 1). The literature search was conducted using PubMed in 2018 by RK and MC. The literature was scanned for other qualitative studies on RWE implementation. Interview guides were reviewed if available, and themes identified by the studies were reviewed to identify salient topics for discussion. Additionally, the CanREValue team had previously conducted a horizon scan, which identified topics related to RWE implementation that merited discussion. RK piloted the interview guide by conducting mock interviews. The interview guide was revised throughout data collection to capture emerging questions and domains. Through the consent and the interview processes, participants were informed about why the research was being conducted. Interviewers took field notes after each interview. Interviews were audio recorded and transcribed verbatim. Transcripts and findings were not returned to participants for comments or correction. Repeat interviews were not conducted.

Analysis

The transcribed interviews were analysed using thematic analysis. Interviews were coded by MC and RK. An initial codebook was developed by MC and RK through immersion in the data and research team meetings. Initial codes were derived from topics in the interview guide and were supplemented by codes that were inductively derived from interview data. The codebook was modified as new codes and themes emerged from subsequent interviews. Codes were grouped into larger themes and patterns, and constant comparison of the data was used to explore common and divergent themes across interviews. Barriers and facilitators to RWE uptake described by Canadian stakeholders were compared to international experts' experiences implementing RWE, to triangulate Canadian perspectives with experiences from other health systems. Reflexive notes were analyzed and incorporated into the study results. Research team members met periodically to review codes and discuss major themes, contributing to analytic rigor. Data analysis and management was conducted using HyperRESEARCH[16]. When conducting analysis, the research team reflexively considered how their assumptions about the value of RWE for decision-making played a role in interviews and interpretation.

Ethics Statement

Ethical approval was obtained from the research ethics board at St. Michael's Hospital, Toronto, ON.

RESULTS

Participant characteristics

Forty individuals were invited to participate. Eight did not respond to the invitation email, and two declined to participate. A total of 30 stakeholders (Table 1) participated in interviews (~30-75 minutes long).

Value of RWE in cancer drug funding decisions

All stakeholders expressed enthusiasm and optimism about the possibility of incorporating RWE into cancer drug funding decisions to address the limitations of RCTs (e.g. time-limited, resource intensive, limited generalizability) and provide evidence on whether a drug provided "good value for money spent" (#005, Canadian) in the real world (Table 2, Quote from #013).

RWE was described as a valuable supplement to inform post-market decisions about continued funding, price re-negotiations, or de-listing drugs currently on the formulary. Participants described how RWE could provide post-market data to reduce uncertainty about a drug's long-term performance and assist the payer in price negotiations (Table 2, Quote #002).

However, some participants expressed concern that de-listing based on RWE meant taking away treatment options, and that patients and the public would "fight tooth and nail" to maintain access to currently listed medication (#012, Canadian). Others noted that RWE might have limited utility in provinces that currently fund fewer drugs than other provinces, where their main challenge is finding ways to expand the number of therapies available to patients. Participants recommended a need for clarity about the intended outcomes of incorporating RWE into decision-making.

A cultural shift is required to adopt RWE in decision-making

While participants were enthusiastic about RWE's potential for external validity over RCTs, they recognized that a cultural shift was required for decision makers to move beyond the traditional, "gold standard" (#11, Canadian) evidence provided by RCTs. In contrast, RWE was perceived as susceptible to bias and confounding, with inconsistent data collection, analysis methods, and conclusions. To adopt RWE in decision-making, decision-makers would need to trust RWE and accept RWE's uncertainty (Table 2, Quote #014). Overall, participants recommended a culture shift away from sole reliance on RCT data.

Some participants perceived the incorporation of RWE into decision-making as a potential catalyst for transforming healthcare data collection and use in Canada. These participants recommended developing mechanisms to manage uncertainties through conditional approval, whereby results can continue to be captured until the data have matured to inform the final decision about public funding for a drug.

Canadian RWD data infrastructure is currently inadequate for decision-making

Participants saw challenges with data infrastructure and data access as the biggest barrier to currently using RWE. In Canada, RWD is collected by multiple organizations operating in different provincial jurisdictions. Participants described how current data collection procedures were not built for evaluation: RWD is not standardized, embedded into clinical workflows, and in some cases not collected. Participants noted that key measures (e.g. patient reported outcomes) are often missing. Many participants described the current Canadian data infrastructure as patchy and unreliable, limiting its utility (Table 2, Quote #10).

Participants feared de-listing of effective drugs or the continued funding of ineffective drugs if inconclusive or incorrect data were used in decision-making. These participants preferred to wait for the routine and consistent collection of all the necessary outcomes for a decisive RWE evaluation. Participants projected 3-7 years to generate suitable RWE for decision-making, though some acknowledged that certain Canadian jurisdictions currently collect RWD of sufficient quality for decision-making. Some participants expressed comfort in using international data to fill Canadian data gaps, while others noted that RWE is extremely contextual.

While recognizing the need for data protection, many stakeholders expressed frustration with the time and financial resources wasted through difficult and inefficient procedures for data access. Academic and industry representatives described the importance of timely access, as RWE cannot inform decisions throughout a product's life cycle if it takes 2-3 years to access. With respect to data protection, patient representatives stated that patients would be willing and eager to share personal data for research, provided it was anonymized, used in aggregate, and protected from insurers and employers. However, some patient representatives feared sharing personal data with industry could result in its misuse. Participants recommended that patient groups be involved in revising data access procedures.

International experts corroborated the Canadian stakeholders' concerns about data infrastructure, reporting that fragmented datasets were a major barrier to using RWE (Table 2, Quote #19).

Canadian and international stakeholders recommended key improvements necessary for uptake of RWE: guidance on the collection of thorough and relevant data, a unified pan-

Canadian data collection infrastructure, and a learning health system approach where RWE could be used to make funding decisions.

Committed investment in building capacity is required

Participants described a need for investments in system-wide capacity building to support RWE, as current system readiness was seen as "very poor" (#017, Canadian). Stakeholders perceived the Canadian drug funding decision-making system as stretched beyond capacity in terms of finances, expertise and leadership, barriers to the adoption of an RWE framework (Table 2, Quote #007).

All participants discussed a lack of capacity to cover the costs needed to generate and use RWE, and a lack of clarity regarding how to divide costs and roles between public and private sectors. Some participants stated that industry should be responsible for costs associated with RWE. Others supported public funding for RWE, to reduce perceptions of bias associated with industry-generated evidence.

Participants noted that few individuals have expertise to appropriately generate and analyze RWE and highlighted a need to invest in training programs to build capacity for RWE analyses across Canada.

Finally, participants recommended the need for strong leadership and clear roles and responsibilities. Otherwise, participants stated, different groups would use RWE varyingly, undermining the benefits of a unified approach to its uptake in decision-making. Participants recommended that RWE could first be used at a provincial level to work out issues on a smaller scale prior to pan-Canadian adoption.

There is a need for increased collaboration between key stakeholders

All participants expressed a desire for collaboration across organizations. The current siloed state of RWE was identified as a significant barrier to its adoption (Table 2, Quote #002).

All participants acknowledged a strained relationship between industry and the public sector, but recognized that RWE use in Canada would not be feasible without industry participation. Some participants expressed concern about loss of public control of data if industry acted as gatekeepers of RWE, and withholding RWE if it worked against their financial interest. Others saw RWE as an opportunity to improve relations with the private sector. Such a partnership could give the public sector access to data holdings and technical expertise currently limited to the private sector. International experts also recognized the need to involve industry in generating and collecting RWE, but raised questions about data ownership, data governance, and which sector would pay for data collection.

Industry participants were eager to partner with academic and government organizations. Industry participants stated that their teams had resources and experience needed to work with RWE, and that they had much to offer to the development and implementation of an RWE framework. To industry participants, partnership could improve the currently fragmented state of RWE, benefiting both sectors.

Participants across the public and private sectors recommended that stakeholders determine early on what role industry will play in the development of an RWE framework (Table 3). Belgium was raised as a model of true partnership where both sectors benefit from each other by sharing data and costs.

INTERPRETATION

Stakeholders in this study were interested in using RWE to fill gaps in current cancer drug funding decision processes to achieve better patient and economic outcomes. However, barriers (e.g. data quality, stakeholder collaboration) must first be addressed in any framework that aims to effectively guide RWE use in decision-making by Canadian stakeholders.

Issues with data collection and quality, were viewed as near-insurmountable. This is consistent with previous work linking perceived poor data quality with hesitation to use RWE in decision-making.[17] Participants were not aware that ongoing efforts to address RWD quality in Canada, meaning the data are closer to readiness for use than anticipated. Efforts to improve data quality must be made more transparent using knowledge translation strategies to assuage decision makers' concerns about the readiness of RWE for use in decision-making.[18,19] Effective adoption of RWE will also require reducing siloes between organizations that collect RWD, and generate, analyze, and implement RWE.

An RWE framework must clearly define how RWE findings are meant to be used (e.g. de-listing, re-negotiations or otherwise). Training programs are needed accompany the RWE framework to build capacity in RWE evaluation. A conditional reimbursement system may aid uptake of RWE, whereby drug funding is contingent upon re-evaluation and renegotiation after a defined time period based on RWE. An RWE framework could be piloted at a provincial level to work out issues like data consistency prior to pan-Canadian implementation. Finally, all stakeholders, including industry, should have some role in early design and development of the framework. These recommendations may improve uptake of RWE into decision-making.

Study limitations include lack of representation from the Quebec healthcare system or from the Territories. Though we spoke with stakeholders familiar with the Quebec system, further research is needed in these specific contexts. We reached thematic saturation within our sample, but there was variation within different groups of respondents (e.g. government, industry), and future research could explore further distinctions between these and other organizations using RWE. As with all qualitative research, the study does not aim to produce generalizable findings, but study findings are valuable for understanding the attitudes to RWE adoption in other health systems.

CONCLUSION

Incorporating RWE into a healthcare system's decision-making process is complex. In this study, stakeholders revealed that aa cultural shift would be needed to include evidence beyond RCTs in drug-funding decisions. In addition, stakeholders require improved data infrastructure, a committed investment to building the necessary financial, leadership and expert capacity to implement RWE, and increased stakeholder collaboration (particularly between the private and public sectors). These recommendations, together with local stakeholder engagement, will be valuable to optimize RWE implementation.

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Table 1. Participants' demographic characteristics.

Participant Demographics	N = 30
Role	
Decision-makers	14
Academics	5
Industry representatives	4
Patient advisors	4
International experts (Scotland, England, USA)	3
Institution type	
Academic	6
Industry	4
Government (e.g. ministry)	4
Health Technology Assessment/Health Economics not-for-profit organization	4
Provincial/federal health authority	6
Federal or provincial pharmaceutical pricing negotiation	2
Other (patients)	4
Gender	
Male	14

Female	16
Region	
Central	15
Atlantic	2
Prairies (MB, SK, AB)	6
West Coast	4
Outside Canada	3

Table 2: Key themes and supporting quotes

Theme	Description	Illustrative Quotes
Stakeholders value RWE in cancer drug funding decisions	Stakeholders expressed enthusiasm and optimism about the possibility of incorporating RWE into cancer drug funding decisions to address the limitations of RCTs and provide evidence on whether a drug provided "good value for money spent" (#005, Canadian) in the real world.	"So, I think real world evidence is an essential part of what we need to do in terms of bringing sort of science to real world decision-making. [...] We need [RWE] and I think we are in a very, we are at a point where certainly decision-makers must have that information." -#013 (Canadian)
		"Rather than us accepting these [cost-effective] models that are fanciful, in which there's tremendous uncertainty in them, you'd be better to make an additional recommendation to fund and collect data prospectively in the real world to see, "What is the duration of survival?" What is the duration of treatment? What are the long-term toxicities? Things

		that you don't pick up in a clinical trial. […] There has to be much more certainty of their benefits and with certainty on the benefits, then we could…if we're going to require drugs to be cost-effective, we're in a better position to negotiate what those prices might be and get it into what we consider a cost effective range." - #002 (Canadian)
A cultural shift is required to adopt RWE in decision-making	While participants were enthusiastic about RWE's potential for external validity over RCTs, they recognized that a cultural shift is required for decision makers to move beyond "gold standard" (#11) evidence from RCTs.	"I guess it's just easier with randomized controlled trials, because I think the approach and the accepted analytical methods are much better known. And there's a lot more debate, and I guess uncertainty about what the best methods would be in real world evidence because there's so many variables. It creates a situation where it's easy to criticize any analysis that's done-#014

		(Canadian)
RWE data infrastructure is currently inadequate for decision-making	Participants saw challenges with data quality and access as the biggest barriers to currently using RWE. As such, participants were uncertain of how our current data infrastructure could be transformed so that it can be used to inform quality decisions.	"I also think that there's still a scarcity of data, that we don't have data for everything yet. We have a lot of data, but it seems to be unorganized and lack of consistency of how people are gathering data. So, until we really can get our data together, and that it's shared, it's consistent, it's gathered in the same way, and it's pool-able, until that is done I think it can be challenging to really use the data" -#010 (Canadian)
		"Linking the different data sets and different electronical health records together is still a huge challenge especially here in the U.S. where you have so many different payers, so many different systems." -#019 (International)
Committed investment	Stakeholders perceived the	"So, it's a kind of problematic

in building capacity is required	Canadian drug funding decision-making system as stretched beyond capacity in terms of finances, expertise and leadership and saw these factors as a barrier to the adoption of an RWE framework.	issue right now to be pursuing real world evidence-based agreements for too many products because they're very complex and it takes a long time and it takes a lot of resources because capacity is very stretched." -007 (Canadian)
There is a need for increased collaboration between key stakeholders	Participants noted that systems are currently operating in "silos" and emphasized the need to increase engagement among stakeholders. There was a diversity of opinion on whether and how to engage industry.	"If you're going to do these studies, there has to be a change in the attitudes between the players. Like, the payers, government, and cancer agencies, typically don't have a really good relationship with industry…only if you have that kind of collaborative environment, would you actually be able to undertake some of these studies efficiently and effectively." - #002 (Canadian)

Table 3. Overall recommendations to incorporate RWE into cancer drug funding decisions.

Overall Recommendations
Clarify the intended outcome of using RWE
Improve data collection mechanisms
Determine when and how RWE would be used
Balance the need for RWE with needs of privacy
Involve patient groups and industry
Apply RWE at a provincial level first
Build infrastructure, capacity and expertise in RWE
Use “Conditional Reimbursement”

Appendix 1: Interview Guide

Instructions for interviewer:

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

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

Hello [participant]. Thank you very much for your participation in this study. We are going to ask you some questions about real world evidence. The information you provide us with will help us better understand how real world evidence can be used in cancer drug funding decisions. Your participation is completely voluntary, you can stop at any time and you can opt out of any questions you do not wish to answer or discuss. Your answers are confidential. We would like to record this conversation. To protect confidentiality please do not use names or other identifiers during the interview or other. Once this interview is completed we will have it transcribed, at which time we will remove any references to names or places that could identify you. Once the transcription is verified we will erase the audio recording. Please note that if for any reason in this interview you inform us of your intent to harm yourself or other we will have to report this information. It is ok to record this conversation?

If yes: turn on recorder

If no: proceed with out recording

Instructions for Interviewer:

This interview guide has **two** sets of questions. The first set of questions is for all the stakeholders except patient representatives, and the second set of questions are for only patient representatives.

Question Set I – For stakeholders except patients/patient representatives

I. General Background

1. Please tell us about your background in the healthcare industry.

(Probe: What is your role/position in the healthcare industry? What is your area of study/area of expertise?)

II. Current Understanding of RWE

***Objective**: The goal of this section is to assess stakeholders overall opinions on RWE.*

2. What are your general thoughts about RWE?

(Probe: Have you ever been involved in any studies/work using RWE? Do you know anyone who has involved RWE in his or her work? Do you use it yourself? Where do you think that RWE is most needed/lease needed**?** What does RWE mean to you and/or your organization?

3. What do you see as the current state RWE in heath care decision-making?

(Probe: Who and where do you see using it? How do healthcare professionals react to RWE? What potential does RWE have?).

4. Often RWE and RWD are terms that can be interchangeable. What do you think are the differences between RWE and RWD (Real World Data)?

5. What are the barriers to the use of RWE?

(Probe: What factors limit RWE uptake, RWE utilization or knowledge translation? Is there difficulty when transforming RWD into RWE?)

6. What has facilitated RWE uptake, implementation and utilization?

(Probe: What efforts do you think have facilitated the use of RWE so far? What factors can you think of that may improve the utilization of RWE?)

III. Past Experiences

Objective: The goal of this section is to have an in-depth knowledge of stakeholders' past experiences and how his/her experiences shape his/her views regarding RWE.

7. Please tell us about your past experiences with RWE. (*If the stakeholder has no experience related to RWE, please skip the entire section III.)*

(Probe: For what purpose have you pursued RWE? In what ways were the RWE used, if any? What efforts you have taken to incorporate RWE into your work/studies?)

8. What are lessons learned from your experiences?

(Probe: How can the RWE system be improved? At what stage do you think RWE system can be improved, for example, data selection, data collection, data analysis, and knowledge translation? Would you use RWE again, If so, why or why not?)

IV. RWE Framework

***Objective**: The goal of this section is to gain stakeholders' opinions on the framework for the incorporation of RWE into Canada drug funding decisions.*

The goal of this research is to get key stakeholders perspectives on RWE. This information will be used to develop a framework to guide the incorporation of RWE in health care decision making for cancer drugs. These next questions ask about your thoughts regarding the development of this framework.

A. Data Uptake

9. What types of data source do you think are or could be valuable for uptake?

(Probe: Data source example: administrative database, hospital, pharmacy and claim data, electrical medical record, etc. Why are those data source valuable? Please explain.)

10. Do you think there should be some general data requirements in the process of RWE uptake?

(Probe: How important is it that RWE is generated from Canadian jurisdiction? In case of data gaps, could RWE from other provinces or countries be useful? Does it matter to you which organization generates the RWE?)

B. Implementation/Incorporation

11. From your perspective, what is the current state of system readiness for the incorporation of RWE in the Canadian health system?

(Probe: What factors limit the healthcare system from pursuing RWE uptake, RWE utilization or knowledge translation? What factors can you think of that may improve the utilization of RWE?)

12. How could RWE be incorporated into the drug funding decisions in general or in Canadian pricing and reimbursement process?

(Probe: At what steps would you like to see RWE generated/used, for example, at the stage of research/pre-regulatory approval/post-approval? How might researchers/government effectively balance RWE with other types of research (e.g., clinical trials)?)

C. Guidance Documents

13. Is a guidance document for the use of RWE in supporting drug funding decisions desirable and feasible?

(Probe: What is the potential scope of the guidance document? Where are these accompanying guidance most needed and least needed?)

D. Personnel

14. Who do you think should be involved in this initiative?

(Probe: Who needs to be involved at all stages (Development, testing, implementation, uptake, KT) for this initiative to be successful? Which agencies/organizations are necessary or do you think would benefit the most from RWE work?)

E. Expectations of Utility and Purpose

15. What kind of healthcare issues could RWE address when RWE is incorporated into Canada drug funding decisions?

(Probes: In what way could RWE: 1) refine/inform/revisit drug/technology funding decisions (Streamline/hinder drug approval); 2) reduce gaps in the cancer drug funding process & needs of the recommendation/decision-makers: Funding decisions 3) assess drug treatment effectiveness; 4) Address increases in drug prices)

16. What do you see as risks and benefits to the Canada healthcare system to incorporate RWE into drug funding decisions?

17. From your perspective, what will you do to maximize the impact of RWE in the decision-making process?

(Probe: Do you think there are any incentives for researchers/decision makers/industry to adopt RWE?)

V. Closing

18. Thank you for your time, do you have any other thoughts you would like to share with us?

Turn off recorder

19. Can you recommend someone you think it would be important for us to talk to about Real world evidence?

Question Set II – For patients/patient representatives

Instructions for interview: Some interviewees will have a good knowledge of RWE while others may not. The beginning of the interview may require a more in-depth discussion of RWE and how it works. Please take the time to describe RWE to the interviewee and answer their questions.

I. Perspective on RWE

Objective: The goal of this section is to assess the patient's (or patient representatives) current level of understanding of RWE.

1. What are your thoughts about of RWE and its use in decision making.?

(Probe: What is your first thought about RWE? Do you have any past experiences with RWE? If you do not know what is RWE, what aspects of RWE system are important to you (E.g., some vital information such as the ownership of patients' data after consent, RWE data standards, data oversight mechanism and privacy measures)?

2. From your perspective, how would RWE change patients' medical experiences?

(Probe: what kinds of change would RWE bring to the medical experiences? Do you think RWE can improve the medical experience?)

3. **What do you think should be considered in creating framework for use if RWE in cancer drug funding decision?** (Who should be involved, what potential impact would this have on patients, what might patients be most concerned with).

III. Expectations

Objective: The goal of this section is to gain knowledge in patients' (or patient representatives) expectations in the establishment of the future RWE system and what RWE could bring to the society.

4. From a patient perspective, do you think there will be any benefits and risks associated with RWE in Canadian healthcare system?

(Probe: After the implementation of RWE, do you think patients will be provided with better-informed health services? Do you think clinical practices can be improved by incorporating RWE? Can you think of any risks associated with the implementation of RWE?)

5. Can you think of any factors that may encourage you adopting/accepting RWE? Or are there any factors that prevent you from trusting RWE?

(Probe: Do you think the incorporation of RWE into health service evaluation will improve physicians' clinical practices? Do you think RWE provides you with more treatment options for comparison? Do you think RWE provides convenience for you to check the coverage of drug products/treatments and associating reimbursement?

III. Data Confidentiality and Consent

Objective: The goal of this section is to know about patient's (or patient representatives) view on the confidentiality of personal health information and the privacy consent of personal medical information disclosure.

6. To what extent should patients be willing medical information for research/decision making purpose? .

(Probe: What kind of personal medical information would you be willing to authorize for RWE research? If you are not willing to share your medical information, what concerns do you have that stop you from sharing the information?)

7. In your opinion, who would have the right to access/use patients' medical information and why?

(Probe: This may include researchers/physicians/government/insurance companies/drug companies/etc.)

8. What is your preference for the medical information disclosure policy of RWE system? How would patients give their permission to healthcare professionals to allow them using patients' medical information for studying RWE?

(Probe: Patient Permission Type may include: 1) No Permission Needed; 2) Assume Permission but with opt-out option; 3) Ask for Permission; 4) No permission for RWE research)

IV. Closing

9. Thank you for your time, do you have any other thoughts you would like to share with us?