Journal of Occupational Rehabilitation (2019) 29:104–118
https://doi.org/10.1007/s10926-018-9768-8

"Apping Up": Prospects for Information Technology Innovation in Return to Work Communication

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Published online: 21 March 2018
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Abstract

Purpose During return to work (RTW), communication between health care providers and employers largely takes place through standardize paper-based forms. Information technology (IT) platforms may provide advantages in enabling information exchange and decision-making through sharing of guidelines and resources. We investigated stakeholder perspectives on the prospect of IT use for RTW communication in Ontario, Canada. *Methods* Consistent with the exploratory nature of the questions, qualitative methods were used. Primary data were interviews with health care providers (HCPs), employers, and workers with experience in RTW. The first portion of initial interviews elicited general perspectives and experiences related to RTW communication. Participants were then exposed to a prototype IT communication platform and elicited their feedback. Follow-up interviews with HCP's and EMP's were used to allow further reflection and clarification of data. We used progressive, thematic coding to analyze data. *Results* 12 HCPs, 7 employers, and 5 workers participated in the study. Five inter-related themes were obtained. Participants expressed no absolute objection to the use of IT for RTW communication but varying degrees of support. Participants revealed how media change depended on a prospective IT innovation's perceived usefulness, fit with current practices, capacity to gain buy-in from other stakeholders, and ability to demonstrate positive performance in actual practice. *Conclusions* Findings suggest that a transition to an IT-mediated tool for RTW communication is supported in principle; however, major caveats exist in relation to perceived value and fit with stakeholder practice. System support and stakeholder cooperation are likely necessary to adopt the change, yet IT-mediated communication has yet to demonstrate value. To avoid circularity, proof of principal needs to be established through an implementation trial of such technology.

Keywords Sickness absence · Return to work · Disability management · Rehabilitation · Communication

Introduction

Work disability is a disruptive life event for workers and is likewise costly to employers and society, resulting in significant human suffering, economic loss, and stressing human resource and support systems [1]. Safe, sustainable, and timely return to work (RTW) can be beneficial to all parties involved. Because of the multiple stakeholders (i.e., health care, workplace, insurance, disabled worker) involved in the process, RTW depends upon timely and smooth interactions between parties.

The health care provider (HCP)–employer connection is of particular importance in enabling injured and ill workers to traverse the 'disability threshold' by bridging the gaps between health, impairment, and function [2]. HCPs provide necessary information about impairments that enable the role of employers in accommodating affected workers. HCP–employer communication is an integral part of successful multimodal interventions and is believed to contribute positively to RTW outcomes [3–5].

Despite the importance and logic underlying communication, there exists a large body of research that suggests how stakeholder interactions during RTW are susceptible to a wide variety of problems [6–9]. Employers in past research, for example, have frequently expressed their frustration and

Electronic supplementary material The online version of this article (https://doi.org/10.1007/s10926-018-9768-8) contains supplementary material, which is available to authorized users.

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concerns about the quality of information they received from HCPs, particularly GPs and family physicians, in terms of detail, reliability, and timeliness. In their defence, HCPs in past research have indicated need for better forms, guidance, and access to resources such as workplace information to make more informed RTW decisions and to communicate better with employers.

Improved communication between HCPs and workplaces has been considered a potentially untapped resource for improving work disability processes and outcomes [10]. Innovation in information technology (IT) may be valuable for the endeavour. Though examples of IT innovation can vary in sophistication (from a simple word processor to online teleconferencing), advances in IT have typically enabled valuable gains in terms of efficiency, communication, access, education, mobility, and collaboration [11]. IT has been used in workplace and health care settings for years to improve information management and communication [12]. Yet, IT's application to RTW activities remain limited.

IT-mediated communication provides the prospect of streamlining processes into a single, more efficient platform—for example, integrated access to guidelines and workplace information that are not usually readily available. An IT platform has the potential to improve the timeliness and quality of HCP information. While the idea of transitioning media change to an IT-mediated platform is enticing, little is known about how stakeholders would respond and how it can be pursued in the field of RTW.

The Present Study

Considering its intuitive appeal and the lack of penetration of IT in the field of RTW communication, we studied the prospect of applying IT innovation to communication activities between HCPs and employers. Our aim was to critically examine the potential of such technology in RTW and, in doing so, provide guidance for design and suggest directions for implementation. By using a prototype IT-mediated tool, named the Return to Work Expert (RTWE) App, we were able to gain practical insights from HCPs, employers, and disabled workers as to what design features, barriers, and facilitators exist for making such a change. We learned that while media transition has inherent appeal, valued features of the current paper-based system and the logistics of implementation present important obstacles to realizing media change.

Methods

The present research was conducted in collaboration with an industry partner interested in developing an electronic app to improve RTW communication between HCPs and workplaces. The industry partner approached the second author for assistance in researching the app. We sought to elicit immediate stakeholder views on the present paper-based system and the prospect for adopting IT-mediate communication using the RTWE App, prior to testing it in the field. We intended to provide information to support the app's development, but also, more broadly, understand the prospects of transitioning media change in the field. The researchers had no business-related interests or obligations in relation to the app.

Design

Qualitative design was employed owing to the exploratory nature of the study. The design had greater potential to elicit contextualized participant perspectives on the app and media change [13, 14]. Ethics approval was granted by the Trent University Research Ethics Board (Protocol #23246). The industry partner agreed to unrestricted publication of study findings.

Context

The study was conducted in Ontario, Canada. Ontario has a government-managed, employer-funded, no-fault based workers' compensation system (Workplace Safety and Insurance Board or WSIB). The *Workplace Safety and Insurance Act, 1997* mandates that workers and employers cooperate with RTW efforts and that HCPs consult to the process by providing information concerning impairments and functional abilities. Information from HCPs to employers is typically transmitted via the functional abilities form (FAF). HCPs are paid for completing the form. WSIB Programs of Care also direct HCPs to communicate with employers for the purposes of accommodating workers under their care.

Employers are also obligated to accommodate worker impairments to undue hardship for non work-related disability, as protected under Ontario's *Human Rights Code, 1990*. Private insurers, managing non work-related disability may request information from HCPs using their own forms. Some employers also play an independent and active role in soliciting information from HCPs for the purposes of accommodation.[1]

[1] Readers can consult https://www.ontario.ca/laws/statute/97w16 for further information regarding the Workplace Safety and Insurance Act; http://www.wsib.on.ca/cs/idcplg?IdcService=GET_FILE&dDocName=WSIB012218&RevisionSelectionMethod=LatestReleased for further information regarding WSIB Program of Care requirements; and https://www.ontario.ca/laws/statute/90h19 for further information on the Ontario Human Rights Code.

Table 1 Summary description of the RTWE App form compared to the WSIB FAF

Feature	WSIB FAF	RTWE App FAF
1. Transmission	Via worker or fax	Online
2. Length	Two pages	Nine pages (when printed)
3. Basic RTW information components	Yes	Yes
4. Workplace information	Limited	Expanded[a]
5. Guidelines information	No	Yes (MDG integration)
6. Cognitive/behavioural component	No	Yes
7. RTW barriers component	No	Yes
8. RTW specialist component	No	Yes
9. Commenting space	Four lines	Plenty (expandable 'text-boxes' for free-text input)
10. Smart-tool' and scroll-over functions	No	Yes (data automation and yellow highlighting)

Features reflect the RTWE App's development as of July 2014

[a]Employer can pre-fill the app's form with employee information, injury or illness description, and job level together with the worker. Design also contemplated workplace document templates (e.g., cover letter and description of organizational RTW programs) and file attachment functions. The possibility for video file attachment was also under consideration

The App

To gain background, we first interviewed the RTWE app's developers to identify their motivations for developing the app, and their reasons for incorporating its design features. The app developers also shared information gained from promotion activities including marketing and demonstration to potential users.

The referent model for designing the app was the FAF developed by and used within the workers' compensation system in Ontario. Table 1 provides a basic summary of the app's FAF in relation to the WSIB FAF (as a well-known example for comparison), which will assist in elaborating the features and developers' logic in designing the improvements.

The app was developed to address deficiencies in the current paper-based system. In the present system, information is most often shuttled between workplaces and health care settings via the disabled workers. Transmission could also occur through fax. The app would enable online transmission, which developers believed would be more expedient and prevent delays associated with current modes.

Both the app and the WSIB FAF cover basic RTW information for inquiry and delivery (e.g., functional abilities and RTW ability). Both also rely on listing options and 'check-boxes' as input structures, although the app also includes online interfaces (i.e., drop-down lists and search engine). While both modalities direct employers to share relevant workplace information to HCPs (e.g., job description and employer contact information), the app would direct the creation and enable online access of relevant workplace documents (e.g., physical demand analysis and description of organizational RTW program).

The app's form is longer and more comprehensive than the regular FAF because it contains additional key components. These included the integration of MDGuidelines (MDG), which is an occupational medicine-based guideline source for disability management and RTW, developed by the ReedGroup (private vendor) from the United States. Accordingly, prospective HCP and employer users would receive guideline information on normative recovery durations specific to a select diagnosis (selected by HCP, but not disclosed to employer), as well as recommendations for RTW at the workplace. HCP users, but not employer users, will also have access to guidelines information on recommended treatments and tests. The general assumption of the developers was that access to the guidelines would improve RTW decision-making and the overall quality of available information in the form.

The app also enables the communication of cognitive and behavioural limitations to the employer and worker, as well as suggestions for possible accommodations at the workplace for such impairments. The assessment of cognitive impairments was considered important, especially given the increasing prevalence and recognition of mental health issues in the field of RTW. There is also a component for HCPs to identify possible barriers for RTW for employers to be notified and, then, pursue appropriate avenues to support. These barriers could include worker concerns or psychosocial risk factors such as "concerns about the availability of appropriate accommodation" or "fear of re-injury" that could benefit from corresponding measures and reassurance at the workplace. HCPs could also recommend the involvement of a RTW Specialist or Coordinator to employers, which can be helpful in complex RTW cases.

The app provides plenty of opportunities to provide detailed communication through expandable 'text-boxes' for various areas of function. This is in comparison to the WSIB FAF, which has four-lines of paper space for free-text input. Last but not least, by virtue of being an IT innovation, the

app has 'smart-tool' functionalities such as data automation. The app also highlights key areas of functional abilities that apply to a particular diagnosis in yellow and has scroll-over information to support field completion. This was considered to help HCPs focus on providing pertinent information and avoid having to go through the form in its entirety.

Sampling and Recruitment

HCPs, employers, and workers with experience in RTW were sought to gain their perspectives on the app and media change. We used direct contact with local HCPs and employers, and snowball sampling to build our pool of informants. Recruitment of HCPs did not only include physicians, but also physical rehabilitation care practitioners such as physiotherapists and kinesiologists who often provide RTW information to employers. Employer representatives directly involved in using HCP information to plan RTW in their organizations were recruited from different industry sectors and firm sizes. Workers with experience of work disability provided a valuable vantage point on end-product impact, as their experiences would be affected by the communication practices of others. Sampling, therefore, enabled a triangulated overview of the social phenomenon of interest from its three immediate actants [14]. Outcome of the sampling is presented in the "Results" section.

Procedure

Figure 1 summarizes the study's procedure. A semi-structured interview guide was used for all interviews. Separate interview protocols were created for each stakeholder group based on the focus of the study, the stakeholder's role in the process, literature review and past research experience. The protocols outlined a list of open-ended questions to prompt and facilitate participant input where necessary. The semi-structured format enabled an organic discussion of topics. Instead of being prescriptive, a flexible approach was taken to allow each participant to contribute to the flow of the interview and the development of relevant information outside those outlined on paper. The protocols were updated as the study progressed to incorporate new ideas and areas for investigation, which is reflective of the flexible and iterative nature of qualitative research. Individual interviews were conducted in all but two instances where physiotherapists were interviewed in pairs in their practice settings. Initial interview guides are provided in the supplementary material.

We used a funnelling strategy to move from general to specific perspectives on communication and media change, dividing the interview into two parts. The first part focused on their general experiences, processes, and views on HCP–employer communication. Questions pertained to the quality of communication, important aspects for successful communication, major challenges experienced in communicating with other stakeholders, and thoughts about the proposal to transition media change.

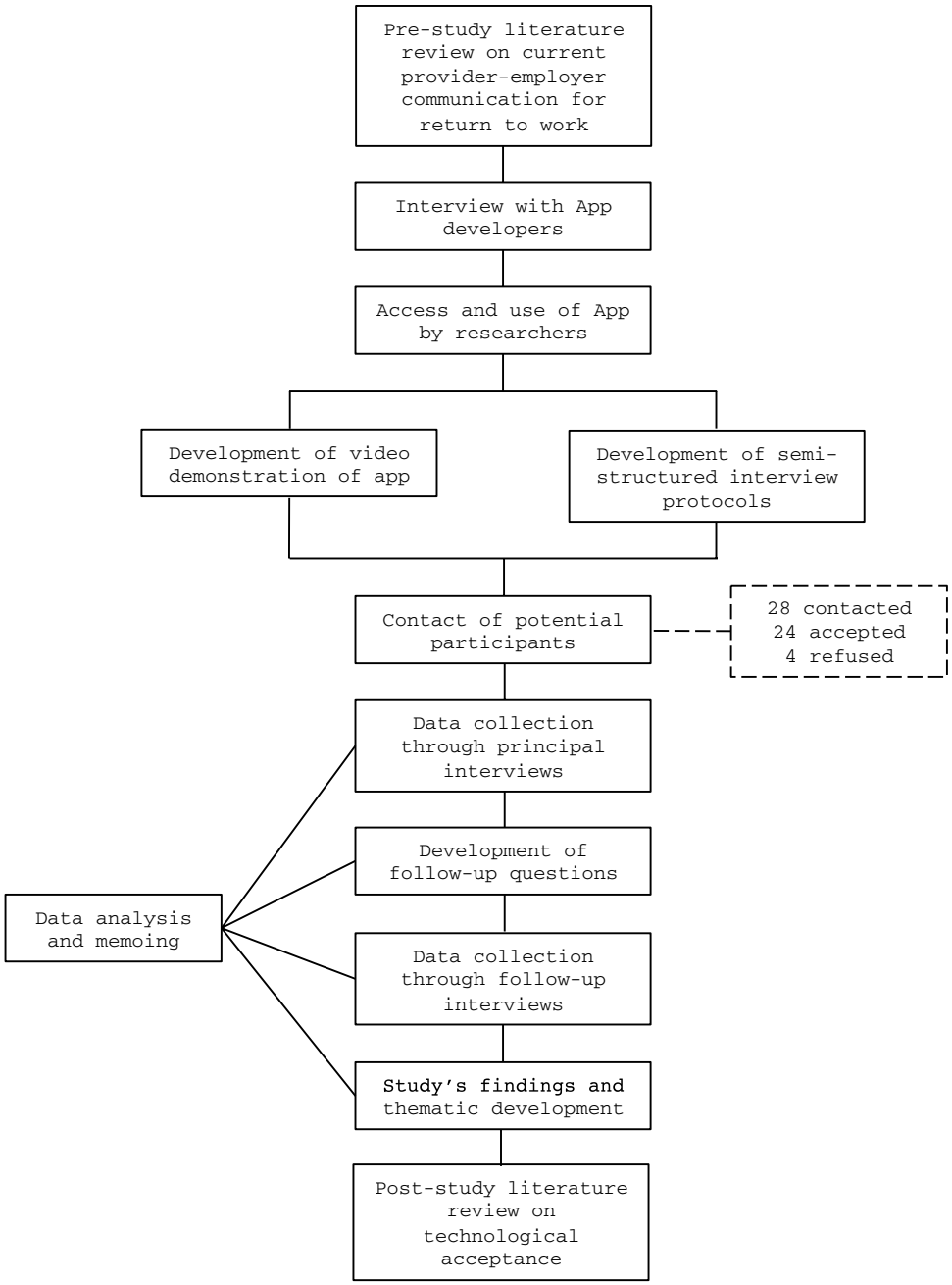
In the second part, participants were shown an 8 min demonstration video of the RTWE app, which provided a summary of its features and functions. A mock generic case of low back pain was used to demonstrate the app. The video was presented in a neutral way to not sway respondents one way or the other toward the app. Participants were able to access the video remotely through an online sharing platform. Upon watching the video, participants were asked if they had any questions about the app, their general impressions, its value, and their concerns about implementation. Participants were also asked if they would consider using the app in their organization or practice setting. Readers wishing to view the video demonstration can contact the corresponding author. We anticipated that part 1 and part 2 of the initial interview would take 45 min total.

Follow-up interviews were conducted with HCP and employer participants to member check data and elicit further reflection on the app [13, 15]. Opportunities for a second, follow-up interview were pursued with HCP's and employers to supplement data from the initial interview. Each follow-up was tailored to elicit further response based on the initial interview and the maturing understanding of the phenomenon. This enabled a better understanding of the findings where lacking. Participants were able to clarify and elaborate on information from their previous interview and their completed survey. They were also able to comment on concurrent results for the research project, as well as provide further input on questions developed post hoc as the investigation progressed. The collection of follow-up data from this interview had a minimum allocated time of 15 min. Owing to a more limited role in use of the app and greater flexibility in scheduling, worker participants were only required to do a single interview. Actual interview times are provided in the "Results" section.

Data Management and Analysis

Data were recorded and transcribed verbatim. Field notes were written then typed. Progressive thematic coding, as per Charmaz [13] was employed for data analysis. Analysis was also supported through use of the qualitative research software, Atlas.ti version 7 (Berlin, Scientific Software Development). Interviews, field notes and annotations were included as analytic material in Atlas.ti. Multiple reads of the text were engaged. Coding moved progressively from broad/discrete to specific/inclusive [13]. In the open coding stage, meaningful elements within a text were identified and labeled into codes based on participant vocabulary (line to line and sentence to sentence).

Fig. 1 Methodology flowchart



Concepts were developed to group codes of similar content and veracity. The concept, "information quality", for example included codes such as "detail", "clarity", and "legibility". Properties of nouns (e.g., online communication, MDG, and HCP time) were also labeled into codes in terms of their associated adjectives (e.g., "more efficient", "useful", and "problematic") and adverbs (e.g., "sometimes", "often", and "always"). Also labeled for coding was participant attitude (i.e., "neutral", "positive", or "negative") to assess the emotional value attached to a particular object, person, or situation.

Axial coding established how the codes and concepts related to each other. Networks of initially descriptive elements were given new labels to represent their functional, relational, and causal properties. Selective coding was then engaged toward core concepts capable of anchoring and categorically subsuming others. This resulted in the development of themes, which, in turn, enabled theoretical generation. The coding process was also facilitated through constant comparative analysis by comparing emerging categories or concepts in terms of their similarities and differences repeatedly from various contexts.

Negative cases were also sought to understand instances that did not fit with existing themes or created paradoxes within the dataset. Literature review prior to the study was limited to HCP–employer communication issues during RTW. Literature review on IT acceptance, adoption, and implementation occurred only after completing data analysis. Thus, data analysis was genuinely inductive, where we relied on the data proactively to "speak for itself" in evidencing and guiding the analytical process [13].

Strategies for Rigour

Based on best practices for qualitative research, the following strategies were implemented to ensure rigour in the study [15–18]. Purposeful sampling of participants with varying RTW experience maximized the opportunity to examine convergence/divergence of perspectives. Thick description of verbatim accounts made explicit the nature of the findings (e.g., context, number of instances, and relevance of theme).

Multiple contacts helped build researcher-participant rapport and encourage informants to share insights to maximize richness in the data. Participants were empowered to lead the inquiry process as subject-matter experts through the interview protocols. Specifically, interview questions were made open-ended, neutral, sensitive, and understandable. Non-judgmental inquiry was established, where emphasis was placed on what participants considered to be true and meaningful to them. Forthright disclosure was supported by the process-related elements of consensual participation and anonymity.

Informant feedback was pursued during interviews or via email to validate interpretation and check emerging themes. Communicative validity was enabled through ongoing meetings and discussions between the researchers. Negative cases were sought to challenge trends in the data. Reflexivity was engaged to support the analytical process by actively identifying and bracketing researcher biases that might affect analysis. An audit trail of the data-driven analytical process was made available through data records, the use of Atlas.ti, extensive fieldnotes, and memoing.

Results

The final participant sample consisted of 7 employer representatives (EMP1-7), 5 workers (IW1-5), 6 primary care physicians (DR1-6), 5 physiotherapists (PT1-5), and 1 kinesiologist (KN1) with experience in work disability and RTW. Of the health care professionals approached, two failed to respond—one female physician and one female nurse practitioner. Two workers declined to be involved. Everyone else we approached, participated. Only one employer participant (EMP5) did not complete a follow-up interview owing to time constraints and limited contact availability. Interview duration was between 30 and 113 min, with a medium of 46 min (not inclusive of app video demo viewing). Contact with participants is detailed in Online Resource 2. Respondent demographics are summarized in Table 2.

Demographic information indicated a computer literate sample of employer and HCP participants. The majority, nine participants, considered themselves as having a general competency in a number of computer applications ('average'), followed by seven other who self-identified as having the ability to competently use a broad spectrum of computer technologies ('advanced'). Two HCPs reported being able to perform basic functions in a limited number of computer applications ('beginner'). Lastly, one HCP reported being extremely proficient in IT use ('expert'). Notably, our sample consisted of individuals with variable exposure to the advent of IT innovations in their professional career. Whereas some had experienced IT use as the new norm after years of manual and paper-based practices, others simply experienced it as the norm.

Data analysis led to the development of five interrelated themes (depicted in Fig. 2). The first and central theme focused on stakeholder receptivity and buy-in of the broad idea of transitioning media change and, more specifically, the RTWE App. The four other themes entailed key areas of discourse around the app, which participants additionally indicated to influence their buy-in of it. These themes included: (1) perceived usefulness, (2) perceived fit, (3) buy-in from all stakeholders, and (4) burden of proof. The narrative of each theme is presented in turn, to which evidential quotes from respondents are appended in the supplementary material or cited in text for elaboration.

Stakeholder Reception and Buy-In; Media Change as "the Wave of the Future"—Maybe

Stakeholder reception toward the proposal of media change were mixed prior to viewing the video demo of the app. At first blush, most participants indicated media change as representing "the wave of the future" (EMP7: Q49), or, simply, the reality that "everybody is tied to IT somehow" (EMP1: Q51). Many also believed that IT innovation was a possible avenue some of the challenges they presently experienced with communication. This included improving the timeliness of communication by making it "much more expedient" (EMP4: Q44). The following example pertained to the structure of the FAF to enable detailed communication.

> [On what media change would look like.] Yeah, and the drop-down boxes and things like that, I'm sure that would be included in it. It would be helpful. And then, you're leaving maybe more room than the other forms.

Table 2 Demographic characteristics of participants

Characteristic	HCPS	Employers	Workers
Gender	Male (12)	Female (4); male (3)	Female (3); male (2)
Age (years in range)	25–35 (4); 35–44 (4); 44–54 (1); 55 or above (3)	25–35 (1); 35–44 (1); 44–54 (5)	35–44 (1); 44–54 (3); 55 or above (1)
Profession	Kinesiologist (1); Physician (6); Physiotherapist (5)	HR professional (2); nurse practitioner (1); OH&S Professional (1); RTW Coordinator (3)	Construction worker (2); collections agent (1); hospital housekeeper (1); hospital nurse (1)
Industry sector	Health care (12)	Education services (2); health care (1); manufacturing (1); public services (1); social assistance (2)	Construction (2); finance (1); health care (2)
Firm size (employers and workers only)[a]		Large (4); medium (1); small (2)	Large (2); small (3)
Injury or illness type (workers only)			Cancer (1); leg injuries (1); low back pain (1); low back injury (1); shoulder injury (1)
Insurance system type (workers only)			Private insurance (4); WSIB (1)
Self-rated IT proficiency (HCPs and employers only)	Beginner (2); average (5); advanced (4); expert (1)	Average (4); advanced (3)	
Buy-in of the App[b]	No (1); yes (11)	No (2); yes (5)	Unknown (3); yes (2)

[a]Firm size was classified according to Statistic Canada. The agency defines the employment of 1–99 employees as small, 100–499 employees as medium, and 500 employees or more as large

[b]Participants indicated if they would or would not be willing to use the app in practice in its present form

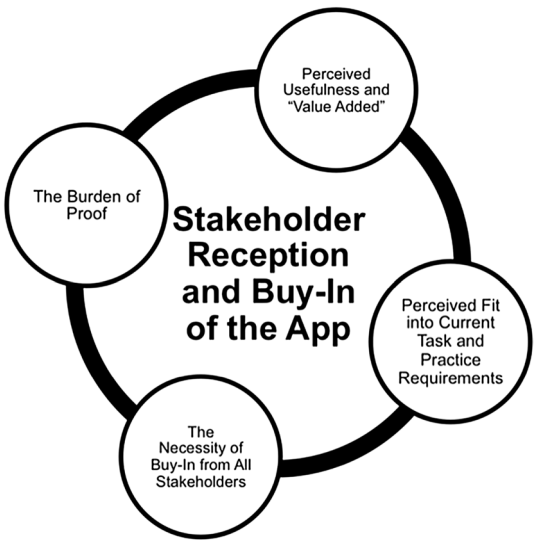


Fig. 2 Visual summary of themes

> I'd like to actually make comments on your own. Yeah, that would be helpful. (PT3: Q24)

Not all participants welcomed the proposal with open arms. Four physicians (DR1, DR2, DR3 and DR5) were particularly wary, to the extent that one saw media change as eliciting feelings of "fear and suspicion" (DR2: Q44) in him, and potential in other physicians. In addition to a common distaste for non-medical tasks such as form completion, one physician was sceptical that simply moving to an IT platform would really make a difference, as elaborated below.

> Does it [media change] change my thoughts on the forms in general in terms of is it really something that a physicians should be filling out? No. If it's the same exact questions, just an electronic form, it doesn't change my thoughts. (DR5: Q59)

Nevertheless, the majority of participants provided statements of personal buy-in upon viewing the app's video demo. Only three participants (EMP2, EMP6, and DR1) did not see themselves as using the app in its current state, if given the opportunity. Most reported being impressed with what they saw, although this occurred to varying extents. Positive responses toward the app included simple statements of approval such as the app having "a lot of good possibilities" (EMP5: Q37) or being a "really neat idea" (KN1: Q75), as well as more elaborate statements such as the following from a worker's perspective.

> It looks like a great app. There's no thinking. He [doctor] can just flip through and start. There are a lot of really good sections in it for sure. Yeah. I am impressed. Yeah, I wasn't expecting that. I don't know what I was expecting. No, I think I was thinking, you

Table 3 Summary of dimensions, endorsements, and critical insights relevant to perceived usefulness and "value added"

Dimension (definition)	Participant input (endorsements and/or critical insights)
1. Efficiency Perceptions of how the app might improve the efficiency of communication tasks and processes	Endorsements • Improved access to and delivery speed of pertinent information (Quote #1) • Streamlined form completion via data automation and prompts (Quote #2) Critical insights • Highly dependent upon commitment of key actors to engage with tasks and process requirements as intended (Quote #3) • App introduced technical and technological issues and risks that are not encountered in usual practice (Quote #4) • Practice required to gain familiarity and user efficiency (Quote #5) • HCPs still considered the paper FAF to be more efficient (Quote #6) • Physicians suggested app's interoperability with EMR systems to improve ease of access (Quote #7)
2. Effectiveness Perceptions of how the app might improve the effectiveness of communication tasks and processes	Endorsements • Structure and components enabled more comprehensive understanding of RTW issues and capacities (Quote #8) • Improved access to pertinent information supported informed RTW decision-making (Quote #9) • MDG use as supporting HCP objectivity and trust for some employers (Quote #10) • MDG use as improving HCP accountability for RTW decision (Quotes #11a, b) • Greater commenting space allowed for more detailed HCP information (Quote #12) • App offered aids to discuss RTW with patients/workers and identify potential issues to address (Quote #13) • Better legibility from typing (Quote #14) • Stakeholder access to the same information supported consistency for shared knowledge and RTW expectations (Quote #15) Critical insights • Highly dependent upon commitment of key actors to engage with tasks and process requirements as intended (Quote #16) • Accuracy of MDG-related functions depended on the quality of diagnostic information (Quote #17) • Lack of knowledge about the reliability of MDG (Quote #18) • Guidelines-based information on recovery durations could be a source of conflict for stakeholders (Quote #19) • Employers have less need for guidelines-based information on recovery durations when insurers are involved (Quote #20) • Direct verbal communication was still considered necessary to some to facilitate collaboration and shared understanding (Quote #21)

know, he just have to keep filling it all in like he would on the paper one. But, I mean, it gives him so many options that he may not even think about, you know, that would pop up that are, uhm, appropriate. (IW1: Q63)

Buy-in of the app was often attached with endorsement from participants regarding the app's functional value and fit. However, and perhaps more importantly, it was highlighted how their buy-in did not reflect unequivocal support toward media change. Reservations continued to exist for many, some more than others. In fact, along with their endorsements, many offered critical insights on possible issues and challenges that needed to be addressed to strengthen the quality of their buy-in and that of other prospective users.

Consequently, actual emphasis was placed in the study on the issues and challenges identified for stakeholder buy-in, regardless of said buy-in, and with a more critical perspective. These will be explored and elaborated in the subsequent thematic sections.

Perceived Usefulness and "Value Added" by the App

Viewing the video demo enabled participants to extrapolate what they perceived as the usefulness and "value added" (EMP1: Q49) of the app, relative to present paper-based practices. Participants highlighted two dimensions to the theme, which were the efficiency and effectiveness of communication tasks and processes. Table 3 presents a summary description of the dimensions, as well as participant input in terms of relevant endorsements and critical insights. Supporting quotes are provided in Online Resource 1.

One main finding was that the app had a range of perceptible benefits, to which participants were able to provide personal endorsements. The benefits perceived were also largely consistent with those intended by the developers by design. Key areas of potential benefits included: (1) the timeliness of information exchange, (2) access to pertinent information, (3) stakeholder RTW decision-making and discussion, and (4) overall quality of HCP RTW information. These benefits were attributed primarily to the characteristics of the innovation itself (e.g., online communication, more comprehensive

form, and integration of MDG-related functions) to streamline and improve communication practices.

Yet, the app was not without its critical insights in terms of usefulness. To begin, any technical advantage in communication efficiency and effectiveness was predicated on the commitment of stakeholders to use the app as intended, or, as one HCP described it, "how much effort someone puts into it." (DR2: Q46). HCP participants, in particular, felt that they had to negotiate the possibility of improved information quality via a novel IT-mediated tool (e.g., greater commenting space and MDG-supported decision-making) with the efficiency and familiarity of paper forms in busy practice settings (e.g., paper form on hand versus accessing app on the computer when time-constraint).

Several participants were also attuned to how online form completion presented new issues and complexities that were non-existent for paper-based completion. There were now concerns over sudden technological malfunctions (e.g., computer problems and poor internet connection), the need to remember login details, and the ability of patients to deliver their access codes. Technical concerns also existed in terms of the need for correct diagnosis to be able to use MDG-related functions appropriately, as well as the redundancy of employer access to guidelines information on recovery durations when this was usually in the jurisdiction of the compensation systems.

The app's integration of MDG functions was considered a major feature for improvement through the app. Employer participants, in particular, believed the integration would lend an "objective medical" (EMP1: Q55) orientation to RTW decision-making via guidelines on recovery durations. For their part, HCPs generally agreed that guidelines were useful to inform decision-making in areas that were "nebulous" (DR4: Q41). Overall, it was assumed that by enabling better HCP input, employers would receive appropriate feedback to improve work conditions and, thereby, help workers RTW.

However, HCP and worker participants were concerned about guidelines on recovery durations in terms of their applicability and being a possible source for stakeholder conflict. In contrast to employers' beliefs about the added objectivity provided by guideline use, almost all the HCPs could attest that objective information in the form of normative data did not always translate well in actual practice, given the complexity and variability of individual cases. HCP and worker participants were also sceptical about the degree to which MDG information could compare to the intimate knowledge that HCPs have of their patients, as well as their sense of authority over issues of RTW timing.

Accordingly, three worker and ten HCP participants argued that such guidelines should not be extrapolated as being "set in stone" (DR4: Q41), whether in HCP practice, or by other stakeholders. Many insisted that employers and insurers should not "pigeon-hole" (DR2: Q52) or argue against HCP decisions based on the information. HCP-based intentions for using the information were thus, not prescriptive. Three HCPs also reported the specific need to scrutinize and verify the credibility of MDG as a guideline source. One HCP in particular, was concerned on whether using an unfamiliar source was worth staking his reputation. Whereas four employers reported familiarity and use of MDG, none of the HCPs have had the benefit of familiarity.

Perceived Fit of the App with Current Task and Practice Requirements

Viewing the video demo also enabled participants to extrapolate the fit of the app with current task and practice requirements. Six dimensions were highlighted as particularly relevant and vital. Table 4 presents a summary description of the dimensions, as well as participant input in terms of relevant endorsements and critical insights. Supportive quotes are provided in Online Resource 1.

In terms of ease of use, the app was accepted as being "user-friendly" (DR4: Q46), even by the two HCPs who self-identified as having beginner-level computer proficiency. As for information security, all agreed that the confidentiality and privacy of medical information was important during RTW, especially for injured and ill workers. In fact, critical insights from worker participants revolved primarily around information security, where this was also the only concern that arose for two workers. Even so, most participants were optimistic and had the general expectation that necessary cyber security measures would be implemented in the app when used. The consistency of the app with legal requirements of HCPs in providing only RTW-related information (e.g., functional abilities, recovery durations, and work accommodations), as opposed to medical information (e.g., diagnosis, test results, and treatment information) to employers was also of benefit.

Media preference pertained to how individuals can have a strong preference for certain communication mediums, for example paper-based practices, to the extent that they find media change disagreeable. This was the case for participant DR1 and was the major reason why his buy-in of the app was precluded.

There were also more stakeholder-specific dimensions to consider when assessing fit. One employer participant, EMP2, helped us understand how the app was not a 'one size fit' for all organization characteristics and processes in relation to logistical suitability. Specifically, paper-based practices remained the practical choice in terms of communication timeliness and process for managing occupational injuries in her organization, given the involvement of jobs with unconventional work settings (i.e., roadwork and transportation) and hours (i.e., round the clock shifts).

Table 4 Summary of dimensions, endorsements, and critical insights relevant to perceived fit

Dimension (definition)	Participant input (endorsements and/or critical insights)
1. Ease of use Whether the app was perceived as easy to use	Endorsements • The app was considered easy to use in general, even among 'beginners' in computer ability (Quote #22)
2. Information security Whether the app was perceived as able to keep information secure and maintain medical confidentiality	Endorsement • App met formal requirements to procure only relevant information for employers (Quote #23) • Most were confident or expected that cyber security measures would be up to standard for the app's implementation (Quote #24) Critical insights • Injured and ill workers might hesitate to consent the app's use from concerns over hacking or inappropriate information access (Quote #25)
3. Media preference The strength and openness of personal preference in using various media	Endorsement • Some individuals have strong preference for online communication in their practice that they find media change very agreeable (Quote #26) Critical insight • Some individuals have strong preference for paper-based communication in their practices that they find media change disagreeable (Quote #27)
4. Logistical suitability - Whether the app was suitable to the logistical RTW needs of the organization (employer)	Critical insight • App was not suited to organizations with unconventional work settings and hours; paper-based communication might be the most practical choice for the logistics of their RTW processes (Quote #28)
5. HCP time The extent the app was perceived as able to manage time-related challenges for HCPs	Endorsement • The app's structure and inclusion of time-savers were important to avoid the app from seeming too cumbersome (Quote #29) Critical insights • Despite time-savers, use of the app required more time and effort than completing the paper form (Quote #6) • HCP time-constraints would hinder appropriate application (Quote #4)
6. HCP remuneration Whether HCP use of the app would be adequately remunerated	Endorsement • HCPs were more willing to use the app with adequate remuneration and financial incentives (Quote #30) • Employers could see how increased remuneration could be worth the investment for better HCP information (Quote #31) Critical insights • Paper-based forms remained cheaper (Quote #31) • Employers would have to directly pay HCPs for the app's use in WSIB cases since the Board only compensates use of the WSIB FAF (Quote #32)

For HCPs, there were issues of practice economics that concern the impact of time management and remuneration on the work and practices of HCPs. Despite the app's ease of use and time-savers, it still had to compete with the perceived advantages of paper-based forms. Seven HCPs indicated that paper-based form completion remained an easier and speedier option. Many participants were also sensitive to the fact that HCP time-constraints would limit appropriate use of the app.

As for HCP remuneration, there was general agreement that adequate remuneration for the app would influence HCP uptake. As the app entailed the completion of a more comprehensive form, seven HCPs supported the developers' proposal for employers to pay more for using the app (i.e., \$60–\$75 instead of the \$45 fee for WSIB paper FAF completion). Employer participants would prefer the fee for form completion to be consistent with the current standard. However, four employers reported that they could see the increase as an investment worth pursuing, but only if the quality of HCP information would actually improve through the app. Overall, the discourse over HCP remuneration and financial incentives for using the app revolved around the general notion that "you get what you pay for" (EMP7: Q51 and PT1: Q83).

Table 5 Summary of critical insights relevant to necessity of buy-in from all stakeholders

Participant input (critical insights)
Critical insights • Buy-in of the app from HCPs encouraged buy-in from employers and vice versa (Quotes #33 and #34) • App could only be used as intended with adequate buy-in and commitment from both parties (Quote #3) • Buy-in of the app from workers and unions is critical to the app's implementation (Quote #35) • Employers have a role to gain buy-in of the app from workers and unions (Quote #23) • Scepticism among a few participants (both employers and HCPs) about procuring buy-in of the app from other stakeholders, especially physicians (Quotes #36, #37, and #38) • Buy-in and involvement of compensation systems, especially the WSIB, would be critical for administrative control and the app's wider implementation (Quotes #39, #40, and #41)

The Necessity of Buy-In from All Stakeholders

Buy-in from all stakeholders represented a single-dimension theme that consisted of only critical insights. Table 5 presents a summary of the relevant critical insights obtained. Supportive quotes are provided in Online Resource 1.

To begin, participants in the study acknowledged that personal buy-in of the RTWE App was a necessary, but insufficient condition for transitioning media change. Complete buy-in from the three immediate stakeholders (i.e., worker, employer, and HCP) was needed, at the minimum, for the app to be used. Besides highlighting the interdependency among stakeholders during the RTW process, the finding also re-emphasized the importance of commitment and cooperation among users that several participants deemed necessary for the app to be used as intended and successfully. Employer and HCP participants also indicated how the acceptance of their counterparts could encourage or discourage their own buy-in of the app.

While participants were generally uncertain of how other stakeholders would react to the app, several were quite apprehensive about the app's appeal to physicians. For participant EMP6, in particular, the scepticism over physician reception was a major reason for her own lack of buy-in of the app. She perceived barriers in terms of time constraints, confidentiality, interest, and IT use among physicians. There was also the view that the app was "a bit ahead of its time" (EMP6: Q58). Her elaboration on the matter can be referred to in the online resource.

Some participants acknowledged that involvement of the WSIB or private disability insurers was "not necessary at all" (EMP7: Q52) for the immediate implementation of the app, since the employer was in a position of authority to decide its use as a modified FAF. Even so, many recognized the benefits of involving the compensation systems for the app to "become a large scale app" (DR4: Q49), as well as to "get everybody on the same page" (DR6: Q65) regarding expectation around the roles and processes relating to the app.

Taken as a whole, the discourse on buy-in of the app from all RTW stakeholders, including the compensation systems, represented the need for assurance at a system level to move forward in transitioning media change. A participant provided the following elaboration.

> You know, what would be great is if we know that this is the way that it is going to go. You know, that you know you're not changing your systems, you're not figuring out how to do a new way, and then go, "Ah, let's not. Scrap that." Obviously, things are going to change. You get modified [employer FAF]. They do that with even forms that have been around forever. They're always changing. Even if that's the case, if you know, "Hey, this is the way it's going to be. Okay?" Then, I'd be fine to go to do it. Yeap. (PT2: Q43)

The App's Burden of Proof

The burden of proof pertained to an important critical insight that was fairly straightforward to understand. Specifically, almost all participants agreed that there was a need to pilot and test the app in the field. As a physician elaborated, "You have to test, verify them [the capacities of the app], get experience, get feedback, and then, sort of have someone agree to adopt it, and then, implement it. Right?" (DR3: Q76). Furthermore, as participants indicated that much of their input on the app (i.e., buy-in, perceived usefulness, and fit with practice) was tentative, many considered demonstrable results based on field research to be critical to facilitate more informed judgment of buy-in from prospective users. As the study's kinesiologist explained, "I think the app would be used if people realized it's gotta be more efficient than the current [paper-based] system. And they won't know unless they're shown that" (KN1: Q93).

Discussion

Our aim was to critically examine the prospect of using IT in RTW communication and provide guidance for design and implementation. As the results indicated, the study enabled central stakeholders to consider and provide perspective on

the notion of transitioning media change toward an IT-mediated platform as a potential to improve HCP–employer communication during RTW. We did fulfill our aim of exploring the receptivity of immediate users for such a transition. We also gained insights into critical design features for an app. Our findings suggest that app design will need to consider user perceptions of utility and fit into practice as well as users' perceptions of other stakeholders' reception and use of such technology. We are more limited in providing guidance for implementation. Nonetheless, it was clear from participants that evidence of app effectiveness and commitment within disability systems for transition to IT-mediated communication are important for immediate users (i.e., employers and health care professionals) to consider such a transition.

It was reassuring to find, upon post-analysis literature review, that the themes developed in the study reflected variables and interactions that were consistent with those available in the field of IT adoption research. Accordingly, buy-in of the app can be related to the construct of 'IT acceptance', which is the technical reference for one's behavioural intent in using a particular IT innovation [19–21]. 'Perceived usefulness' has been widely recognized as being the most common and most important factor for IT acceptance, especially for innovations that are work-oriented instead of leisure-oriented [22, 23].

The theme of perceived fit can be related to the existing construct of 'compatibility (general)', and the relevant dimensions to the constructs of 'ease of use', 'IT security', 'agreement with IT (welcoming/resistant)', 'compatibility with work processes and values', 'HCP time constraints', and 'feasibility' [22, 24–27]. The necessity of buy-in of other stakeholders can be related to the construct of 'subjective norm', which refers to the perceptions and social influence of others on a user's decision to use technology [20, 24, 26]. Lastly, burden of proof can be related to the construct of 'result demonstrability' or 'evidence strength and quality' in the field of IT adoption [22, 25–28].

Despite the coherence and benefit of substantiation found in relation past research, it must be noted that the study's findings are unique and specific. Constructs for IT acceptance do not always apply or operate in a similar manner across studies. This because contextual differences based on the characteristics of a specific innovation, the tasks and processes involved, and the user environment can contribute to nuances in findings and can, in turn, limit the relevance of findings from past research [21–23, 28]. The present study is contextually unique. There are no direct comparisons in past research in terms of the app's characteristics and user environment.

For example, subjective norm has typically been studied from a single organization or system context, where elements such as 'upper management demands and support', 'leadership', and 'peer response or pressure' have been identified as important. There has been limited research on the influence of patients and consumers in the context of health care and business, respectively, despites past researchers agreeing that obtaining feedback and collaboration from relevant stakeholders external to the user setting could support IT acceptance and a smoother implementation of innovation [27–31].

Within a multi-system and multi-stakeholder setting (as it is the case for the app), the necessity of buy-in from all stakeholders encapsulated the interdependent nature of stakeholders and their activities for the RTW process [10, 32–35]. The characteristics of the app as a group (or multi-user) technology, instead of an individual (single-user) technology, also meant that intragroup coordination, cooperation, and collaboration become important social elements for successful use [23].

Past researchers have also referred to perceived usefulness in terms of 'relative advantage', which is understood as "the degree to which an innovation is considered better than the idea that is superseding." [25]. Indeed, participants' judgments of usefulness did involve comparing present paper-based practices with a proposed IT innovation. However, it was also the case that the app could be perceived as having relative disadvantages. For example, although the app was considered useful to enable more comprehensive input from HCPs, the elaborate design and added workload also made it seem less efficient for form completion to HCPs when compared to the relative simplicity of the paper FAF. Although inclusion of MDG information on recovery duration could facilitate more informed decision-making for RTW, it could also be a major potential source of stakeholder conflict. Lastly, although electronic communication could improve accessibility and delivery of pertinent information compared to current practices, reliance on technology also introduces new problems and risks for communication (e.g., sudden technological malfunctions and login problems).

Actual and prospective users of IT innovations have similarly reported on the trade-off in past studies [36–40]. The paper-versus-app debate was, therefore, not straightforward. It was not the case that the app was simply better and would be the obvious choice for replacement. The paper FAF represented a real competition. There were significant trade-offs in choosing between the two.

The study's findings also indicated a 'carry-over' of stakeholder interests and concerns. Regardless of the medium, employers continued to worry about HCP form completion for issues that are beyond the medium such as time constraints, HCP motivation, and the methods of assessment involved. Similarly, HCPs continued to worry about their practice economics and how employers would understand and respond to their information.

With regard to the need for user commitment, past researchers have suggested similarly in that failure to realize expected benefits through technological use is not always caused by problems within an innovation per se [22, 27, 30, 31, 36]. As Klein and Knight [30] explained, innovation failure can be attributed to ineffectiveness in the users themselves in terms of the "consistency, skill, and care required to achieve its expected benefits". Accordingly, access to innovations with potential benefits does not lead to appropriate use on its own. Consistent with past research [22, 30, 31, 36], many of the participants in the present study emphasized the importance of education and practice for users to develop the interest and skills necessary for appropriate use of the app.

With respect to future development, it is clear the technology needs to prove its value in practice settings before wide-scale implementation. Considering the results of the study and the multi-user and stakeholder context, we suggest a field trial in a limited environment (i.e., geographic area or part of a system) as the next step forward in app development. The field trial could proceed in phases where one stage thoroughly vets the functionality of the app in a single practice setting to refine its operability. For example, the first phase could focus on HCP-users. They can test the app and provide feedback from completing forms through case studies (written, video-recorded, or acted). The goal would be to gain their confidence of the app and iron out problems for implementation in their practice settings. In the second phase, employers and workers could be brought into the picture, providing feedback for further improvement. A graduated approach would enable a product to be shaped with minimal initial investment and reduced risk of a large-scale failure that could hamper IT integration.

Strengths and Limitations

Employing the video demo of the app was a strength of this study. Tangible demonstration of a prototype technology helps get around inherent "tech-positive" biases and enables a critical assessment. Regardless of their initial outlook and reception toward media change and IT innovation, gaining further knowledge of the app through a video demo served to inform and fine-tune participant judgment, as well as obtain important and relevant insights.

The impact of having a more tangible object for evaluation is not surprising. The general paradigm in IT adoption research maintains that the thought processes involved for decision-making are rationalistic, systematic, and based on merits [19, 26, 41]. Accordingly, the quality of people's decisions about an IT innovation depends greatly on information availability. As Joseph [19] explained, barriers in information can lead the less informed target consumer to rely more on personal beliefs and attitudes that may be inaccurate, take a more prudent ("buyer beware") approach, and, thus, hesitate in trying new innovations.

Despite the demonstrative strategy, a limitation remains from the lack of opportunity for participants to directly use the RTWE App within their respective practice settings. The actual effectiveness and fit of the app in improving communication remains unclear. Thus, only tentative conclusions could be drawn until the app's actual performance can be better verified with appropriate measures and metrics in practice environments. Another weakness pertains to the lack of opportunity for participants to assess personal buy-in based on knowledge of buy-in from other stakeholders, given the impact suggested of subjective norm. The exploratory nature of the present study explains both of the limitations identified. Moreover, these can be addressed in due time with further research. A third limitation pertains to sampling. There may be other professions who would use the app such as Occupational Therapists. However, our intention was to target primary or principal care providers for disabling injuries. Similarly, mental health professionals may find use for the psychological impairment features. Future research could examine response to such technology in these professions.

The post-analysis literature review engaged was also a key strength. It should be noted that there are often lexical differences in the choice of nomenclature, as well as inconsistent definitions related to key constructs across the research literature [24, 26, 28, 42]. This is unavoidable partly because of differences in the nature of research and analysis involved. However, it should also be noted that studies of IT adoption consistently identify conceptually similar constructs and that differences in definition or scope tend to be slight [20, 22, 24].

Lastly, the critical orientation of the study was a major strength. The findings gathered will be beneficial to guide the development of the RTWE App (or other similar innovations) in the field. Although we did not trial the app, a priori consideration of key issues for stakeholders can also enable a more sensitive and strategic implementation of new technology [29].

Conclusion

IT adoption for RTW communication is a tantalizing prospect. Our findings suggest that a transition to an IT-mediated tool for RTW communication is supported in principle; however, major caveats exist in relation to perceived value and fit with stakeholder practice. System support and stakeholder cooperation are likely necessary to adopt the change, yet IT-mediated communication has yet to demonstrate value. Be that as it may, the study indicated how media change to IT innovation could be a useful and meaningful avenue to possibly improve HCP–employer communication during

RTW. Like many innovations, the app's development and implementation requires careful thought and consideration. To avoid circularity, proof of principal needs to be established through an implementation trial of such technology. Field testing to address the burden of proof of such a tool's value remains the most significant hurdle for development, implementation, and progress.

Acknowledgements We would like to acknowledge our participants for the generous gift of their time and experiences, the RTW Ex app developers for allowing us to use their product as a means to this research, Deborah Kennett for her advice on the research and Keeley Moloney and Amy Sayles for their assistance with data management.

Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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