



Sun Safety at Work Canada: Baseline evaluation of outdoor workplaces recruited to participate in a sun safety knowledge transfer and exchange intervention



Desre M. Kramer^{a,*}, Emily Haynes^a, D. Linn Holness^{b,c,d}, Peter Strahlendorf^e, Rivka Kushner^a, Thomas Tenkate^e

^aOccupational Cancer Research Centre, Cancer Care Ontario, 525 University Avenue, Toronto, ON M5G 2L3, Canada

^bSt. Michael's Hospital, 30 Bond Street, Toronto, ON M5B 1W8, Canada

^cCentre for Research Expertise in Occupational Disease (CREOD), 223 College Street Toronto, ON M5T 1R4, Canada

^dDalla Lana School of Public Health, University of Toronto, 155 College Street, Toronto, ON M5T 3M7, Canada

^eSchool of Occupational and Public Health, Ryerson University, 350 Victoria Street, POD 249, Toronto, ON M5B 2K3, Canada

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ABSTRACT

Purpose: In 2014, an estimated 7000 skin cancer cases were attributed to occupational solar ultraviolet (UV) exposure in Canada (CAREX Canada, 2015). A knowledge transfer and exchange intervention project was initiated in three Canadian provinces to enhance sun safety in 14 workplaces with outdoor workers in two industry sectors – municipalities and electrical utilities. This manuscript is a detailed description of the method used for, and results from, the pre-intervention, developmental evaluation that was conducted in the first year of this two-year project.

Design/methodology: A theory-based conceptual model helped direct a cross-case analysis of 22 hours of interview and focus group data. The deductive and inductive analysis helped explore the workplace characteristics that emerged as potentially significant for the adoption of sun safety by participating workplaces, and helped evolve a project-specific conceptual model.

Findings: The electrical utilities (the utilities) and municipalities differed in their organizational structure, organizational safety culture, and readiness to change. These variables have been identified as being potentially predictive of a workplace's engagement in implementing sun safety policies and practices.

Originality/value: The study is a knowledge transfer and exchange (KTE) intervention looking to enhance sun safety in 14 outdoor workplaces across Canada, which span the public and private sectors, while working within different legislative frameworks. The cross-case analysis methodology facilitated comparisons within and between cases to understand the factors that may lead to successful uptake of occupational sun safety knowledge and practice.

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1. The need for sun safety

Solar UV exposure is the leading cause of skin cancer in Canada, and has also been linked to other damaging health effects including sunburn, skin damage, cataracts, eye lesions, eye cancer, and heat-related illnesses (Canadian Cancer Society, n.d.; CAREX Canada, 2015; Elwood, 2004; Health Canada, 2014; Staples et al., 2006). Skin cancer is the most common type of cancer in Canada, number-

ing roughly one in three new cancer cases (Canadian Cancer Society's Advisory Committee on Cancer Statistics, 2015). Solar ultraviolet (UV) exposure is a serious, but largely preventable, occupational hazard. In 2014, 7000 skin cancer cases were attributed to occupational solar UV exposure in Canada (CAREX Canada, 2015). Further, heat stress is of significant concern for outdoor workers. The most severe form, heat stroke, can cause irreversible damage to the heart, lungs, kidneys, and liver, and has been associated with increased risk of cardiovascular disease, ischemic heart disease, and chronic liver and renal failure (Adam-Poupard et al., 2013). Recent estimates indicate that there are 1.5 million Canadian workers exposed to solar UV radiation, with 61% being in the highest exposure category (i.e., 75% or more of their work day; Peters et al., 2012).

* Corresponding author.

E-mail addresses: desre.kramer@occupationalcancer.ca (D.M. Kramer), emily.gross@occupationalcancer.ca (E. Haynes), holnessl@smh.ca (D.L. Holness), pstrahle@ryerson.ca (P. Strahlendorf), rivka.kushner@occupationalcancer.ca (R. Kushner), thomas.tenkate@ryerson.ca (T. Tenkate).

In response to this need, and building upon previous research and practice relating to the prevention of occupational solar UV exposure (Janda et al., 2014; Be SunSible, www.besunsible.ca), a knowledge-transfer (KTE) intervention project was initiated in three Canadian provinces (British Columbia, Ontario and Nova Scotia) to explore the feasibility of creating a nationally applicable, workplace-based sun safety program. Knowledge transfer (also known as knowledge translation in Canada) has been defined by the Canadian Institutes for Health Research as:

A dynamic and iterative process that includes synthesis, dissemination, exchange, and ethically-sound application of knowledge to improve the health of Canadians... [that] takes place within a complex system of interactions between researchers and knowledge users which may vary in intensity, complexity and level of engagement depending on the nature of the research and the findings as well as the needs of the particular knowledge user (<http://www.cihr-irsc.gc.ca/e/29418.html>).

A knowledge transfer intervention is typified by an organizational level implementation, led by a knowledge broker, based upon research knowledge, with the goal of achieving a health-focused change. This project contrasts with previous approaches attempting to protect workers from UV exposure that focused on worker education or changes in worker behaviour or practices. Instead, this project has approached sun exposure like any other occupational hazard that needs to be controlled by employers using the major strategies that have been identified as effective in knowledge transfer. This project is also unique in that it combined skin cancer prevention and heat stress practices. It also encouraged workplaces to incorporate the sun safety program into their existing occupational health and safety management systems (OHSMS) or programs. Work has shown that sustainability is encouraged by integrating a new intervention into existing processes such as OHSMS (Lau et al., 2016; Leeman et al., 2015). Further, as suggested by Procter and Randall (2015), the workplace interventions will last up to two years to increase the likelihood of sustainability. For the project, sun safety was defined as the prevention of skin and heat effects, and their resultant conditions (e.g., skin cancer, heat stroke).

This article focuses on the program's initial engagement with 14 workplaces that were recruited for the study. The basis for this manuscript is the evaluation of the baseline qualitative data that were collected from the workplaces after their recruitment to the project, but before the commencement of the KTE intervention. This baseline data was collected by knowledge brokers (KBs), who were referred to as "sun safety advisors", in the early spring before they engaged the workplaces in implementing the sun safety initiatives. This evaluation fulfills the definition of a "developmental evaluation" as offered by the U.S. Department of Veterans Affairs' Quality Enhancement Research Initiative (QUERI) group as: "a rigorous assessment process designed to identify potential and actual influences on the progress and effectiveness of implementation efforts" (Stetler et al., 2006).

2. Development of a conceptual model

The project's intervention and evaluation activities were informed by a conceptual model that was first described in the protocol (Kramer et al., 2015) and developed as the study progressed. The initial model was used in the project to create the baseline interview questions, help structure the cross-case analysis of the qualitative data, and serve as the theoretical underpinning of the project's developmental evaluation. The present model, the 'Sun Safety at Work Canada Organization Implementation model'

[Fig. 1], reflects the changes to the process that inductively emerged as significant during the cross-case analysis. The model attempts to capture the complexity of the KTE intervention, including the social processes within the local context, and the dynamic relationship between the workplace parties and the knowledge brokers.

The model builds upon two widely used frameworks of KTE and implementation science: the 'Promoting Action on Research Implementation in Health Services' (PARIHS) framework (Stetler et al., 2011), and the 'Consolidated Framework for Implementation Research' (CFIR; Damschroder et al., 2009; Damschroder and Lowery, 2013). The PARIHS model's three major variables – knowledge source, workplace context, and facilitation – informed three of the model's constructs: (1) a review of existing knowledge on sun safety and the vulnerabilities of outdoor workers; (2) the collection and analysis of information from the participating workplaces; and (3) the examination of the facilitator role of the KBs in the intervention. Two of the CFIR model's five domains – the outer context, and the evaluation of implementation effectiveness in organizational settings – informed two of the model's constructs: (1) an examination of the impact of Canadian OHS legislation on sun safety programs, and varying UV and temperature averages across the country (the outer context), and (2) a three-points-in-time developmental evaluation of the implementation process to evaluate knowledge utilization.

Variations of this model have been used by the first author of this article (Kramer and Cole, 2003; Kramer et al., 2015), and by Allen et al. (2013). The model's seven major dimensions include: the knowledge source; the outer context; the KTE intervention (as facilitated by the KBs); the workplace context; the knowledge exchange; barriers and facilitators; and knowledge utilization (including short-term, intermediate, and long-term outcomes).

The Knowledge Source was the research on sun safety that was described above. The Outer Context included relevant OHS legislation, and climate and UV exposure. The KBs were the facilitators of the 'KTE intervention'. The importance of knowledge brokers has been highlighted by Bornbaum et al. (2015), Helfrich et al. (2010), Lau et al. (2016), Stetler et al. (2006). Their intervention activities were guided by the principles that they would: (1) intensively engage with the workplaces; (2) lead participatory engagement with multiple levels of the workplace; and (3) understand and tailor the interventions to the workplaces' contexts. This model also has 'engagement of workers,' 'feedback,' and 'understanding' as variables, since these concepts have emerged as important themes. The conceptual model also included measures of 'knowledge utilization', including barriers and facilitators to knowledge uptake and use, and short-term, intermediate and long-term outcomes.

This manuscript focuses on what we learnt about the workplace context before the intervention commenced – on baseline data. The 'workplace context' included three major constructs and seven sub-constructs. The first major construct, organizational structure, included: (1) industry and the nature of the work, and (2) integration with existing processes. The second major construct, organizational culture, included: (3) social norms, (4) leadership, and (5) available resources. The third major construct, readiness to change, included: (6) the importance given to OHS and sun safety, and (7) how the nature and characteristic of the change were regarded.

The constructs and sub-constructs were based upon a comprehensive review of questions asked in similar studies, and on previously identified barriers and facilitators to health interventions (Damschroder et al., 2009; Estabrooks et al., 2015; Greenhalgh et al., 2004; Grimshaw et al., 2012; Janda et al., 2014; Kitson et al., 2013; Rogers, 2003). For example, the first two sub-constructs, "industry and the nature of work" and "social norms" were highlighted because the literature has emphasized the impor-

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