CSIRO PUBLISHING

RESEARCH NOTE
https://doi.org/10.1071/WF22076

International Journal of WILDLAND FIRE
International Association of Wildland Fire

Assessment of wildland firefighter opinions and experiences related to incident medical providers

Mark Hoffman[A,*], Valerie Moody[B], Viktor E. Bovbjerg[C], Isabella Callis[B] and Zachary Snauer[A]

For full list of author affiliations and declarations see end of paper

***Correspondence to:**
Mark Hoffman
Oregon State University, 226 Langton Hall, Corvallis, OR 97333, USA
Email: mark.hoffman@oregonstate.edu

ABSTRACT

Background. Medical services for wildland fire incidents are vital and fire personnel need to be comfortable seeking care and have adequate access to care. **Aims.** The aim of this study was to examine wildland firefighters' (WLFFs) attitudes towards, opinions of and experiences with the medical services on fire assignments. **Methods.** A survey was used to collect information from WLFFs. The survey covered: (1) demographics, (2) injury descriptions, (3) trust/respect toward medical personnel, and (4) perceived impact of injury treatment on individual and team deployability. Analysis used contingency tables with chi-square tests to compare groups. **Key results.** WLFFs in both groups respect and trust incident medical personnel. Private firefighters compared with agency firefighters report a perception of less access to care, a high level of discouragement to seek care, and a greater concern that seeking care could result in being removed from the incident. **Conclusions.** Although respect and trust are high, there are concerning perceived differences between groups on several aspects of seeking and receiving medical care. **Implications.** Policy changes and culture shifts may be needed to narrow the opinion and perception gaps between private and agency firefighters on multiple aspects of incident medical services.

Keywords: access to care, injury prevention, injury reporting, occupational injury, respect, tactical athlete, trust, wildland firefighter.

Received: 19 May 2022
Accepted: 13 May 2023
Published: 15 June 2023

Cite this:
Hoffman M *et al.* (2023)
International Journal of Wildland Fire
doi:10.1071/WF22076

© 2023 The Author(s) (or their employer(s)). Published by CSIRO Publishing on behalf of IAWF. This is an open access article distributed under the Creative Commons Attribution-NonCommercial 4.0 International License (CC BY-NC)

OPEN ACCESS

Introduction

Wildland fire suppression is an arduous activity posing significant work hazards such as heat stress (West *et al.* 2020), smoke exposure (Semmens *et al.* 2021) and orthopedic injuries (Moody *et al.* 2019), and illnesses such as camp crud (Rapid Lesson Sharing 2017) and COVID-19 (Belval *et al.* 2022). Wildland fire epidemiological injury and illness data are somewhat limited and the most commonly cited study on the subject reports only injuries and illnesses significant enough to generate worker's compensation claims (Britton *et al.* 2013*a*), likely resulting in under-reporting of events. With the potential catastrophic consequences of injury combined with employers' high cost of caring for occupational injuries (Thrift and von Winterfeldt 2021) and the significant threat of time lost working on the fireline, it is imperative that the wildland firefighter (WLFF) has access to high quality medical care and is comfortable seeking services when needed. During most state and federal wildfires, medical services are arranged by the fire's management team according to guidelines provided by the National Wildfire Coordination Group (NWCG) (NWCG 2010).

Medical providers are available on the fireline and in fire camps, which range in size from hundreds to thousands of personnel, to provide medical services to incident staff. In larger camps, the medical unit can sometimes exceed 50 emergency medical providers at the Emergency Medical Technician (EMT) or paramedic level (NWCG 2010). The providers are a combination of employees from the federal agencies and private contract companies who specialise in Emergency Medical Services (EMS) in remote environments.

While medical services are provided on fire incidents, it is not well understood how WLFFs utilise these services or if there are potential barriers that affect them seeking

care. Anecdotal accounts suggest some WLFFs are reluctant to seek care out of a concern of being perceived as weak or possibly being sent off an incident (demobilised or 'demobbed') for a minor medical issue. Both of these reasons for not seeking care are potentially related to the firefighter's level of trust and respect for the providers and may be a barrier to care. There are no published reports ascertaining whether these anecdotes reflect widespread opinions, and if so, whether they have basis in actual practice. If so, steps should be taken to ensure WLFFs have confidence in their medical providers to act in the best interest of all incident personnel. Without an initial exploratory study of this type, the wildland fire community has no evidence to investigate a narrative based on anecdotes and cannot determine whether change is needed, and if so, whether the appropriate change is clarification of existing policies or actual changes in practice. Therefore, the current exploratory study was conducted to examine the WLFFs' attitudes, opinions towards and experiences with the medical services provided while on fire assignments.

Materials and methods

The study was approved by the Oregon State University (OSU) institutional review board for human subjects research. A web-based Qualtrics (Qualtrics, Provo, UT, Seattle, WA) survey was made available to potential participants via email invitation to National Wildfire Suppression Agency (NWSA) member companies and via links posted on several wildland firefighting-related Facebook groups. The NWSA represents more than 300 private companies, most of which are located in the Pacific Northwest. Survey participants were required to be at least 18 years of age and have been employed as a WLFF for at least one season within the past 10 years. For this analysis, respondents had to complete the demographic, employment, and attitudes and beliefs items on the survey. Survey respondents could indicate that they had worked for a government agency, a private contractor, or both. Of note, in 2018, approximately one quarter of the more than 40 000 WLFFs in the US were from private companies (US News 2019). Respondents who indicated they had worked in both settings were excluded from the present analysis to facilitate comparisons.

To our knowledge, no studies have explored WLFF beliefs and attitudes towards medical services provided on the fire line or in camp. The WLFF Attitude and Beliefs about Medical Services (WLFF ABMS) survey consisted of 26 questions and had four sections: (1) demographics and wildland fire experience; (2) history and description of injuries sustained during firefighting; (3) respect and trust toward fire line and fire camp medical personnel; and (4) perceived impact of injury and injury treatment on personal and crew deployment ability. The survey was developed from existing literature focused on WLFF injuries (Britton *et al.* 2013*a*, 2013*b*; Moody *et al.* 2019; Sondag *et al.* 2019) as well as the authors' experiences in wildland medical services provision, and on discussions with both line firefighters and supervisors. Because this was an exploratory survey, we did not conduct traditional scale development activities prior to this pilot study. The WLFF ABMS contained 23 closed-ended questions and three open-ended questions to allow for further explanation or clarification regarding previous injury history and treatment as well as experience with medical services on fire deployments. To assess our primary aims, we analysed those items assessing trust, respect, discouragement to seek medical services and injury impact on deployment (Table 1). These items were assessed on a seven-point ordinal scale, anchored at 'strongly agree' and 'strongly disagree.'

Table 1. Survey items included in the analysis.

At any point during my career as a WLFF, I have been encouraged not to seek the medical services provided on wildfire incidents.
I have witnessed a WLFF being encouraged to avoid the medical services provided on wildfire incidents.
I feel that seeking medical attention from incident medical personnel can potentially affect a crew's demobilisation order.
Private contracting firefighters have the same access to medical services compared with agency crews.
Most WLFFs have a high level of respect for the medical personnel on fires.
Most WLFFs have a high level of trust for the medical personnel on fires.

These are the items pulled from the larger survey that are related to: assessing trust, respect, discouragement to seek medical services and injury impact on deployment.

Data analysis

Descriptive analysis was conducted on responding WLFF demographics, experience and injury history. Data analysis compared responses of firefighters employed by government agencies ('agency firefighters') with those of private contractors ('contract firefighters'). Contingency tables were tested with chi-square tests of independence, examining agency vs contractor responses to items assessing perceived access to care, trust and respect for medical personnel, underreporting of injuries and the potential for injuries to influence crew demobilisation. Because some response categories were seldom endorsed, the original seven-point scale for these items was collapsed to three ordered categories: agree, neither agree nor disagree, disagree.

Results

A total of 177 individuals started the survey. Four failed to indicate consent to take part and were excluded without further review. A further 50 did not complete the required survey items, 31 indicated they had worked for both government agencies and private contractors, and one did not

Table 2. Participant characteristics.

Characteristic	Count	Percentage
Employer		
Government agency	61	67.0
Private contractor	30	33.0
Gender		
Male	73	80.2
Female	18	19.8
Age category		
18–20	3	3.3
21–25	9	9.9
26–30	19	20.9
31–35	12	13.2
36–40	13	14.3
40+	35	38.5
Race/ethnicity		
White	73	80.2
Black	0	0
Hispanic/Latino	7	7.7
American Indian/Alaska Native	3	3.3
Asian	1	1.1
Native Hawaiian/Pacific Islander	0	0
Multiple	4	4.4
Other	3	3.3
Number of fire seasons worked		
1–2	12	13.2
3–4	13	14.3
5–6	7	7.7
7–8	9	9.9
9–10	8	8.8
10+	42	46.2
Injured		
Yes	38	41.8
No	52	57.1

indicate an affiliation. The final analysis dataset included responses from 91 individuals. The majority of respondents were male, white and worked for government agencies; nearly half had worked 10 or more fire seasons, and approximately 40% reported an injury (Table 2).

Access to medical services

The results indicate significant differences in the agreement between respondents regarding perceived access to medical services provided on wildland fires. Agreement with the statement 'private contracting firefighters have the same access to medical services compared with agency crews' was similar across agency and contract firefighters, but disagreement with this statement was much higher among contract firefighters compared with agency firefighters (Table 3, Fig. 1*a*).

Table 3. Statistical results.

	Disagree	Neither	Agree
Access: Private contracting firefighters have the same access to medical services compared with agency crews			
Agency	4/6.6	24/39.3	33/54.1
Private	13/43.3	3/10.0	14/46.7
Chi-square = 20.6, $P < 0.001$			
Trust: Most WLFFs have a high level of trust for the medical personnel on fires			
Agency	7/11.5	6/9.8	48/78.7
Private	4/13.3	2/6.7	24/80.0
Chi-square = 0.292, $P = 0.864$			
Respect: Most WLFF have a high level of respect for the medical personnel on fires			
Agency	8/13.1	8/13.1	45/73.8
Private	3/10.0	1/3.3	26/86.7
Chi-square = 2.5, $P = 0.281$			
Encouraged against: At any point during my career as a WLFF, I have been encouraged not to seek the medical services provided on wildfire incidents			
Agency	44/72.1	4/6.6	13/21.3
Private	11/36.7	4/13.3	15/50.0
Chi-square = 10.6, $P = 0.005$			
Witnessed discouragement: I have witnessed a WLFF being encouraged to avoid the medical services provided on wildfire incidents			
Agency	40/65.6	6/9.8	15/24.6
Private	7/23.3	5/16.7	18/60.0
Chi-square = 14.7, $P = 0.001$			
Affect demobilisation: I feel that seeking medical attention from incident medical personnel can potentially affect a crew's demobilisation order			
Agency	27/44.3	9/14.8	25/41.0
Private	3/10.0	2/6.7	25/83.3
Chi-square = 14.8, $P = 0.001$			

Trust and respect

In response to the constructs of respect and trust for medical personnel, both groups (agency and contract) responded with high levels of agreement, with no significant differences between the groups (Table 3, Fig 1*b*, *c*).

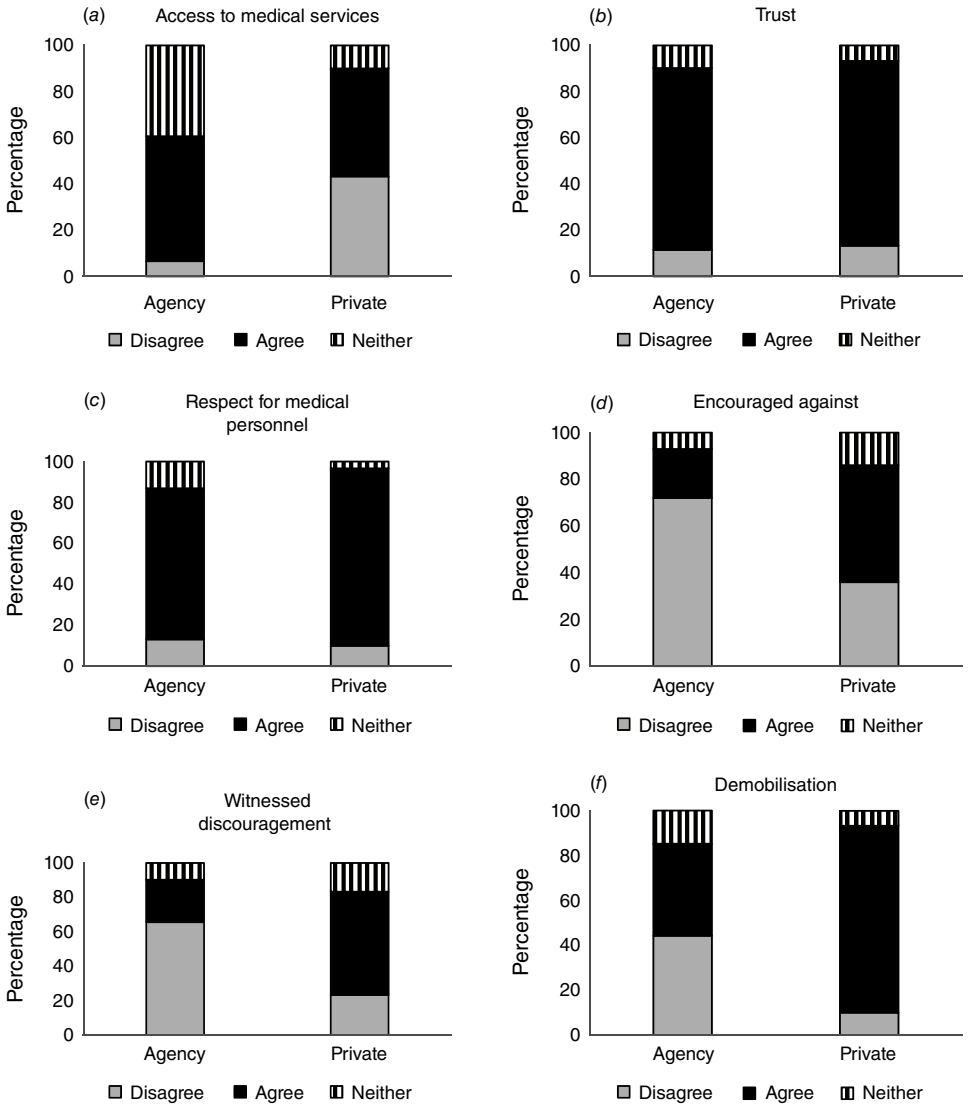

Fig. 1. Comparisons of responses from agency vs private firefighters in the 6 areas of interest (*a*–*f*).

Encouraged not to seek medical services

The responses to the statement 'I have been encouraged not to seek the medical services provided on wildfire incidents' were significantly different between the groups for both 'agree' and 'disagree' (Table 3, Fig. 1*d*). The agency WLFFs showed high levels of disagreement whereas the contract WLFFs showed more agreement.

Witnessed encouraged not to seek medical services

In direct response to whether the firefighter had witnessed others being encouraged not to seek medical assistance, significantly more of the agency WLFFs disagreed with the statement compared with the contract WLFFs, who responded with a higher level of agreement (Table 3, Fig. 1*e*).

Effect on demobilisation

To determine if the groups differed in their feeling toward the potential influence of seeking medical attention on being demobilised from an incident, the participants were asked to respond to the following statement: 'I feel that seeking medical attention from incident medical personnel can potentially affect a crew's demobilisation order'. Contract WLFFs agreed significantly more often than respondents from the agency group (Table 3, Fig. 1*f*).

Discussion

Wildland firefighting is a dangerous occupation that can lead to injuries ranging from minor to serious to fatal (Britton *et al.* 2013*a*). To the extent firefighters perceive that accessing healthcare can jeopardise their income and

careers and that of their team, they may not seek timely care, increasing the potential that a given injury could have long-lasting consequences. The purpose of this exploratory study was to examine the WLFFs' attitudes, opinions towards and experiences with the medical services provided while on fire assignments. The results suggest WLFFs have generally high levels of trust and respect for onsite medical professionals, although there are clear differences between agency and private firefighters in their perceived access to and utilisation of medical services, and in their perceptions of the impact of seeking care on themselves and their crew.

Trust and respect are critical factors in a patient's decision to seek medical attention (Birkhäuer *et al.* 2017). A patient's respect for a provider is linked to their perceived competence of the provider and the attitude the provider displays toward the patient (Gilson *et al.* 2005). This is a particularly important note for providers on wildland fires, as the attitude displayed toward the WLFFs can impact the level of trust and respect the patient has for them (Gilson *et al.* 2005). Given the anecdotal accounts of WLFFs not seeking medical attention owing to concerns of being perceived as weak or out of fear of being demobbed, knowing that in general the WLFFs trust and respect the emergency medical providers is an important finding. Specifically, these findings suggest that if individuals are choosing to not seek medical attention, it is likely unrelated to the firefighter's trust and respect for the medical personnel.

Over the course of the COVID-19 pandemic, a lot of popular press commented on trust in the US medical system. It is important to note that this survey was deployed just prior to the COVID-19 pandemic shut-down and, therefore, the results presented were not directly affected by the pandemic. Regarding trust in the US medical system, evidence from a Gallup poll on the topic indicates that confidence in the US medical system has actually increased as of July 2020 compared with pre-pandemic data (Baker 2020).

Access to community medical services is usually discussed in relation to constructs such as socioeconomic status (Levesque *et al.* 2013), race (Brown *et al.* 2000; Richardson and Norris 2010) and health insurance (Brown *et al.* 2000). However, in the context of wildland firefighting, medical services are provided by a medical unit and are available to everyone assigned to an incident – barriers seen in community settings (e.g. insurance, co-payments, transportation) are absent in the medical unit in the wildland firefighting setting. Consistent with this, the results from this study indicate similar percentages of agency (54.1%) and private (46.7%) firefighters agree that access to care on incidents is the same for both groups. However, when the responses for 'disagree' are considered, there is a much larger and concerning percentage of private firefighters (43.3%) who disagree with this statement compared with agency respondents (6.6%). In practice, private and agency firefighters are on the same incidents, camped in the same locations, with the same physical and administrative access to the medical personnel and facilities; yet, private firefighters report a much larger level of disagreement related to equal access to care. To our knowledge, there are no standing medical unit practices that prescribe differential treatment for agency and private firefighters. Although our data do not explain the perceived differences in access, it is likely that several factors contribute, including not understanding the logistics of receiving care, fear of being demobilised from the incident, uncertainty in payment requirements for treatment and tension between private and agency resources.

It remains unknown why some firefighters report perceived lower levels of access to fire provided medical services and it is likely a complex and multifactorial issue. Future work is needed to determine whether firefighters who report decreased access to medical services feel this was due to their supervisor functioning as a gatekeeper, other firefighters discouraging the use of medical services, or other real or perceived barriers. It is important to understand whether firefighters who report decreased access to medical services provided by the incident are receiving care from other sources such as within their own crew or outside of the fire operation, or are self-treating.

The trends seen in the data regarding discouragement of firefighters to seek medical attention are also troublesome. Of the private firefighters responding to this survey, 50% report they were discouraged from seeking medical attention and 60% report having seen others being discouraged from seeking medical attention. The design of the current survey did not investigate the potential sources of discouragement. One possible contributing factor, although not able to be determined from this study, is the effect of firefighter fear of reprisal or negative consequences for seeking care (TriData 1996). Some firefighters have reported the concern of being demobilised from an incident if medical services are utilised for even minor medical issues. Being demobilised for a medical issue does not ensure that private firefighters will be compensated with paid time off or sick leave as is more common for agency firefighters. Our findings support this concern: 83.3% of the private firefighters perceive that seeking medical attention can impact or result in early demobilisation of their crew. For private firefighters, many of whom are seasonal, being demobilised from an incident can have a significant financial impact and this is magnified if an entire crew is removed from an incident because they can no longer maintain a minimum level of staffing.

If WLFFs are not seeking care for injuries and illness for any reason, it is a concern for the wildland fire community for several reasons, many of which have been discussed. However, a potential hidden consequence for individuals not seeking care is the significant under-counting of injuries and illnesses happening in this environment. Without good injury epidemiological data, it is difficult to gain complete understanding of the problems and develop effective change.

In conclusion, wildland firefighting is a physically demanding profession that places the WLFFs at risk for a variety of injuries and illnesses, and providing adequate

emergency medical services to fire personnel is an integral part of the incident. Prior to this exploratory study, little was understood about how WLFFs perceived the medical personnel on fire. The results indicate that both agency and private WLFFs have high levels of trust and respect for medical personnel working on incidents, whereas private firefighters more often disagree that access to medical services is similar for both agency and private firefighters. This perceived difference in access to medical services is a substantial concern. Furthermore, private firefighters report a concerning higher rate of either being discouraged themselves or witnessing others being discouraged from seeking medical attention despite having similar access to medical services as agency firefighters.

Although this was the initial exploratory attempt to understand some of the constructs around WLFF health and wellness, several limitations must be acknowledged. We were unable to calculate a response rate based on the sampling technique used in this study and acknowledge the sample size is relatively small compared with the thousands of wildland firefighters in the United States. Although the survey was distributed via nationwide social media in order to reach a geographically broad sample, we do not have demographic information sufficient to document the extent to which respondents represent the national wildland firefighter community. Furthermore, a large number of respondents opened but did not complete the survey. Although the survey did not undergo external validation, it was developed by experts, including the study team, who have considerable experience in survey-designed research and are familiar with wildland fire incidents and the related literature. Lastly, it should be noted that individuals other than the patient, such as crew members and supervisors, may influence a WLFF seeking medical care and these factors were not directly assessed in this study.

Further study is imperative to better understand why some WLFFs perceive a lack of access to medical services in fire camp, despite the long-standing policy-driven practice of having similar resources available (NWCG 2012). If there is an element of mis-information that contributes to this perception, information efforts and campaigns may be a useful tool to address the problem. Additionally, it would be helpful to gain insight as to why WLFFs report being discouraged from seeking out medical services while working on a fire. With the rigours of working in wildland fire suppression, it is essential that the health and safety of the WLFF are prioritised and that the WLFFs seek out timely and appropriate care for any injuries or illnesses. Lastly, it would be helpful to understand if WLFFs are seeking out other sources of care or are self-treating their injuries or illnesses to mitigate the perceived risk of demobilisation. Understanding and addressing actual or perceived barriers to wildland fire camp medical care is likely to benefit individual firefighters and their employers, and contribute to incident success.

References

Baker DW (2020) Trust in health care in the time of COVID-19. *JAMA* **324**, 2373–2375. doi:10.1001/jama.2020.23343

Belval EJ, Bayham J, Thompson MP, Dilliott J, Buchwald AG (2022) Modeling the systemic risks of COVID-19 on the wildland firefighting workforce. *Scientific Reports* **12**, 8320. doi:10.1038/s41598-022-12253-x

Birkhäuer J, Gaab J, Kossowsky J, Hasler S, Krummenacher P, Werner C, Gerger H (2017) Trust in the health care professional and health outcome: a meta-analysis. *PLoS One* **12**, e0170988. doi:10.1371/journal.pone.0170988

Britton C, Lynch CF, Ramirez M, Torner J, Buresh C, Peek-Asa C (2013*a*) Epidemiology of injuries to wildland firefighters. *American Journal of Emergency Medicine* **31**, 339–345. doi:10.1016/j.ajem.2012.08.032

Britton C, Lynch CF, Torner J, Peek-Asa C (2013*b*) Fire characteristics associated with firefighter injury on large federal wildland fires. *Annals of Epidemiology* **23**, 37–42. doi:10.1016/j.annepidem.2012.11.001

Brown ER, Ojeda VD, Wyn R, Levan R (2000) 'Racial and Ethnic Disparities in Access to Health Insurance and Health Care.' (UCLA Center for Health Policy Research) Available at https://escholarship.org/uc/item/4sf0p1st

Gilson L, Palmer N, Schneider H (2005) Trust and health worker performance: exploring a conceptual framework using South African evidence. *Social Science & Medicine* **61**, 1418–1429. doi:10.1016/j.socscimed.2004.11.062

Levesque J-F, Harris MF, Russell G (2013) Patient-centred access to health care: conceptualising access at the interface of health systems and populations. *International Journal for Equity in Health* **12**, 18. doi:10.1186/1475-9276-12-18

Moody VJ, Purchio TJ, Palmer CG (2019) Descriptive analysis of injuries and illnesses self-reported by wildland firefighters. *International Journal of Wildland Fire* **28**, 412–419. doi:10.1071/WF18132

NWCG (2010) Interim NWCG Minimum Standards for Medical Units Managed By NWCG Member Agencies. eb-m 10-040a. Available at https://www.nwcg.gov/sites/default/files/memos/eb-m-10-040a.pdf

NWCG (2012) Clinical Treatment Guidelines for Wildland Fire Medical Units. PMS 551. (National Wildlife Coordinating Group) Available at https://www.nwcg.gov/publications/551

Rapid Lesson Sharing (2017) Camp Crud. Available at https://www.wildfirelessons.net/HigherLogic/System/DownloadDocumentFile.ashx?DocumentFileKey=0ece5e7b-a780-dfc6-48e9-fef8aef24130

Richardson LD, Norris M (2010) Access to health and health care: how race and ethnicity matter. *Mount Sinai Journal of Medicine* **77**, 166–177. doi:10.1002/msj.20174

Semmens EO, Leary CS, West MR, Noonan CW, Navarro KM, Domitrovich JW (2021) Carbon monoxide exposures in wildland firefighters in the United States and targets for exposure reduction. *Journal of Exposure Science & Environmental Epidemiology* **31**, 923–929. doi:10.1038/s41370-021-00371-z

Sondag A, Moody V, Mangan A (2019) Examining barriers, motivators and injury related to physical training in wildland firefighters. *International Journal of Wildland Fire* **28**, 678–686. doi:10.1071/WF18134

Thrift SM, von Winterfeldt D (2021) Risk-informed benefit–cost analysis for homeland security R&D: methodology and an application to evaluating the advanced personal protection system for wildland firefighters. *Journal of Benefit-Cost Analysis* **12**, 335–366. doi:10.1017/bca.2020.33

TriData (1996) Wildland Firefighter Safety Awareness Study – TriData Reports. Available at https://www.wildfirelessons.net/viewdocument/wildland-firefighter-safety-awarene

US News (2019) Federal laws mean contract firefighters face the risks but don't get the benefits. Available at https://www.usnews.com/news/national-news/articles/2019-02-19/federal-laws-mean-contract-firefighters-face-the-risks-but-dont-get-the-benefits [verified 15 March 2023]

West MR, Costello S, Sol JA, Domitrovich JW (2020) Risk for heat-related illness among wildland firefighters: job tasks and core body temperature change. *Occupational and Environmental Medicine* **77**, 433–438. doi:10.1136/oemed-2019-106186

Data availability. The data that support this study will be shared on reasonable request to the corresponding author.

Conflicts of interest. The authors declare that they have no conflicts of interest.

Declaration of funding. This research did not receive any specific funding.

Acknowledgements. We would like to thank all of the fire personnel who completed the survey.

Author affiliations

[A]Oregon State University, 226 Langton Hall, Corvallis, OR 97333, USA. Email: zsnauer@gmail.com

[B]University of Montana, 32 Campus Drive McGill Hall 205, Missoula, MT 59812, USA. Email: valerie.moody@umontana.edu, isabella.callis@umconnect.umt.edu

[C]Oregon State University, Milam Hall, Corvallis, OR 97333, USA.