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Sun Safety Knowledge and Practice in UK Postal Delivery Workers**Abstract**

Background: Postal delivery workers spend a large proportion of their work time outdoors, placing them at increased risk for skin cancer. To date, no studies have examined occupational sun safety knowledge and practice within this group in the UK.

Aims: To describe the occupational sun safety knowledge and practice of UK postal delivery workers and to investigate the association of demographic, personal and occupational factors with knowledge and practice in order to identify potential strategies for improving sun safety in this occupational group.

Methods: Postal delivery workers completed a questionnaire that collected data on occupational sun safety knowledge and practice in addition to demographic, personal and workplace characteristics. One-way analysis of variances were applied to assess differences in knowledge and practice by these characteristics.

Results: A total of 1153 postal delivery workers completed the questionnaire, a 60% response rate. Thirty-three per cent reported receiving sun safety training within the previous 12 months. The majority of respondents reported correct knowledge on three of the six domains and good practice on four of the six behavioural domains. However, only one-fifth of respondents reported wearing sunglasses and ensuring a plentiful intake of water. Knowledge and practice differed significantly according to demographic, personal and workplace characteristics.

Conclusions: There is a need to raise the profile of occupational skin cancer in this occupational group and to increase the priority given to occupational sun safety policies alongside targeted and tailored interventions, the effect of which can be evaluated.

Keywords: postal delivery workers, skin cancer, solar ultraviolet radiation, sun safety.

Introduction

Exposure to ultraviolet radiation (UVR) is a primary and avoidable risk factor for both melanoma and non-melanoma skin cancer [1,2]. Postal delivery workers in the USA spend between 4 and 5 h outdoors on work days [3–5], placing them at increased risk of skin cancer attributable to solar UVR exposure. In addition, US postal delivery workers typically fail to protect themselves adequately from solar UVR exposure while working [3–5]. Australian postal delivery workers have been estimated to be at increased risk of 1.1–3.6 for basal cell cancer and 1.2–5.5 for squamous cell cancer due to solar UVR exposure [6].

Postal delivery workers in the UK similarly spend a large portion of their working hours outdoors, placing them at increased risk of solar UVR exposure. However, sun safety research involving postal delivery workers has been conducted exclusively in countries that typically experience more prolonged and intense periods of sunshine than the UK, resulting in little being known about the issue in the UK context. The overarching objective of this study is to initiate a UK-specific strand of postal sector sun safety research concerned with promoting sun safety in this population. The study aimed to profile UK postal delivery workers' occupational sun safety knowledge and practice. This information could serve as a baseline in evaluating the efficacy of sun safety interventions. In addition, we examined whether there are differences in knowledge and practice according to demographic, personal and workplace characteristics. Knowledge in this regard could guide the targeting of modifiable work characteristics and skin cancer prevention interventions.

Methods

The study was conducted among employees of Royal Mail Group (RMG) Limited, the UK's designated universal postal service provider, which employs 143,000

postal delivery workers. The workforce is predominantly male (88%) and ageing, with 40% over the age of 50. Skin cancer (all cause) accounted for 2,971 lost working days between April 2014 and June 2015. A questionnaire was administered in 2014 to 1,927 delegates attending a 2-day 'National Safety Event' conference for postal delivery workers whose role included a health and safety responsibility. Delegates were drawn in equal proportions from the three RMG operational regions: North (Northern Ireland, Scotland, Northern England), East (London, South East England), and West (Wales, South West England). The questionnaire gave details of an identical online version available for 2 weeks post-conference for those preferring to submit responses in this way. Delegates were asked to place completed questionnaires in a sealed postbox provided at the conference. Responses were anonymous. Self-report was deemed an acceptable data collection strategy given the high concordance between postal delivery workers' subjective assessments of their sun safety practices and observational data [7].

Data were collected on demographic, personal and occupational characteristics. Occupational sun safety knowledge was assessed using six items [8] previously applied in UK sun safety research [9,10]. Respondents indicated their agreement with each statement on a dichotomous yes/no scale. For each item, a score of 1 was assigned to correct knowledge and 0 to incorrect knowledge and an overall knowledge score was calculated as the sum of the six items. Use of a set of six sun safety practices previously identified as being among the primary measures typically available to outdoor workers [11] was also assessed, with respondents indicating whether or not they usually applied each practice when working outdoors in the summer. An overall practice score was calculated as the sum of the six items. The knowledge and practice items are shown in Table 1.

Table 1

Sun Safety Knowledge and Practices

	Yes <i>N</i> (%)	No <i>N</i> (%)
<i>Knowledge</i>		
I don't need to wear sunscreen on a cloudy or overcast day	372 (32)	781 (68) ^a
It is important to wear sunglasses to protect the eyes from the sun	1139 (99) ^a	14 (1)
It is important to wear a wide brimmed hat to protect the neck from the sun	490 (43) ^a	663 (57)
Sun exposure is the most important risk factor for skin cancer	1110 (96) ^a	43 (4)
If I apply factor 30 sunscreen I need only apply it once per day	631 (55)	522 (45) ^a
Sun protection is important when working outdoors for less than one hour	378 (33) ^a	775 (67)
<i>Practices</i>		
When working outdoors in the summer I usually...		
Use a shade/cover when working in the sun	979 (85)	174 (15)
Wear long-sleeved loose-fitting tops and trousers	1025 (89)	128 (11)
Wear sunglasses	256 (22)	897 (78)
Use sunscreen	769 (67)	384 (33)
Drink plenty of water	256 (22)	897 (78)
Check the UV index for the day	776 (67)	377 (33)

^a Indicates correct knowledge.

Data were analysed using SPSS version 21. To profile occupational sun safety knowledge and practice, the proportion of participants reporting correct knowledge or good practice was calculated for the sample as a whole. One-way analysis of variances (ANOVAs) with Tukey post hoc tests were applied to examine differences in

knowledge and practice by demographic, personal and occupational characteristics. Ethical approval was granted by a Research Ethics Committee at the University of Nottingham.

Results

A total of 1,153 questionnaires were returned, a 60% response rate. Characteristics of the sample are displayed in Tables 2–4. The majority of respondents were male (64%) and the mean age was 36. The most frequently reported skin types were ‘medium’ (35%) and ‘very pale’ (33%). Respondents were drawn evenly from across geographic regions. Most respondents (96%) had not experienced sunburn lasting a day or more within the last 12 months. Approximately one in five respondents (18%) reported having checked their entire body for signs of skin cancer in the previous 12 months, rising to 55% for checking exposed areas. Respondents reported working outdoors for an average of 5.4 h daily and a minority (33%) reported having received sun safety training within the previous 12 months. The job role of the majority of respondents (55%) was letter carrier.

In relation to occupational sun safety knowledge and practice, Table 1 shows that the majority of respondents reported correct knowledge on three of the six indices, with almost all showing correct awareness of the need for sunglasses and of sun exposure as a key risk factor for skin cancer, with two-thirds correctly reporting the need for sunscreen on a cloudy or overcast day. However, fewer than half of respondents reported correct knowledge about neck protection and the need for repeat administration of sunscreen throughout the day or when working outdoors for <1 h. A similar picture was observed for sun safety practice, with the majority of respondents reporting good practice on four of the six assessed indices. More than four-fifths reported using a shade or cover and wearing long-sleeved loose-fitting tops and trousers

when working outdoors in the summer, while two-thirds reported usually using sunscreen and checking the UV index for the day when working outdoors in the summer. In contrast, just one-fifth of respondents reported wearing sunglasses and drinking plenty of water.

In terms of demographic characteristics (Table 4), males reported better sun safety knowledge and, contrastingly, poorer sun safety practice than females. Younger respondents reported better knowledge and practice than older respondents. Knowledge and practice differed significantly by location with respondents based in the West region reporting significantly better knowledge and practice than those in the other regions. Respondents in the East region reported significantly poorer knowledge than those in the West and poorer practice than the West and North regions.

For personal characteristics (Table 2), knowledge and practice differed by skin type. Respondents identified as being of 'very pale' skin reported significantly better knowledge than the other three skin types but only better practice than those with 'dark' skin. Those in the 'pale' category reported poorer knowledge than 'very pale' respondents, better knowledge than 'dark' respondents, and better practice than those with a 'medium' skin type. Respondents with a 'medium' skin type reported worse knowledge than those with 'very pale' skin but better than those with 'dark' skin, while reporting poorer practice than 'pale' respondents but better than 'dark' respondents. Those with a 'dark' skin type reported significantly poorer knowledge than the other three skin type groups. Respondents who had undergone a full body skin check within the last 12 months reported significantly *poorer* knowledge and *better* practice than those who had not had such a check. Those who had undergone a check of typically exposed areas of skin within the last 12 months reported poorer knowledge than those who had not had such a check.

As regards occupational characteristics (Table 3), a difference in knowledge and practice was reported according to hours worked outdoors. Knowledge among those who typically worked outdoors for 4 h per day was higher than for all other groups. Respondents who worked outdoors for 5 h on a typical day reported better knowledge than those who worked outdoors for 6 h. In general, the more hours that were worked outside the better the sun safety practice; however, those who worked outdoors for 7 h on a typical day reported poorer practice than all other groups. Those who had received sun safety training reported *poorer* knowledge than those who had not, though there was no difference between the groups in terms of practice. Differences were found in knowledge and practice across job roles. Letter carriers showed poorer knowledge and *better* practice than those in other job roles.

Table 2

Personal Characteristics in Relation to Sun Safety Knowledge and Practices

	<i>n</i> (%)	Sun safety knowledge score M (SD)	<i>F</i>	Sun safety practice score M (SD)	<i>F</i>
Personal Characteristics					
Skin type					
Very pale	384 (33)	4.6 (0.96)	220***	3.7 (0.57)***	55***
Pale	108 (10)	3.6 (0.51)		3.9 (0.94)	
Medium	405 (35)	3.7 (0.52)		3.6 (0.92)	
Dark	256 (22)	3.0 (1.02)		3.0 (0.83)	
Sunburn in last 12 months					
Yes	43 (4)	3.8 (0.98)		3.6 (0.85)	
No	1110 (96)	3.8 (1.02)		3.5 (0.86)	
Skin check (entire body, last 12 months)					
Yes	208 (18)	3.4 (1.00)	61***	3.7 (0.72)*	5.6*
No	945 (82)	3.9 (0.99)		3.5 (0.88)	
Skin check (exposed areas, last 12					

months)					
Yes	639 (55)	3.7 (1.01)	12.2**	3.5 (0.84)	NS
No	514 (45)	4.0 (1.02)		3.5 (0.88)	

M, mean; NS, not significant; SD, standard deviation.

* $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$.

Table 3

Occupational Characteristics in Relation to Sun Safety Knowledge and Practices

	N (%)	Sun safety knowledge score M (SD)	F	Sun safety practice score M (SD)	F
Occupational Characteristics					
Hours worked outdoors on a typical day					
4	128 (11)	5.9 (0.30)***	918***	3.3 (0.44)***	40***
5	512 (44)	3.9 (0.35)		3.6 (1.10)	
6	385 (33)	3.0 (0.83)		3.8 (0.42)	
7	128 (11)	3.9 (0.26)		2.9 (0.69)	
Sun safety training received in last 12 months					
Yes	385 (33)	3.6 (.58)***	23.3***	3.5 (0.61)	NS
No	768 (67)	3.9 (1.16)		3.5 (0.96)	
Job role					
Letter carrier (introductory)	638 (55)	3.4 (0.83)***	310***	3.7 (0.98)***	43***
Intermediate	301 (26)	4.8 (1.03)		3.2 (0.44)	
Supervisory	214 (19)	3.9 (0.25)		3.5 (0.74)	

M, mean; NS, not significant; SD, standard deviation.

* $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$.

Table 4

Demographic Characteristics in Relation to Sun Safety Knowledge and Practices

	N (%)	Sun safety knowledge score M (SD)	F	Sun safety practice score M (SD)	F
Demographic Characteristics					

Gender					
Male	733 (64)	4.1 (1.01)***	113***	3.5 (0.80)***	14.9***
Female	420 (36)	3.4 (0.90)		3.7 (0.93)	
Age					
≤39	762 (66)	4.3 (0.80)***	629***	3.7 (0.84)***	90.4***
≥40	391 (34)	3.0 (0.86)		3.2 (0.80)	
Location					
East (London, South East England)	568 (49)	3.5 (0.78)***	130***	3.4 (0.90)***	30.1***
West (Wales, South West England)	294 (26)	4.6 (1.24)		3.8 (0.81)	
North (Northern Ireland, Scotland, Northern England)	291 (25)	3.7 (0.78)		3.6 (0.72)	

M, mean; NS, not significant; SD, standard deviation.

* $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$.

Discussion

In this study among UK postal delivery workers, the majority of respondents reported correct knowledge on three of the six domains and good practice on four of the six domains. Significant differences in knowledge and practice were observed by demographic, personal and workplace characteristics.

Our results confirm those from the USA [3–5] and New Zealand [12,13] in demonstrating considerable room for improvement in postal workers' sun safety knowledge and practice and suggest there is a need for refinement and enforcement of occupational sun safety policies in the sector, supplemented by tailored and targeted interventions to enhance sun safety and able to be evaluated to confirm their impact. US research has shown the sun safety practices of postal delivery workers to be receptive to modification [14], suggesting that comparable interventions in the UK could do

likewise.

Occupational sun safety knowledge in this study differed by demographic and personal characteristics. Such factors are not usually modifiable but knowledge about them can help in targeting interventions at high-risk groups. We recommend that interventions should permit tailored modifications for high-risk groups while being available to the wider workforce. They should avoid excluding certain groups as this risks generating ethical and social problems and could compromise success rates [4]. The emphasis should be on organization-wide interventions that can be administered quickly, efficiently and at low cost to a large number of people. This has been shown to be the case for DVD-based interventions in the UK construction sector [9].

Among the workplace characteristics assessed in this study, providing occupational sun safety training is likely to be most receptive to modification. Notably, one-third of respondents reported having received such training in the previous 12 months, but they reported *poorer* knowledge than those who had not received training. Interestingly, no differences were observed in practice between those who had and had not received training. Research among postal workers in New Zealand similarly found a disconnect between sun safety knowledge and practice leading the authors to conclude that 'educational efforts to change workers' knowledge and attitudes, alone, are unlikely to be sufficient to significantly improve sun-protective behaviours' [13]. The finding that knowledge among those who had received sun safety training was inferior to that reported by those who had not is counterintuitive and further research is required to establish whether this might reflect a lack of standardization in the content of existing training. Overall, these findings point to substantial room for improvement, in terms of availability and content, in the provision of sun safety training for UK postal delivery workers. However, sun safety behaviour is unlikely to undergo wholesale positive

change as a result of training alone; enforcement of occupational sun safety policies, health surveillance and the ready provision of protective products may also be needed.

The high reliance on sunscreen as a protective measure reported in this study is noteworthy given McCool *et al.*'s [12] observation that sunscreen should not represent the first line of UVR defence for outdoor workers, particularly when protective clothing is feasible, and indeed may be implicated as a predictor of melanoma due to its use encouraging over-exposure to UVR. Further research is warranted to explore postal delivery workers' preferences for various sun safety practices with a view to developing and promoting a hierarchy of control measures including the provision of personal protective equipment.

Rates of skin checking for moles or unusual changes were low in this study. Moreover, we consider it would be appropriate for skin health surveillance to be provided for outdoor workers whose role involves solar UVR exposure.

The strengths of this study include the large sample size, high response rate and inclusion of postal delivery workers from throughout the UK. Nevertheless, there were also several limitations: firstly, the questionnaire was administered to a convenience sample of workers with a health and safety responsibility, making it possible that respondents might have better sun safety knowledge and practice than other postal delivery workers. However, all respondents were operational postal delivery workers and almost all received no time off from operational duties for their health and safety role. Furthermore, if the sun safety profile of participants in this study is superior to that of UK postal delivery workers as a whole this would highlight the imperative for action to secure sector-wide improvements.

Data were collected via self-report, leading to possible recall bias or bias towards socially desirable responses. However, previous studies of postal delivery

workers have shown that subjective and objective measures of sun safety behaviour are comparable [7], suggesting that these issues are unlikely to have presented a problem. The item we used to assess sunscreen usage did not identify location of application, only whether or not it was used. Reeder *et al.*'s [13] study of New Zealand postal delivery workers found a discrepancy between reports on the use of sunscreen on the face (26%) and its application to all exposed areas (58%). This might explain why the sun-screen usage rate found in our study (67%) was substantially higher than the rates of 21–25% observed in US studies of postal delivery workers [3,4]. Future studies should separately examine the extent to which sunscreen is applied on each exposed area of the body.

In conclusion, this study provides an important picture of occupational sun safety knowledge and practices in UK postal delivery workers. There is a need to raise the profile of occupational skin cancer among this population and increase the priority given to sun safety policies alongside targeted and tailored interventions subjected to evaluation of their impact.

Key Points

- This study was the first to document occupational sun safety knowledge and practices among UK postal delivery workers.
- Respondents worked outdoors for an average of 5.4 hours per day, a minority had received sun safety training, and there was considerable room for improvement in knowledge and practice.
- There is a need to raise the profile of occupational skin cancer among this population and increase the priority given to occupational sun safety policies alongside targeted and tailored interventions, the success of which is subsequently evaluated.

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