A qualitative exploration of forestry chainsaw operator non-technical skills

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SUMMARY

Non-technical skills are the cognitive, social and personal management skills considered necessary, alongside technical knowledge, for safe and effective work practice. Despite forestry operations, particularly those involving a chainsaw, being extremely high-risk, these skills have not yet been examined in the forestry context. This study used qualitative interviews to explore the non-technical skills relevant to forestry chainsaw operation, with preliminary findings highlighting skills such as situation awareness, task management and decision-making as vital for forestry worker safety.

KEYWORDS

Forestry, non-technical skills, safety

Introduction

Forestry operations can encompass working on steep ground, felling trees, operating a range of forestry machinery (including chainsaws and ATVs), aerial tree work and planting. Due to the range of hazards (such as overhead power lines) present within the forestry environment, and a persistent record of fatalities and injuries each year, forestry is considered a high-risk industry. Much of the research examining forestry work safety has focused on physical causes of error and discomfort (e.g. chainsaw kickback, exposure to noise; Iftime, Dumitrascu & Ciobanu, 2020). However, recent research has begun to explore the cognitive and social factors linked to safe performance. A New Zealand study examining forestry worker safety reported that 70% of reported incidents could be linked to human error, specifically cognitive failures, with 78% of those failures explained through worker fatigue (Hinze et al., 2021). Similarly, a study with US forestry workers highlighted the influence of human factors on worker safety, including the adverse impact of work pressure, and the importance of developing, and maintaining, accurate situation awareness (Newman et al., 2018). These studies suggest the potential importance of non-technical skills (NTS), the social, cognitive and personal management skills considered necessary for safe and effective work performance, within the forestry context, though to date no research has sought to examine these skills (except situation awareness) with forestry workers.

The aim of the current study was to evaluate the non-technical skills necessary for forestry chainsaw operator safety using a qualitative approach based on semi-structured interviews encompassing the critical incident technique.

Method

Participants

Participants (*n*=27) were recruited through a national forestry agency and included managers (n=11), supervisors (n=5), chainsaw operators (n=9), an educator and a business owner.

Interviews

Each semi-structured interview consisted of five sections. The first section asked for demographic details such as job role and level of forestry experience. The next section asked interviewees to detail their job role and usual tasks. The third section involved participants discussing their perception of hazards and causal factors in accidents. The fourth section used the critical incident technique, asking participants to recount an adverse incident they had experienced, in as much detail as possible. The final section featured questions designed to further explore NTS.

Preliminary findings

The interviews have been coded using content analysis, conducted using Word. The current stage of analysis applied a framework of NTS to the text. Both deductive (based on framework) and inductive (allowing for new forestry specific skills to be identified) coding was used (Table 1). The NTS categories found to be relevant to the data include teamwork, communication, leadership, decision-making, situation awareness, task management and cognitive readiness. The codes are currently undergoing a series of checks and edits, which will be followed by a test of inter-rater reliability, then final grouping into NTS categories and associated elements.

Table 1: Selected codes, illustrative quotes and proposed NTS categories.

Quote	Code	Proposed NTS category
'Checking that all the chainsaws that we're going to use are sharp and they're all running properly and everything's, you know, in working order, there's no defects on them'	Personal and equipment preparation	Task management
'The rest of the organisation gets an input and they add local knowledge to the knowledge pool'	Information exchange	Communication
'Sometimes you'll be told that there'll be a single windblown tree and when you get there it can be anything, you know, there could be several trees blown over and from that you now have to assess my escape routes, have to pick the right saw'.	Adaptation	Cognitive readiness
'I discussed with them how I was going to take them down and have them standing in strategic places to watch for… watch for people coming onto the site'.	Coordination	Teamwork

Discussion

Research within a range of high-risk industries including aviation, healthcare and farming has highlighted the importance of NTS for safety, with many industries developing NTS training and assessment programs. The current study presents the first direct investigation of these skills in the forestry context, confirming these skills are important for chainsaw operators. This is the first step towards developing a behavioural taxonomy of NTS for forestry workers, which will in turn enable the production of tailored training and assessment programs for forestry workers.

References

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