checking the checklist

the effect of training on the application and effectiveness of checklist-based risk management

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Research summary

Checking the checklist: the effect of training on the application and effectiveness of checklist-based risk management

IOSH, the Chartered body for safety and health professionals, is committed to evidence-based practice in workplace safety and health. We maintain a Research and Development Fund to support research, lead debate and inspire innovation as part of our work as a 'thought leader' in safety and health.

In this document, you'll find a summary of the independent study we commissioned from researchers at Loughborough University to look at the significance of design features and training in the success of risk assessment checklists.

What's the problem?

Checklist-based risk assessments are widely used – largely because of a demand for straightforward, ready-made and consistent resources to support a workplace risk management programme, combined with the desire to involve employees directly in the process. But the take-up of checklist-based tools doesn't always deliver the best outcomes. For example, some tools are simplistic and generic 'blunt instruments', which can give imprecise results and, importantly, miss the link between risk identification and risk control. Other tools – while more sophisticated – are designed for a specific target group, but routinely taken up by other users who may not have the right skills or experience to apply them appropriately or effectively.

Earlier studies have looked at how effective and reliable checklists are in risk assessments. Until now, very little research has focused on the quality of the actual design of these checklists, or the level and effectiveness of training in how to use them properly, in both the short and longer term.

We commissioned Laurence Clift, Clare Lawton and Martin Maguire from Loughborough University's Design School to investigate the design features behind the most successful checklists, and to explore the impact of training for people using checklists in the risk assessment process. For a checklist to be considered 'successful', it would have to deliver a combination of facilitating users to identity risk factors correctly, and to help them choose the right actions to reduce the effects of those risk factors.

The research team worked with companies in the manufacturing industry and singled out musculoskeletal disorder risks for its evaluation of checklist content, design, use and training – in just one recent year in the UK, more than a million people suffered from a musculoskeletal injury, and associated costs to business were estimated at over £200 million. Checklists are the most common tool used to assess

musculoskeletal disorder risks. Although these risks are now well recognised, research has shown that actions to prevent or reduce them are not often successfully taken. And some studies also suggest that in risk management in general, completing risk assessments and identifying risks is not always followed by effective risk control and reduction measures. The danger is that risk assessment can often be seen as a paper exercise, where findings are dutifully noted but nothing significant happens as a result.

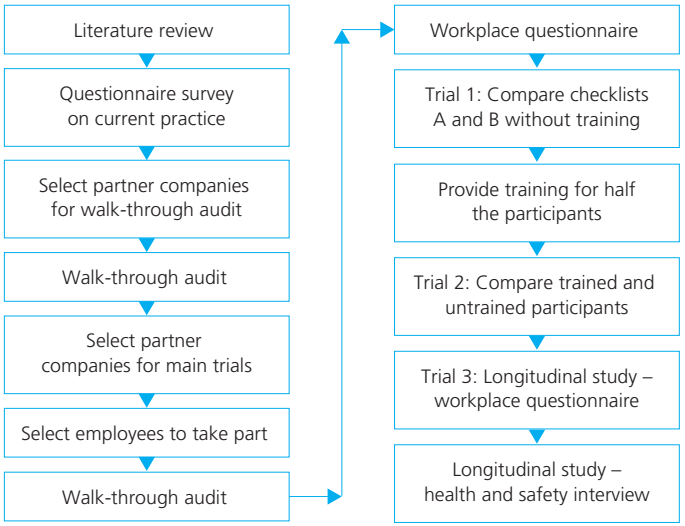
The project aimed to:

- review how companies in the manufacturing industry carry out risk assessment and put in place controls to manage the risks
- evaluate a representative sample of checklist-based risk assessments
- single out the design characteristics of the checklists that prove most effective in risk identification and control
- gauge whether training in how to use the selected 11checklists helps with the risk identification and control process
- assess whether benefits from this training vary for different checklist designs – and, if so, identify the type of checklists that would most benefit from training.

What did our researchers do?

The research project spanned two years, and consisted of five major phases:

- a literature review – this looked at research already carried out into risk assessment, checklist design, risk control implementation, knowledge on checklist-based risk assessment and training, as well as the checklist-based products currently on the market
- survey of musculoskeletal risk assessment practice – the survey involved 88 manufacturing companies in the UK and probed their attitudes and approaches to risk assessment, types of risk assessment process, tools used, risk levels and interventions, what obstacles they faced in risk assessment and how they implemented interventions
- walk-through audits – 15 of the surveyed companies were singled out for these audits, to get a deeper insight into working practices relating to assessing musculoskeletal injury risks
- risk assessment trials – this stage explored how effective different checklist design characteristics and training were in four of the 15 companies involved in the audit phase, concentrating not only on how well risks were identified, but also on the effectiveness of any risk controls subsequently selected. Two different checklist designs for upper limb disorders caused by repetitive activities were tested with a range of users – a 'traffic light' style checklist and a more detailed, analytical one. The effect training had on the process was evaluated by running the trials with and without training
- a longitudinal study into implementing risk reduction measures – the final phase looked at whether training in using the two checklist designs had a lasting effect (six months later), and focused on attitudes, confidence, knowledge, obstacles encountered and any changes to working practices.



Urlings IJM, Nijboer ID and Dul J. A method for changing the attitudes and behaviour of management and employees to stimulate the implementation of ergonomic improvements. Ergonomics 1990; 33 (5). Hendrick H W. Ergonomics in organisational design and management. Ergonomics 1991; 34: 743. Lawton GC and Haslam RA. Organizational issues as obstacles to intervention for musculoskeletal complaints. Contemporary Ergonomics 2000.

Neathey F, Sinclair A, Rick J, Ballard J, Hunt W and Denvir A. An evaluation of the five steps to risk assessment (RR476). Institute for Employment Studies, 2006. Gadd SA, Keeley DM and Balmforth HF. Pitfalls in risk assessment: examples from the UK. Safety Science 2004; 42 (9): 841.

What did our researchers find out?

The findings of the project reveal a complex and correlated picture. The research showed that it is possible to identify good and bad design features in checklist-based risk assessments and therefore optimise future designs to allow better performance. But the researchers found that the most effective features varied according to the worker group. For those organisations that try to involve all workers in the process, this can be problematic. Similarly, the research team confirmed that training can help make risk factor and intervention identification more effective, but the outcome depends on how well it matches trainees' abilities, with particular issues emerging from mixed trainee groups.

More importantly, the project identified a number of other factors as greater obstacles to effective safety management through using these risk assessment tools. The main obstacle, the researchers concluded, was the motivation of participants. Not surprisingly, those who were interested in being part of the safety management process were much more receptive to training and more adept at using the tools, than employees who had been 'drafted in' or were simply taking part as a break from their routine duties. Put simply, some employees either aren't able to contribute effectively – or don't want to do so.

The research team highlighted other barriers that can compromise the effectiveness of checklist-based risk assessments, including:

- language and cultural obstacles
- a lack of commitment (often financial) at executive level
- the need for bespoke resources for different types of employee
- the tendency to rely on risk assessment alone to provide an adequate level of occupational safety.

Other significant issues revealed as part of the project included:

- the diversity of workers and problems associated with making sure that safety information was effectively communicated
- a tendency in some companies to slavishly follow a specific, prescriptive assessment method where few controls existed to make sure that the tool actually achieved the right outcome
- a lack of recognition of the relevant tasks to assess (and better manage), for example, overlooking manual handling tasks featuring repetitive actions
- problems with identifying and implementing interventions once risk factors had been highlighted
- reliance on a limited number of risk assessment tools, many of which were not being used as originally designed
- errors in approach, lack of understanding and practical difficulties when trying to carry out risk assessment processes. Some companies involved in the project assumed that they did not even have an occupational health issue to address, either because of a limited outlook or misguided confidence.

In some of these circumstances – for example, using overly prescriptive and unvalidated tools, applying tools in a way they were not originally designed for, and poor understanding of assessment products – training and better assessment tools would clearly be beneficial.

What did our researchers do?

The study carried out by Loughborough University researchers found that certain features of checklists and training offer benefits in some circumstances – but limitations in others. The team also reported that factors influencing the effectiveness of a risk identification and control programme are highly variable and likely to change over time. This lack of a clear pattern not only makes studying the different elements difficult but also demonstrates that all the conflicting factors associated with the choice, design and application of checklists are unlikely to result in simple solutions being effective. In other words, the wide variability in companies and the people who work for them makes very prescriptive safety solutions unreliable.

The researchers recommend companies be more ready to bring in risk management professionals from outside the business, based on the finding that in-house managers often 'don't know what they don't know'. External, expert involvement should be used in place of the easily accessible, 'endorsed' risk assessment tools that the study has shown to be vehicles for poor judgment, and unreliable and ineffective in many ways.

Companies favouring an all-employee, inclusive approach should instead carefully consider the selection of employees to be involved in checklist-based risk assessments. If, as the project found, some employees are either unwilling to try to use checklists effectively to evaluate risks and suggest control measures, or unable to use and interpret checklists effectively, then checklist outputs will invariably be inadequate. The research team's work suggests that using an ineffective system can deliver poor, potentially harmful results – because of a dangerous presumption that if the process has been followed then inevitably the system outputs must be 'right'. The team therefore advocates putting risk assessment into the hands of a more select group of individuals, allowing checklist content and structure to be tailored far more effectively to this smaller and more appropriately 'qualified' user group – and consequently achieving more accurate, credible and valuable results. The team suggests that continued involvement and engagement of a wider range of employees can be secured through a discussion and observation programme, in place of actually using assessment tools. It also recommended that companies should focus more on achieving better education in the broader principles of safety and risk perception.

While motivation at both board and employee level was found to be a serious issue, the research team also suggested that significant challenges were presented by multinational or multilingual workforces, where conventional approaches are unlikely to work effectively. The study findings support this.

Checklist resources should be tailored to the company, or at least fit its needs as closely as possible. The research team proposes that instead of using readily available and generically approved checklists, that suitably qualified professionals either source or develop materials that match

specific organisation requirements. Training was seen to be effective – but, similarly, only where it was appropriate to the employees' needs. Different worker groups should have training that fits their roles and educational backgrounds, rather than a 'one size fits all' approach. Standard packages were commonly found to be ineffective or unpopular, and the researchers recommend bespoke resources for individual companies.

Risk assessment should be seen as the starting point, not the end of the process. According to the research, even where the right checklist can deliver better risk factor detection, there is still a gap between using a checklist and interpreting it properly, particularly when it comes to selecting control measures and putting them into practice. This isn't just down to practical difficulties, the research team points out, but takes in commercial constraints and conflicts too. Issues around disenfranchisement can inevitably be seen here as a consequence.

Communicating risk assessment findings was seen as a challenge by the study participants, and most companies backed a 'top down' strategy, reflecting board commitment to safety.

The team concludes that identifying and managing workplace risks are not simple processes and the assumption that simple tools and basic training will be enough to achieve an effective result is flawed. Overall, the researchers had serious reservations about how effective a single solution can be in any given company.

Don't forget

The research project had some limitations, resulting from the dependent relationship with the project's industrial partners. These affected the later stages of the study, when efforts focused on a smaller number of companies. Factors such as staff turnover (and mobile and migrant workforces), seasonal changes and work pressures all had an impact on the researchers' attempts to retain consistency and motivation across the study. In a study of this scale, it is difficult to reconcile the demands of a scientifically rigorous research project and the day-to-day demands of a responsive commercial business.

It's recommended that future studies of this kind adopt a more stringent approach to 'selling in' scientific requirements to potential research participants, in an attempt to prevent 'commitment fatigue', as well as stressing the significance of each company partner's contribution to the bigger research picture.

Our summary gives you the major findings of the independent project report by Loughborough University. If you want to read about the study in more depth, you can download the full report at **www.iosh.co.uk/checklistresearch**

Appendix – Good practice in action

The full research report contains a detailed set of guidelines for effective checklist design, based on elements of the two different checklist styles reviewed in this study. The main principles are listed in the table below.

Organisation and layout

1 Page number present
2 Margins wide enough to frame each page
3 Grouping and spacing show structure clearly
4 Text appears spacious
5 Sections in a logical order

Typography

6 ext characters have a height of at least 1.5mm (10-11 point)
7 Few different typefaces and sizes are used
8 Sentence case is used
9 Use of block capital, italics, bold or underlining over several lines of text is avoided
10 Line lengths are all between 35 and 65 characters
11 A ragged right right-hand margin is used

Organisation and layout

12 Colour is used sparingly
13 Colour is used consistently
14 There is good contrast between text and background

Organisation and layout

15 All sentences have fewer than 30 words
16 Wording not overly technical
17 Wording is precise
18 Wording is consistent
19 Unbiased language is used, eg not gender-specific
20 Sentences are easy to understand
21 Availability of multilingual versions

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