Discussion of: The Role of Leading Indicators in the Surveillance of Occupational Health and Safety.

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Abstract
Leading indicators are assessed by collecting information about how the organization is behaving particularly around occupational health and safety. Leading indicators therefore: proceed occupational health and safety outcomes, are a characteristic of the organization, if changed imply occupational health and safety outcomes will change, and implicitly or explicitly incorporate a process of change. The literature in North America has focused on 5 leading indicator concepts: safety culture, safety climate, occupational health and safety management systems, joint health and safety committee and organizational policies and practices. No one metric seems capable of fulfilling all the needs. Thus, there is a need for a broad series of metrics that capture the complexity of organizational and management programs, policies and practices important in predicting injuries, illnesses and work disability outcomes. However key questions remain:

- Many of the questions on these different tools are quite similar, therefore are items in danger of measuring the same construct?
- Which concepts truly predict injuries and illnesses?
- Which questions can be more reliably reported and who is the best in the organization to act as the responder?
- If organizations change do these tools capture the change?
- How do researchers interpret a change in scores using these tools?

Discussion
Consensus was that trailing (lagging) indicators of WC loss data are necessary but not sufficient to rate the effectiveness of OSH programs. For example, focusing on trailing indicators can lead to incentives programs and disciplinary actions that penalize reporting and tend to suppress actual WC rates. Focusing on trailing indicators is limited because it is solely reactive since you are responding to exposures of the past. Also, for small companies, focusing on trailing indicators is not appropriate since most do not have much of a loss experience to focus on. In a similar way, large companies that have been successful in driving down their injury rates need something more to go from "good to great."

Session participants agreed that leading indicators may be useful ("you can't improve a process if you can't measure it"), and focusing on these should be proactive because you can identify system deficiencies that drive future injuries/ illnesses. But the group noted that research in this area has been lacking and that companies do not use leading indicators as much as they should. Most WC research has been done on the claims level – predicting which claims will be the most costly. One participant did question how useful they were, how informative are they? They must present actionable intelligence.

Why are leading indicators not used more by the OSH community? Why has the research not already been done to develop a set of reliable, validated measures developed? The use of leading indicators of one form or another has been increasing. Insurance companies use them every day in assessing exposure/ control for the purpose of risk selection and loss prevention. Many large companies also have developed methods to evaluate the effectiveness of their systems.

But there are reasons why more companies do not use them and research is lacking. First, it is difficult to do and there are many indicators that have been developed but few that have been tested for reliability or validity. Second, the indicators can touch on many levels of the organization and go beyond measuring safety of a task or process. Progress is really a number of small steps forward. For example, how do you measure a concept of "management commitment? Once a measure has been developed, it has to be tested for reliability. Third, there is little evidence for support of leading indicators in terms of their validity and ability to predict injuries/ illnesses. They may well be linked to reduced WC outcomes, but few studies have been designed to show this.

Suggestions for additional research include:

- Define the universe and purpose of indicators
  - Need a more unified field view and a logic model to establish framework for purpose
  - Indicators can range widely across many levels of organization – from Operational- employee, task, job, process, department, site, enterprise to Strategic- organizational policies and procedures, practices, and the value of OSH to the firm; it is difficult to scale data up e.g. translate site level data up to the enterprise level;
  - Exposure vs. control, can measure levels of exposure (e.g. injury potential from cuts, MSD risk factors) or levels of controls in place (safety, ergo, IH)
  - Primary (Safety, ergonomics, industrial hygiene; based on structured safety management systems- OSHA VPP, Z10, AIHA, ISO18001) through secondary/ tertiary prevention (early reporting, disability management)
- Establish reliability of measures- test/ retest; internal consistency of scales; among different types of respondents- employees, employers (safety, management, engineers, production), and external consultants, regulators;
- Establish validity of measures to determine what indicators are linked to increased or decreased injuries/ illnesses or WC outcomes
  - Most prior research has been cross sectional
  - More prospective large sample studies needed to determine how large of a difference in outcomes is significant? Which elements of OSH programs are most important? This again may differ based on company size/ industry. Also, the difference should be sustained (over several years) to be noted as significant not just in one year.
  - Outcome is typically WC measures or other trailing indicators- which we know are not perfect so presents problem of measuring validity against questionable standard;
  - Must control for other variables and match performance of companies in like industries
- Establish usability of measures- SMART- specific, measurable, actionable, realistic, and timely and be able to be used across cultures and resonate globally; there may be sets of core indicators that are useful for companies of all sizes and industries; but most indicator may be dependent on the company size/ level of maturity of OSH program, and industry exposures; also upon purpose- (e.g. employer vs. insurance company, regulators). Just because something is predictive does not mean it contains actionable OSH intelligence.

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