

INSIGHT REPORT

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SOLUTIONS** 
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Seven Leading Indicators to Drive Safety Improvement in Your Organization



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INTRODUCTION

The safety profession has an unhealthy fixation on measuring using purely negative values. OSHA recordable and lost-time injuries spring to mind—both are lagging, and I would suggest, negative indicators. Once they occur, there is nothing that can be done but to investigate and hopefully learn enough to avoid similar incidents in the future. But even these metrics are flawed in that a lack of injuries or incidents does not necessarily equate to a safe workplace. It could be a matter of just being lucky.

For almost 20 years, [Predictive Solutions](#) has helped companies move from “just being lucky”, or in many cases, having not been lucky at all, to saving lives by predicting and preventing workplace injuries. Our safety experts—domain leaders with an average of 20+ years in the industry—help organizations build processes that make safety data easy to collect and act upon, know what to do when risks are predicted, and strengthen and grow safety programs. As a part of their focus on increasing workplace safety, Predictive Solutions has recorded benchmarking metrics involving over 200 different companies, over 61,000 unique observers, over 3.4 million inspections, and over 92 million observations over just the past four years.

Predictive Solutions’ expertise has resonated with organizations who now realize that merely measuring lagging data in the form of incidents and injuries isn’t enough, and who have begun to adopt leading indicators that attempt to show how the safety process is working. The most common indicators are near miss reports and worksite observations. Near misses, however, are simply incidents that did not reach their full potential and rely on a mishap to occur before being observed and reported. In a mature and effective safety process, leading indicators further up the value chain are used including observable inputs such as the behaviors and conditions that would lead to the near miss or incident.

Purpose of Metrics

While safety experts have made a sound case to adopt leading safety indicators instead of relying solely on lagging safety indicators (e.g. injury rates), the reality is that creating and sustaining metrics for leading safety indicators can be daunting for many. While lagging indicators share a universal set of metrics driven by regulatory requirements and are frequently used globally by organizations, leading indicator metrics are varied and are often slow to be developed. As a result, leading indicator metrics are often glacial in adoption, even within a single organization.

As a baseline, a metric is defined as a quantifiable measure that is used to track and assess the status of a specific process. Often a metric is a simple proxy or substitute for a broader and generally more complex process.

When implemented correctly, metrics can provide organizations with the following potential benefits:

- Guide stakeholders on how they are doing and whether they are meeting expectations.
- Indicate where resources need to be proactively focused on the most critical issues.
- Allow for comparisons, either to each other or to an established set of norms, such that deviations or exceptions can be readily spotted.
- Enable organizations to focus on the right things at the right times.
- Create consistent measures within an organization and communicate findings and direction.
- Identify gaps in safety processes and systems.
- Assess leadership and employee engagement.

“**A metric is defined as a quantifiable measure that is used to track and assess the status of a specific process. Often a metric is a simple proxy or substitute for a broader and generally more complex process.**”





Despite the many potential benefits, there are some caveats and rules that must be established in order to utilize metrics effectively:

- Like a goal, a good metric must be S.M.A.R.T. – specific, measurable, achievable, realistic, and timely. Lofty and idealistic aspirations belong in vision statements, not metrics.
- For a metric to work, expectations must be set and clearly communicated. Specifically, criteria are necessary to indicate a “good” range and a “needs improvement” range or set of ranges. Ideally, these ranges have prescribed action items established to drive improvement of the process. This mandates a need to sit down and plan this out by key stakeholders in order to establish clear expectations.
- Metrics are indicators of a process. Management of the process is the focus, not management of the metrics. Gaming of metrics can and will happen when managing to the metric. In this case, you get what you ask for.
- Multiple metrics often provide better insight into a complex process than a single metric.
- Both quantitative and qualitative metrics should be established to ensure high-level KPIs are worthy of consideration. For example, the number of safety inspections is not as valuable without also considering the quality of inspections.
- Collecting metrics is only part of the process. Acting on the information is necessary to drive improvement.



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Which Leading Indicators to Use?

The Predictive Solutions white paper [Predictive Analytics in Workplace Safety: Four Safety Truths that Reduce Workplace Injuries](#) explains a series of leading indicators that allow for the prediction and prevention of injuries.

These leading indicators can be derived from two primary metrics:

- Inspections – a collection of one or more observations
- Observations – a single instance of a behavior or condition (e.g. a worker wearing a hard hat)

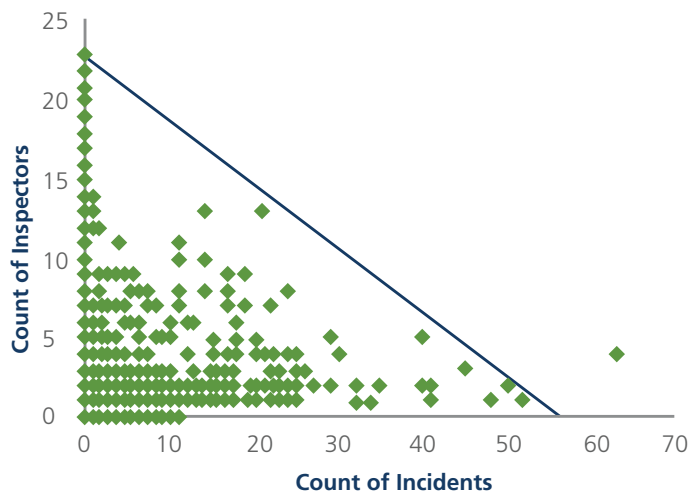
Observations can be determined to be safe or at-risk.

These two primary metrics are the basic building blocks of a more comprehensive safety observation program and concurrently aid in the development of key leading indicators for an organization's measurement of safety. In conjunction with the use of appropriate safety checklists for hazards and processes within an organization, these metrics, along with their derivative components, can help an organization determine 'what is safe' or 'what good looks like'. The following summarizes the correlated findings from the white paper.

SAFETY TRUTH 1

As inspections increase, incidents go down.

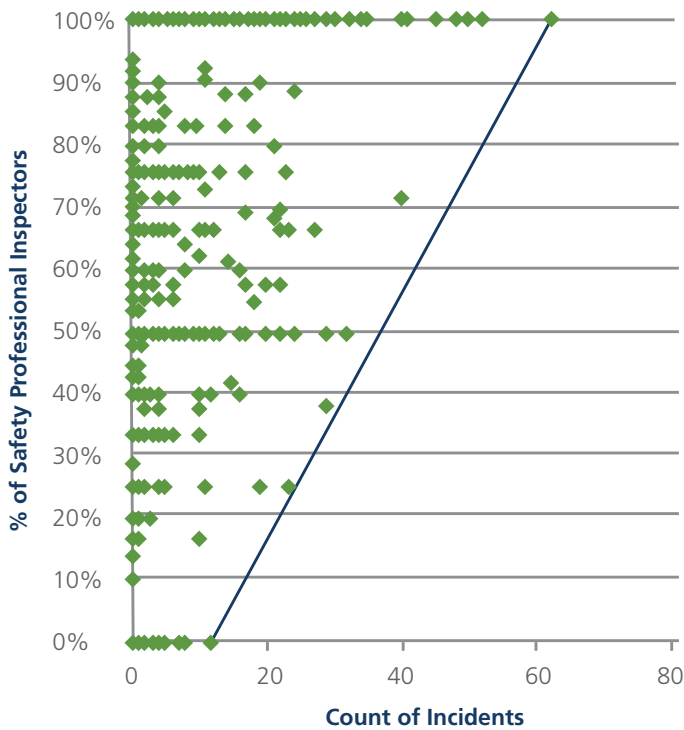
This is the easiest metric to measure and it is important to promote inspection activity. However, doing more inspections alone will solve for nothing. The act of collecting more and more safety inspections, by itself, does very little. That would be like trying to lose weight by standing on the scale more often. It helps to provide information, and is necessary to gain insights, but it is simply the first step.



SAFETY TRUTH 2

The probability of having an incident decreases as the number and diversity of the people performing inspection increases.

Sending the safety team out to conduct more inspections isn't the answer. In order for safety to improve, ownership by the team is essential. This means that everyone in the organization—from leaders to front-line supervisors to workers, has a part to play in identifying hazards, reporting them, and helping to mitigate the risk they pose—both short- and long-term.



SAFETY TRUTH 3

Too many 100% safe inspections are predictive of higher injury rates.

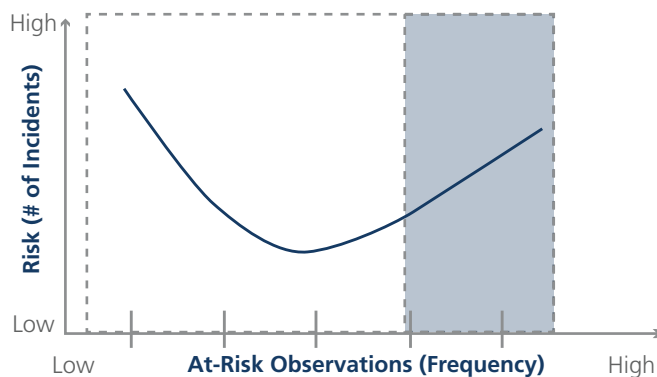
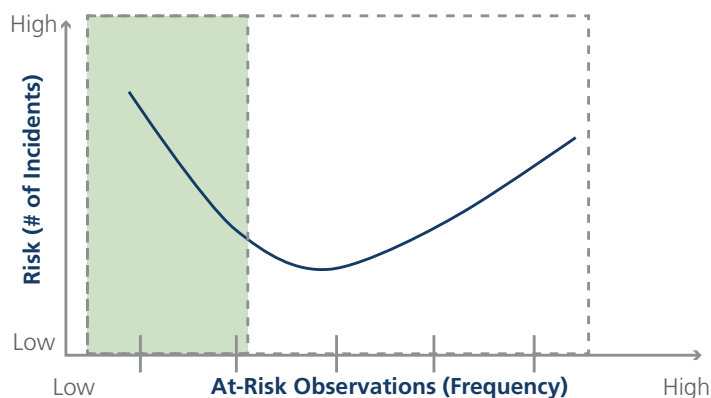
Typically, a high number of inspections with no at-risk findings are seen on worksites with a relatively higher rate of injury. This is a very interesting and potentially counter-intuitive metric. One would think that as safety efforts improve, fewer at-risk findings would be found. However, as long as humans are involved in the process, error will be present. In addition, as one systemic issue is discovered and addressed, another is likely to surface that was virtually unseen before. Another potential issue with reporting

at-risk observations is the negative connotation it can pose to those within an organization. The trick is to instead view this as an opportunity to improve a system or process or task before it leads to an injury. The opportunity to improve should be seen as a gift instead of an accusation or a curse. Finding and addressing at-risk items allows an organization to learn and grow positively, while driving continuous improvement overall.

SAFETY TRUTH 4

Too many at-risk observations are predictive of higher injury rates.

While this metric may seem counter to Safety Truth #3, this is a relative measurement. Finding at-risks is not the problem. Finding the same systemic issue repeatedly can be a problem. As an example, an observation finds someone standing on the top of a ladder during a worksite inspection. As a conscientious person, the observer stops the work and makes it safe. The issue is discussed with the worker and a safe resolution is sought. The problem is averted and the observer moves on. But how many times has this happened? What if the data indicated it happened across the organization many times in the last month? Finding and fixing the issue is a start, but only by addressing the causal factors (why it is happening over and over), will it result in a sustained improvement.





How Metrics Can Be Used to Drive Improvement

Ideally the goal is to develop actionable leading indicators. The action should not be to mandate or influence the metric itself, but to elicit constructive conversations as well as to develop or establish value in the action represented by the metric itself. For example, inspections provide a wealth of leading indicator information from which organizations can derive insight into the differences between work as imagined or expected (e.g. what is defined in a safety and health program) and work as performed (e.g. what occurs in the field). Mandating inspections won't provide more insight if the observers don't find value in the process. Additionally, it is hard to manage risk if it is unknown where the risk resides. At-risk findings can help clarify where the risk is, both real and perceived. Mandating a minimum number of at-risk findings won't solve for a high frequency of 100% safe inspections and/or a low at-risk per inspection metric. Often the issue is cultural in that bad news is not welcome news and no one wants to be the bearer of bad news in an organization that doesn't look at it as an opportunity to improve.

To be clear, simply picking from a list of indicators and measuring the results is a lesson in futility. Metrics and expectations are to be established to determine if a process is in control or effective. The results will indicate where on the spectrum of success your organization lies. From there, action must be taken to adjust the trajectory of the process. The subsequent results then provide insight as to whether the actions proved effective and the trends are tracking in a positive direction.

Benchmarking Universal Metrics

Based on the studies that led to the Four Safety Truths, the resultant metrics have yielded a great 'starter kit' for leading indicators. Additionally, as mentioned in the introduction, benchmarking metrics have been recorded by Predictive Solutions involving over 200 different companies from a variety of industries including construction, oil and gas, utilities, and manufacturing, over 61,000 unique observers, over 3.4 million inspections, and over 92 million observations over just the past four years. For the data behind these metrics, please see Chart 1 at the end of the paper.

1. Inspections

(Count of inspections; traditionally over time)

The fundamental building block of this leading indicator pathway is the collection of worksite safety observations through inspections. All other leading indicators described below are predicated on this activity. These inspections can vary from behavior-based safety (BBS) to compliance to equipment inspections. In addition, inspections can be broad and wide-sweeping or targeted and focused on criteria such as specific tasks, hazards, or areas. The focus of this metric is to measure participation. Inspections can serve as a proxy for employee engagement as well as measure how employees perceive the value of the overall inspection program.

As with any program, established criteria is necessary to communicate clear expectations. Having clear goals helps employees to understand their part in the overall vision of the program. As seen in Safety Truth #2, the diversity of those conducting inspections should be varied and shared across the team. While full-time safety professionals are expected to do more safety inspections, they should not be the only people doing inspections. A typical expectation for observers can be broken down by role:

- Safety – Daily inspections
- Front-line supervision – Twice weekly
- Others – Weekly or bi-weekly

The average number of inspections per week per observer across our dataset is 2.55.



However, this includes a group of inspectors averaging 3-6 inspections per week and another group averaging 0-1 inspections per week. It is important to establish clear roles and responsibilities of each team member before asking them to participate.

2. Observations

(Total count of unique observations)

Inspections are a collection of one or more observations. Observations are specific instances of a behavior or condition. An example would be a worker wearing the proper safety glasses or the condition of an electrical cord. In addition, observations can be determined to be safe or at-risk (e.g. wearing the proper safety glasses or NOT wearing the proper safety glasses). As a best practice, each behavior or condition should be counted separately during an inspection. For example, if ten workers were present in a work area and safety glasses were being observed, each worker's behavior can be documented separately. This methodology aids in measuring the scope of the inspection, the number of unique instances observed, and the ratio of safe versus at-risk findings overall.

The average number of observations per inspection across our dataset is 32.

Most of the observation findings are safe. The details of the ratios of safe and at-risk are shown below. The importance of monitoring this metric includes consistency in approach of observers, ensuring observers are documenting more than at-risk findings, and allows for drill-down into which items on the checklist were or were not observed.

3. Safe Observations

(Total count of safe observations)

Safe observations provide a significant number of advantages to the overall safety inspection process.

- Safe observations allow positive feedback to be employed. The idea is to coach to improve and move away from the safety “cop” mentality of busting workers for safety violations.
- Measuring failures only is inherently flawed. Specifically, if only at-risk findings are collected and safe findings are not, it paints a very incomplete picture. Absence of unsafe observations could just as easily

be attributed to not looking at them at all as opposed to safe work measurement! OSHA has a philosophy: “If it is not documented, it didn’t happen”. Safe observations show proof that something did take place and become a historical marker of what was observed (i.e. item on the checklist), what location the observation took place, and who was observed.

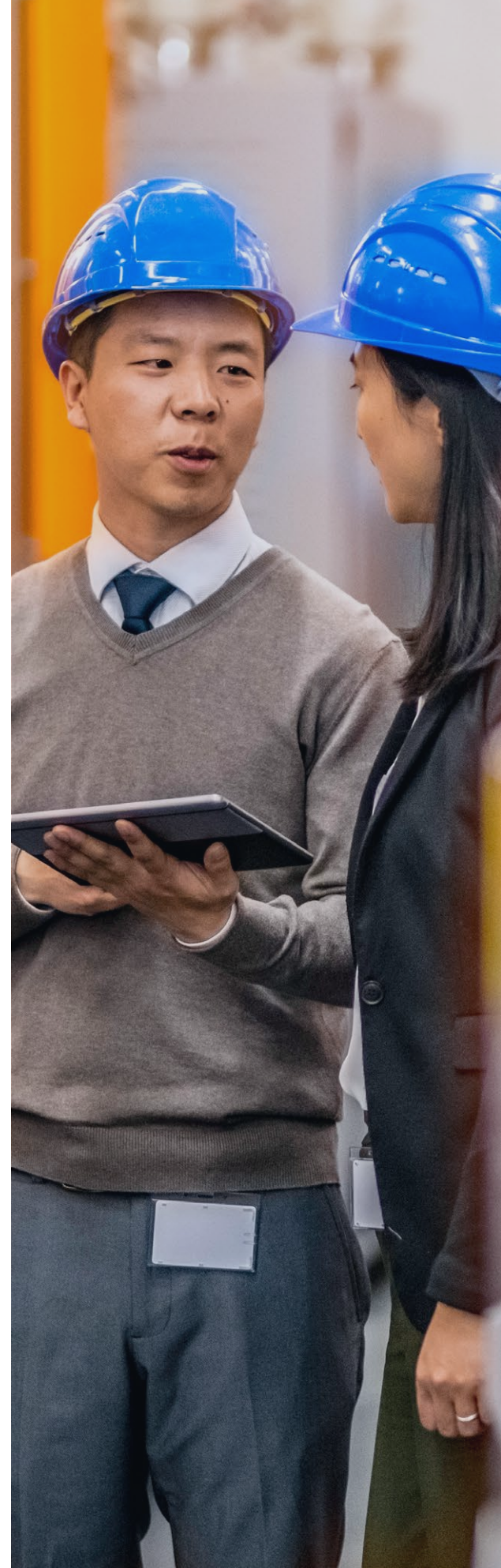
- By using representative sampling, collecting safe and at-risk observations can provide you with a ratio of safe vs. at-risk. For example, would you be more concerned about a ratio of 80% safe in electrical or 80% at-risk/20% safe in electrical?
- By counting a representative amount of safety observations and not just checking a box for the entire project, the context of findings can be determined as well. For example, three unsafe observations for failure to use safety glasses are found. If there were only three workers observed, then this is significant. If 300 other workers were wearing safety glasses, then the gravity of the findings is diminished, allowing focus on more severe findings.
- Only through safe observations can improvement be measured. For example, if a high number of at-risk observations for a certain hazard are found and an action plan was implemented to address it, how would you know if there was improvement? Keep in mind that an absence of unsafe observations could mean nobody is looking. An improved ratio of safe vs. unsafe should support an improvement in the specific safety process that was of concern.

The average number of safe observations per inspection across our dataset is 31.

4. Percent Safe

(Total count of safe observations/total count of all observations)

Total observations per inspections, as noted above, was 32, making the average percent safe 97%. Percent safe, a derivative metric of safe observations, can provide some key benefits but only if properly understood. The following provides more information on how to view and respond to the percent safe metric.



- **Risk Indicator.** When looking at the big picture, it becomes clear that percent safe in and of itself is a poor risk indicator, especially at the single inspection level due to the small sample size. In addition, an inspection is a snapshot in time, often combining dissimilar tasks, hazards, and activities (e.g. Fall Protection plus Housekeeping plus PPE). It is very easy to overreact to the number and make rash statements or decisions which can be damaging to any progress made. Percent safe does what it is designed to do—provide a ratio of safe vs. at-risk findings collected and documented. It is understanding the metric, as well as its limitations, along with the positive actions taken in response to the findings that makes it effective.
- **Long-term trending.** When a statistically significant number of observations are collected with the same or similar theme (e.g. Fall protection category), percent safe can provide a good metric on the efficacy of the safety process. It is a good ‘vectoring’ metric—showing current direction and trajectory.
- **Measure progress.** The percent safe metric can also be used to measure systemic progress. When a process is deemed ‘out of control’ or in need of improvement, then percent safe is a good metric to determine if positive strides are being made. More safe observations should be seen and fewer unsafe observations should be discovered if action is taken to apply controls to the process. The key again is that the data must be closely grouped within a common theme and evaluated for value (e.g. ‘Proper ladder use’ or ‘good condition of electrical cords’).

5. Frequency of All-Safe Inspections

(# 100% safe inspections/total number of inspections; expressed as a %)

Inspections consist of observations that can be either safe or at-risk.

While most observations are safe, as noted above, the finding of at-risk observations should be viewed as a positive experience. The documentation of at-risk findings grants transparency and visibility into risk in the field, allowing proactive action to be taken to prevent injuries. While at first it may seem counterintuitive, a high number of inspections with no at-risk findings is undesired and correlates to higher risk of having injuries. Intuitively it may seem that as worksites improve their safety performance, the number of at-risk findings will diminish. However, the proportion of at-risk findings remains steady as organizations strive to improve their overall safety

performance. If most inspections are returning 100% safe information, there may be other factors at play. Examples include:

- Are observers trained to identify hazards?
- Does the company culture support the reporting of at-risk findings?
- Does feedback after submitting at-risk findings support or hinder future reporting?

Overall, fifty percent (50%) of all inspections submitted in our dataset are 100% safe. While it is understood and expected to conduct focused inspections that yield no at-risk findings, it should be the exception and not the norm. Interestingly, observers either collect at-risk findings or they don't. Broken up by percentiles, with the median at 50%, the upper 75th percentile and higher is at 0% while the lower 25th percentile and lower is at 100%. It is not about the metric, however. The conversation on high frequency all-safe inspections should focus on why.

6. At-Risk Observations

(Total count of at-risk observations)

The purpose of safety observations is to identify work practices and conditions that are at risk of leading to injuries so that proactive steps can be taken to prevent injuries. The observer is comparing expectations of work, as defined in a health and safety plan, to work as performed. The gaps, as identified and documented as at-risk findings, are opportunities to evaluate and improve as necessary. As stated earlier, it is hard to manage risk if it is unknown where the risk resides. Honesty in reporting any deviation from the plan, such as an unsafe hazard, is imperative. But as humans, especially when judged by outcomes (or perceived to be judged), we tend to downplay risks and assure those around us that everything is under control.

The average number of at-risk observations per inspection across our dataset is 1. If blame can be removed so that fear is driven out, it can lead to continual learning and improvement. Additionally, the more detailed the finding, the more learning opportunity it affords. Including pertinent information in a comment section can vastly improve the value of each finding submitted. On average, 77% of all at-risk findings include comments.



7. Severity

(Degree of risk associated with an at-risk observation)

SafetyNet Severity Matrix

		Consequence	
		Low	High
Likelihood	Low	LOW	HIGH
	High	MEDIUM	LIFE THREAT

A risk matrix, such as the one shown above, can be employed by observers in order to classify findings according to their potential level of harm. Low and Medium/Moderate findings are linked to low consequence potential. PPE, Housekeeping items, and minor administrative items are examples of these classifications. High and Life-Threatening observation findings are related to high consequence potential. Examples include falls from heights, electrical exposures, confined spaces, struck by and caught in/between hazards, and work with hazardous materials. On average, about five times as many low and moderate severity unsafe observation findings are recorded compared to high or life-threatening findings. This demonstrates the proclivity to focus on routine low consequence activities over activities that typically lead to significant injuries and fatalities.

On average 50% of all at-risk findings are classified as Medium risk or higher. Whereas, only 10% of all at-risk findings are classified as High or Life-Threatening.

Conclusion

The value in this leading indicator starter kit is that these metrics are relatively universal across industries. While the actual hazards and the approach may vary, the resultant metrics can be compared quite easily across industries, as is done with injury rates. If enough organizations collect this information and share the metrics (not necessarily the specific findings), then benchmarking of leading indicators can begin to take a foothold and aid in guiding better observational approaches and improved data use plans for leading indicator collection.

These are not the ONLY leading indicators available by far. However, they are the most universally utilized across diverse enterprises as well as vetted in a correlation study. As a result, they are the most likely to be collected and ultimately shared across industries for benchmarking.

It is important to remember that it is not the adoption of leading indicators or the collection of leading indicators that leads to improvement; it is the actions taken with the information that determine success. It is less about the metrics and more about the conversations and feedback they elicit. Bear in mind when adopting any leading indicators, to make sure they are actionable. When driving continuous improvement, it is the frequency and quality of the feedback generated from the findings that determine the level of success.

Predictive Solutions specializes in helping organizations to make good decisions about the metrics incorporated into their safety program and provides services to help make them actionable. [Learn more here.](#)

Chart 1: Benchmarking Data

METRIC	AVERAGE	AVERAGE (excluding top 1%)	10TH PERCENTILE	25TH PERCENTILE	MEDIAN	75TH PERCENTILE	90TH PERCENTILE
% Severity - High	0.1069644	0.1069544	0	0	0	0	0.5
% Severity - Medium +	0.50297365	0.50297365	0	0	0.5	1	1
Inspections	2.06789918	2.238854767	1	1	1	3	5
Observations / Inspections	40.3461365	32.30834566	3	9	20.25	44	88.2
Percent All Safe Inspections	0.50318874	0.400240049	0	0	0.5	1	1
Percent Unsafe Observations with Comments	0.76832628	0.768326824	0	0.666666667	1	1	1
Safe Observations / Inspection	39.0541892	31.12396662	2	8	19	43	86.66666667
Unsafe Observations / Inspection	1.29197434	1.041731499	0	0	0.666667	1.619047619	3