WORKtoZERO
an nsc program

Technology Spotlight
PREDICTIVE ANALYTICS

TECHNOLOGY SUMMARY

In workplace safety, predictive analytics uses data analytics, machine learning (ML), and artificial intelligence (AI) to forecast potential safety risks by analyzing historical and real-time data, allowing employers to proactively take action to mitigate these risks before an incident occurs. Barriers to adoption may include high development costs, data security concerns, and the need for human oversight to interpret outputs and address complex, site-specific risks. These challenges can be mitigated by training the platform with accurate, comprehensive data to improve prediction accuracy. Ongoing collaboration with the solutions provider is also essential to address user or employee feedback, refine task learning, and reduce potential biases.

Predictive analytics can monitor workers for musculoskeletal risks and deliver targeted coaching to prevent injuries before they occur.

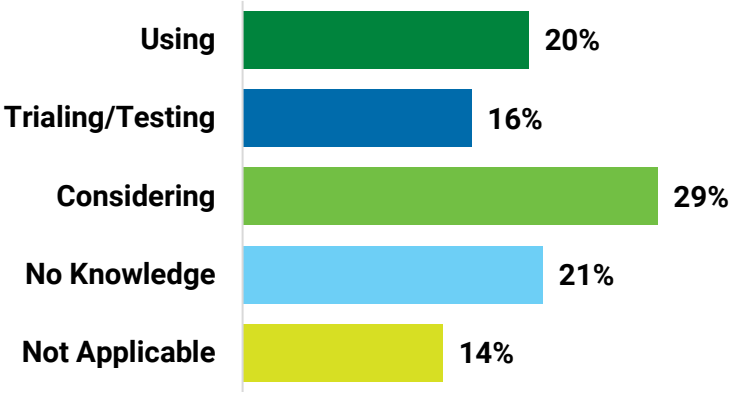
Predictive analytics can analyze trends in near-misses, incident reports, and other data to anticipate safety risks and guide proactive prevention.

Predictive analytics can forecast hazardous conditions such as poor air quality, inclement weather, or extreme temperatures.

SAFETY TECHNOLOGY 2024 SURVEY RESULTS

According to an NSC survey of 500 employers and 1,000 employees in safety-sensitive industries, 20% of employers reported currently using predictive analytics in the workplace, while 45% said they are either testing or considering its use. The highest reported use of the technology came from employees in construction, manufacturing, and agriculture.

Use of Predictive Analytics in the Workplace:



Top Industries Testing or Using:

Construction **(44%)**

Manufacturing **(39%)**

Agriculture **(33%)**

Voices from the Workplace:

"[Predictive analytics] enables faster processing of data to inform and guide on potential safety issues."—*Employer (Manufacturing)*

"[There is] the possibility that the information given to the analytics might be erroneous and could cause us to miss something we should have already been aware of."—*Employer (Retail)*

"[Predictive analytics] helps us predict the probability of a safety incident or a major incident by using our present and past safety statistics as a whole."—*Employee (Utilities)*

"Computers and algorithms fail to consider variables and data quality. Predictive models rely on large, accurate, and relevant datasets to produce accurate predictions."—*Employee (Transportation)*

Benefits of Predictive Analytics

- Predictive analytics can mitigate serious incidents and fatalities (SIFs) by identifying trends in safety data, enabling proactive and targeted interventions.
- Use of predictive analytics facilitates faster decision-making and streamlines manual tasks such as data extraction, cleaning, and contextualization.
- Predictive analytics can drive productivity and cost savings through incident prevention, compliance enhancements, and improved time efficiency.

Considerations for Adoption

- High development costs and variable pricing may limit the use of predictive analytics for small and medium-sized organizations.
- Data privacy and security challenges require robust safeguards and ethical data handling.
- AI and ML may exacerbate biases by amplifying subjective or harmful patterns in training data.
- Human oversight is still necessary to provide broader context to safety challenges and to address complex, site-specific challenges.

BEST PRACTICES

- **Ensure the safety data being used is as accurate, comprehensive, and current as possible** to maximize the accuracy and reliability of AI-driven predictions and recommendations.
- **Combine predictive analytics with human oversight** to validate data outputs and recommendations, identify potential biases in the data, and address more complex, site-specific challenges.
- **Collaborate with your AI solutions provider** to ensure feedback from data outputs, task learning, and potential biases are being incorporated into the algorithm to improve future data analytics.
- **Engage with employees early and often**; if collecting potentially sensitive employee data, clarify how this information will be used to improve safety, use secure data handling practices, and engage often through multiple channels (e.g., feedback sessions, surveys, open discussions).

For more information, see our report Using Data and AI to Gain Safety Program Insights. For additional resources and guidance on adopting safety technologies, explore the Work to Zero *Safety Innovation Journey*.

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Learn More:
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National Safety Council