

ORACLE HEALTH SCIENCES EMPIRICA SIGNAL

KEY FEATURES

- Enhanced, configurable workflow through integration with Oracle Health Sciences Empirica Topics, supporting an efficient end-to-end signal management process
- Support for a full range of statistical techniques for signal detection
- Bayesian Multi-item Gamma Poisson Shrinker 2D and 3D interaction runs
- Enhanced, high-performance logistic regression
- Direct access to safety data through drill-down and case series features
- Interactive reporting with parameter-driven case selection
Options to download data and case details in native XLS, PDF or RTF formats
- Customizable, easy-to-use drug profile view
- Robust, comprehensive online help

KEY BENEFITS

- Identify and monitor safety trends using the same tools used by regulators
- Prioritize and execute critical pharmacovigilance activities
- Employ a variety of classical and Bayesian data mining techniques
- Analyze both drug/event combinations and drug/drug interactions
- Filter out false positives to focus on the most important risks
- Detect problems that may have been overlooked during clinical development
- Gather intelligence on competing drugs' safety profiles
- Maintain a comprehensive history of safety-related topics
- Track signals and manage actions in a regulatory-compliant environment

The Oracle Health Sciences Safety Suite is designed to help companies and regulators manage their pharmacovigilance activities proactively and strategically. Oracle Health Sciences Empirica Signal provides a dynamic, visual data mining environment for detecting signals, uncovering patterns, and recognizing emerging trends in spontaneous adverse event report data. Providing pharmacovigilance professionals with the tools they need to effectively, efficiently and expeditiously manage the review, processing, and response to safety signals, Oracle Health Sciences Empirica Signal eases the process of post-marketing surveillance for pharmaceutical organizations.

Increasing Focus on Product Safety

Ongoing and increasing government and public concern about product safety has heightened the importance of pharmacovigilance activities and highlighted the limitations of traditional methods such as individual case review. Today's zero-tolerance drug safety environment calls for new strategies to proactively identify and expeditiously manage safety risks.

In this highly competitive and risk-averse environment, it's essential for pharmaceutical organizations to establish pharmacovigilance programs that capitalize on the best available information from multiple data sources. They must also use the most advanced set of tools available for developing a thorough and well-understood safety profile.

The Oracle Health Sciences Safety Suite provides a pharmacovigilance and risk management solution that delivers adverse event management, risk management, data mining, signal detection, and signal management capabilities that help companies and regulators identify potential safety problems and manage risk effectively across the full product lifecycle.

With its ability to access both external public and internal proprietary databases, Oracle Health Sciences Empirica Signal:

- Includes configurations and time-stamping capabilities to support analyses in different databases and between different points in time
- Takes advantage of public data sources including the FDA Adverse Event Reporting System (FAERS) and Vaccine Adverse Event Reporting System (VAERS) databases, the VigiBase ADR (adverse drug reaction) database from the WHO Collaborating Center for International Drug Monitoring, as well as proprietary internal databases
- Provides drill-down capabilities to display case details collected in case reporting systems

Signal Management

By combining Oracle Health Sciences Empirica Signal with Oracle Health Sciences Empirica Topics, organizations benefit from an end-to-end Signal Management solution according to industry best practices and recent regulations (CIOMS VIII, GVP Module IX). The Signals tab dashboard functionality lets users integrate quantitative signal detection techniques into their organizations' routine safety reviews. This enables safety reviewers to assess the latest safety information available for all marketed products and understand how signals evolve as data accumulates.

Oracle Health Sciences Safety Suite

Integrated Suite Supporting the End-to-End Pharmacovigilance Process

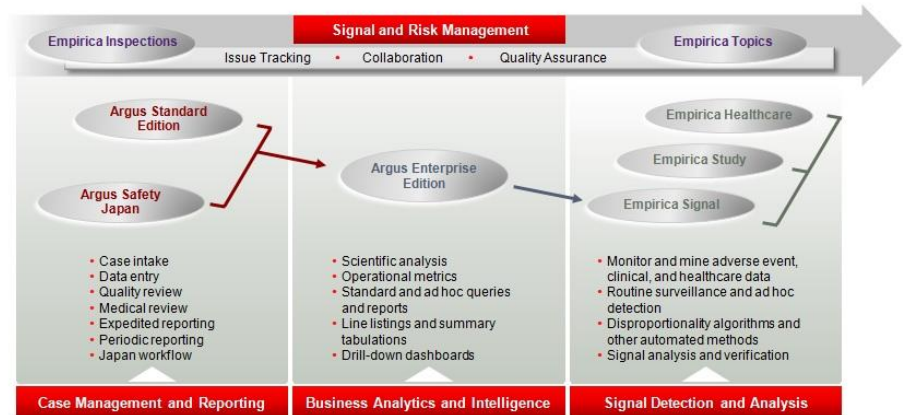


Figure 1. Oracle Health Sciences Empirica Signal is a component of the Oracle Health Sciences Safety Suite designed to help pharmaceutical companies and regulators identify potential safety problems and manage risk effectively across the full product lifecycle.

When combined with Oracle Health Sciences Empirica Topics, the Signals tab in Oracle Health Sciences Empirica Signal provides a workflow-enabled framework for classifying and documenting the output and conclusions of earlier reviews and integrates quantitative signal scores with other relevant drug information such as assessments of listedness, seriousness and other qualitative data to deliver:

- Timely detection of new signals and identification of significant changes in safety profiles
- Structured online assessment, tracking and prioritization tools
- One-click access to a graphical overview of product profiles from the Drug Overview page
- Support of multiple signal review periods for products of different maturity levels
- Flexible reviewer assignments on the drug or signal (event) level
- Configurable views to access data mining and signal detection results, applying tailored criteria, relevant subpopulations, etc. as applicable to the organization's product portfolio
- Enhanced documentation and categorization of review results, extending from the initial comments/annotations of signal triage to full workflow-based tracking through topics
- Maintaining the full review history (audit trail) to manage the evolution of the safety profile and demonstrate compliance
- Support for multiple publishable signal management configurations (system or group level), e.g. when using multiple data sources or supporting different business units

COMPREHENSIVE SERVICES AND SUPPORT

To maximize your investment in Oracle Health Sciences Empirica Signal, you can draw on a range of Oracle services and support.

- Expert consulting: Oracle Health Sciences professionals can help you get the most out of Oracle Health Sciences Empirica Signal
- Data subscription services: Oracle Health Sciences offers subscriptions to FDA FAERS data which has been cleaned and optimized for data mining, including drugs coded with generic and trade names, SMQ support, latest follow-up reports identified, and flags of likely duplicates; other public data subscriptions are also available

Maximizing Resources

Oracle Health Sciences Empirica Signal provides users with trusted, cutting-edge technology for signal detection and management. The system mines drug safety data for signals of adverse events that may be occurring more often than expected in corporate and public databases like FDA FAERS/VAERS or WHO VigiBase. Once identified, signal strength is quantified on a numerical scale and depicted graphically for ease of use and rapid assessment. Changes in signals can be monitored as they develop over time. With Oracle Health Sciences Empirica Signal, sponsors, manufacturers and regulators can adopt a more comprehensive approach to proactively manage risk through strategic pharmacovigilance. As a result, safety professionals can work smarter, not harder.



Figure 2. The Drug Profile display provides a user-configurable view of several key visualizations using current data for products of interest to a safety reviewer.

Uncovering Patterns and Trends

Oracle Health Sciences Empirica Signal detects and quantifies safety signals by using advanced data mining techniques that can be applied to any spontaneous reporting database. Signal strength is derived by looking systematically at all the possible drug-event combinations occurring in adverse event reports. Disproportionality analysis identifies suspect drug-event pairs. Leading pharmaceutical safety groups and regulators (including the FDA and the UK Medicines and Healthcare products Regulatory Agency (MHRA) use data mining technology from Oracle Health Sciences Empirica Signal to identify unexpectedly frequent combinations of drugs and events, and to organize, identify, and analyze patterns in safety data.

Viewing Data Mining Results

Oracle Health Sciences Empirica Signal provides a Drug Profile interface that avoids the complexities of mining while clarifying key safety indicators at a glance, offering a quick and consistent view across users and drugs. Users can review scores in a tabular or graphical format and drill down to underlying case details.

Oracle Health Sciences Empirica Signal’s graphical tools include a robust set of graphs for viewing data mining results including nested confidence interval graphs for 3-D runs, bar graphs for logistic regression (LROR), proportional report ratio (PRR), and reporting odds ratio (ROR) scores. Users can also organize runs, case series, reports, and saved lists into groups. Oracle Health Sciences Empirica Signal supports a variety of statistical algorithms – including the acclaimed Bayesian Multi-item Gamma Poisson Shrinker (MGPS) algorithm created by Dr. William DuMouchel – on post-marketing adverse event report data to produce statistical scores. Detection thresholds are user-defined, allowing a customized balance between the sensitivity and specificity. Whenever these thresholds are exceeded, reviewers are alerted, helping them prioritize or accelerate further analysis. Users can also access logistic regression analysis to isolate the effects of individual drugs in polytherapy situations. Oracle Health Sciences

RELATED PRODUCTS

The Oracle Health Sciences Safety Suite also includes:

- **Oracle Health Sciences Empirica Topics.** Lifecycle signal tracking and resolution.
- **Oracle Health Sciences Empirica Study.** Signal detection in clinical trials data.
- **Oracle Health Sciences Empirica Healthcare.** Signal evaluation in EHR and claims databases.
- **Oracle Argus Standard Edition.** Case capture, processing and reporting.
- **Oracle Argus Enterprise Edition.** Case management with advanced analytics and business intelligence.
- **Oracle Argus Safety Japan.** Case capture, processing and reporting specific to Japan's PMDA requirements.

THE OWNERSHIP EXPERIENCE

Staffed by professionals with extensive pharmaceutical, biotechnology, development, and IT experience, Oracle Health Sciences provides one of the most robust cloud application service offerings in the industry that can scale to the demands of the most complex studies. With Oracle Health Sciences, clients enjoy lifecycle project management, study design and implementation, site and user provisioning, out-of-the-box integrations, hosting and application management, user training, and 24x7 global support. Clients looking to bring applications directly into their enterprise can also leverage Oracle Health Sciences full range of mentoring programs, training offerings and implementation services to transfer knowledge in-house for additional flexibility.

Empirica Signal has been designed for use in a 21 CFR Part 11-compliant environment. Oracle Health Sciences' expert research and development program actively provides continuous enhancements to its cutting-edge signal detection and management tools.

Using Topics to Document Investigations and Actions

The fully integrated tracking functionality in Oracle Health Sciences Empirica Topics allows safety experts to create records of signals and other safety related topics of interest – including those identified outside the Oracle Health Sciences Empirica Signal environment. This feature enables users to collect supporting analyses and documentation using configurable signal management workflow capabilities to direct responses.

Driving Pharmacovigilance Productivity

Oracle Health Sciences Empirica Signal and Topics provide a structured workbench environment where users can assess potential signals – monitoring signals over time, prioritizing work, recording decisions, and routing and tracking actions and responses.

Safety reviewers have direct access to the most current and relevant information about the drugs they are monitoring. The central component of the interface is the Signals tab, where users can view results, sector maps, notes and comments, age group breakdowns, interactions, and topic associations for signal tracking. A key feature of this page is the Signal Status Table (Figure 3), which presents an integrated view of current safety signals with their history and trends, as well as important contextual information such as seriousness and expectedness.

Signal results stored in columns and rows in the Signal Status Table represent drug-event pairs.

Elements include statistics such as EBGM, PRR, ROR, confidence intervals, case counts, and trend data. The highly configurable table includes standard views, options for preferred viewing, and customizable columns that can be adjusted to meet client requirements. Users work with data by filtering results using standard and ad hoc views, visualizing results, and drilling down.

Drug	SOC	Event	Alert	Reince 2012Q4	N 2013Q1	EB05 2013Q1	EB95 2013Q1	Adult	Comment	Topic	Topic
Ibuprofen	Musc	Juvenile idiopathic arthritis	**NEW**	1	27	2.155	1.967				
Ibuprofen	Renal	Renal failure acute	**NEW**	5	249	3.548	2.538	Bring to Meeting	Ibuprofen - Pediatric...	1 - Create	
Ibuprofen	Resp	Throat irritation	**NEW**	3	282	4.926	2.471				
Ibuprofen	SMQ	Oropharyngeal conditions (excl neoplasms, infections and allergies) (SMQ) [narrow]	**NEW**	22	1373	3.017	1.542				
Ibuprofen	SMQ	Oropharyngeal disorders (SMQ) [narrow]	**NEW**	28	1631	2.736	1.509				
Ibuprofen	SMQ	Acute renal failure (SMQ) [narrow]	**NEW**	8	451	2.127	1.696	Bring to Meeting	Ibuprofen - Pediatric...	1 - Create	
Ibuprofen	Skin	Toxic epidermal necrolysis	**NEW**	2	76	2.458	2.059				
Ibuprofen	Skin	Swelling face	**NEW**	5	83	2.442	2.162				

Figure 3. Signal results are stored in columns in the Signal Status Table. Rows in the table represent drug-event pairs. Users can configure this screen to include information of interest and filter the results using a library of standard and ad hoc views.

Contact Us

For more information about Oracle Health Sciences Empirica Signal and Topics, visit oracle.com/healthsciences or call +1.800.ORACLE1 to speak to an Oracle representative.

Oracle is committed to developing practices and products that help protect the environment

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Hardware and Software, Engineered to Work Together