



## Product Description

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MedGuardian is a Web-based patient care monitoring and risk management system for hospitals. It provides automated data collection, reporting and analysis for improving clinical treatments and reducing medical errors. Patient treatment issues such as clinical complications, unexpected outcomes or other medical issues can be monitored and tracked providing continuous, real-time analysis and improvement. Risk events of concern to a hospital, including information about patients, visitors, and employees are also documented and tracked.

MedGuardian's modular design allows for easy integration of existing 3rd party departmental systems. For example, an existing hospital staff credentialing system need not be replaced. Healthnostics' I-Link<sup>sm</sup> Interface tool can simply be integrated into the overall MedGuardian system, tapping the existing staff credentialing system for data and thereby retaining hospital invested value.

The system is designed as a Continuous Quality Improvement (CQI) software system for improving medical outcomes and increasing patient safety. The system captures, integrates and compiles data from all the various departments and many other sources within or outside the hospital, integrates the data with quality and risk management data entered through MedGuardian.

MedGuardian then monitors, tracks and reports on a hospital patient

episode of care from admission to discharge, across all departments in order to improve on the patients care. It does so in real-time as a tactical system to improve care while the patient is still in the hospital. It helps physicians and nurses in hospitals identify the best and up-to-date treatments for patient care, and then use this best practices information to significantly improve patient care methodologies and reduce medical errors and the tragic outcomes associated with them.

This is in contrast to current industry initiatives which seek to improve the quality of patient care in a strategic manner, but that occurs after a patient has been discharged.

This improvement and error reduction process not only dramatically improves patient care, but significantly contributes to lower overall patient treatment costs for a healthcare facility. MedGuardian also maintains strict patient information privacy, so important to healthcare facilities complying with the Healthcare Insurance Portability and Accountability Act (HIPAA).

# System's Architecture

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MedGuardian was originally conceived and written by a large hospital in the Mid-west in the 1990's as a hospital-wide system to collect and report on patient care in order to automate the periodic clinical quality of care reviews conducted by the Joint Commission on the Accreditation of Healthcare Organizations (JCAHO). Over the ensuing years, the system has been expanded and redeployed into the latest technology.

MedGuardian has now made the technological leap to a fully functioning Web browser based system. For hospitals, this means access is afforded through any Internet or Intranet connection using virtually any Web browser, anywhere, with no access limitations. Everyone authorized can gain password access or non-password access in the case of risk event reporting. This is not to be confused with a PC based client-server system that has been simply Web-enabled in order to provide web access.

MedGuardian has been developed using the latest Microsoft ASP.NET architecture and .NET Framework technology. MedGuardian was built on this .NET framework using the latest coding tools and a highly reusable and customizable integrated component design model providing extensive web-based functionality. This places the MedGuardian system in the vanguard of highly productive web-based applications where previously this level of system performance was only available in desktop-based Windows applications.

## Development Tools:

- Database: Microsoft SQL Server 2000
- Reports: Microsoft Reporting Services
- Code: Microsoft Visual.NET (ASP.Net and C#), HTML and JavaScript
- Component Tools: Grids, Combo and Input custom controls

## Compatibility:

MedGuardian has been designed for compatibility with most Web Browsers including the leading web browser engines, Trident (Microsoft Internet Explorer) and Gecko (Fully tested for Mozilla, Firefox and Netscape).

# System Modules

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## System Modules

The modules of the MedGuardian system consist of:

- ***Quality Management***

Quality Management is a hospital patient treatment improvement system. Quality and review information regarding patient treatment is collected by MedGuardian and integrated into patient demographic and clinical treatment information. This creates a consolidated, single access point of patient information for reviewing a patient's continuum of care information. MedGuardian then tracks, reports and evaluates improvement processes regarding patient clinical treatments and medical outcomes, thus helping physicians and nurses in hospitals identify the best and up-to-date treatments for patient care, and then use this best practices information to significantly improve patient care methodologies. It is a product designed to radically improve the way healthcare is applied to patients in a hospital setting.

The system is designed as a Continuous Quality Improvement (CQI) software system for increasing patient safety and improving medical outcomes. MedGuardian also maintains strict patient information privacy, so important to healthcare facilities complying with the Healthcare Insurance Portability and Accountability Act (HIPAA).

- ***Risk Management***

Risk Management captures and documents risk events of concern to a hospital. Medication errors, diagnosis failures, safety errors such as slips and falls, and medical equipment failures can be reduced by capturing and tracking hospital patient, staff or visitor occurrences. The hospital can subsequently identify and implement the steps needed to eliminate a recurrence and thereby reduce risk occurrences and costs. The hospital also can increase the likelihood of successfully adjudicating event incidents prior to them becoming liability insurance claims. This process improvement can have dramatic effects on the delivery of healthcare and provide significant cost savings to the hospital and carriers.

Because MedGuardian is a completely Web-based system, incident

and occurrence reporting is afforded through any Internet or hospital Intranet connection using any Web browser, anywhere. This means no access limitations. Everyone and anyone can gain non-password access to immediately enter incidents into the system to ensure timely review, referral and tracking.

- ***Staff Credentialing***

Staff Credentialing is used to record and maintain credentials, privileges, education, continuing education, committee membership, and other related information for each practitioner. It automates appointment and reappointment processes and maintains online privileges concerning practitioners.

The system is a credentials verification system for hospitals to track data about the practitioner and the provider at a practice for their own uses and for health insurers and managed care organizations.

Credentialing ensures a practitioner has the credentials they claim. This process includes all the activities associated with the primary source verification of the practitioner's history and qualifications. Privileging manages the process of evaluating providers' clinical competence to perform clinical procedures or to treat medical conditions. Practitioner privileges for initial or continuing medical staff membership are based on their education, training, and experience.

Committee memberships and Continuing Medical Education (CME) are tracked for attendance and for meeting internal and external CME requirements. CME credits help maintain a practitioners competency level. Committee attendance is used as part of the reappointment process for a practitioner.

- ***Utilization Management***

Utilization management evaluates and improves the efficiency of medical care. The module provides for tracking and authorizing services across the episode of care. The module includes case history, concurrent review, approved, denied and avoidable days, treatment and findings, referrals, peer reviews, risk factors and discharge assessment.

Utilization allows the documentation of all review requests for utilization management, whether the review is requested from outside institutions, such as insurance companies, or from personnel with the facility. Multiple requests may be entered for the same patient. As

reviews are performed, MedGuardian records review information and tracks all aspects of patient care from pre-certification to discharge. The utilization management process uses individualized worksheets for automatic notification of reviews and follow-up.

- ***Infection Control***

Infection Control records information about specific infections or concerning types of infections. MedGuardian links cultures for ease in trend analysis. The Infection Control Module is linked with the Quality Improvement Module so that patient procedures and infections can be combined to improve tracking. It provides a surveillance, analysis and reporting function for standard and nosocomial infections.

- ***I-LinkSM Integration Engine***

Optionally coupled to the MedGuardian System is the I-Link Integration Engine, a data extraction system designed to collect previously existent patient, practitioner and visitor information contained in any other system within the hospital. I-Link is a system that also has been repeatedly technologically upgraded to increase both functionality and ease of use. This integration engine can extract already existent data from multiple systems simultaneously and feed it into MedGuardian, including pharmaceutical data. The last thing a hospital needs is to re-enter information that has already captured. It also can connect physician EMR practice systems to the hospital for seamless real-time tracking of patients as they traverse from physician office to the hospital and back again.

- ***Reporting***

MedGuardian uses the newest Web-based reporting tool from Microsoft ? Reporting Services. This system allows hospital personnel to access and share information seamlessly for insightful and timely decision making regarding patient care. SQL Server Reporting Services is a comprehensive, server-based solution that enables the creation, management, and delivery of both traditional, paper-oriented reports and interactive, Web-based reports.

Report definitions, folders, and resources are published and managed as a Web service. Managed reports can be executed either on demand or on a specified schedule, and are cached for consistency and performance. Hospital users can use the Management Studio to organize

reports and data sources, schedule report execution and delivery, and track reporting history. It supports both on-demand (pull) and event-based (push) delivery of reports. Users can view reports in a Web-based format or in e-mail. Reporting Services implements a flexible, role-based security model to protect reports and reporting resources.

When Reporting Services is fully deployed it will include Report Builder, a new ad-hoc reporting tool that enables users to create their own reports and explore data. Report Builder incorporates a user-friendly query model that enables users to build reports without deep technical understanding of the underlying data sources.

Hospitals can deploy interactive Web-based reports to deliver information over intranets or extranets of the Internet. Reporting Services isolates report consumers from the complexity of the underlying data sources, while providing personalization and interactivity.

All modules can use Report Services for in-depth reporting and analysis, but hospitals also can optionally use the reporting tool Crystal Reports.

- ***Search Functions***

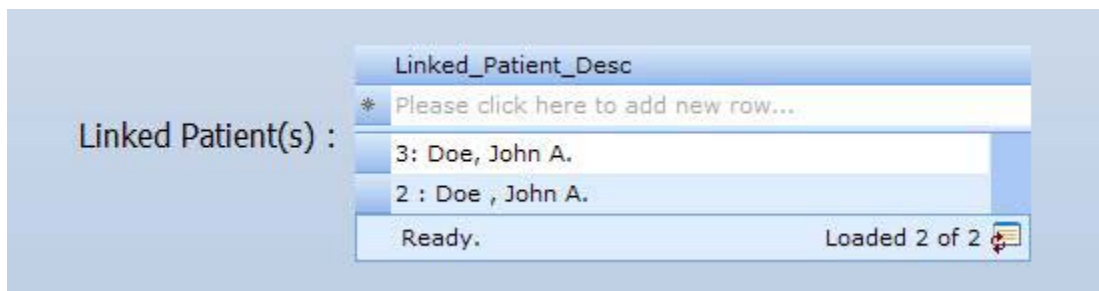
MedGuardian database search functions are provided using Healthnostics proprietary search technologies employing term suggest, find similar and clustering tools. These tools can search structured and unstructured data providing for the incorporation of free-form note fields contained within MedGuardian serving the search, discovery and analysis processes, which augment the reporting function.

# User Interface Components

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## Grids (Linked Patient Sample)

Using grids delivers data in an interactive way utilizing numerous column types. It can display aggregated data, grouped data and filtered data combined also with the ability to export the data to various mediums. A Grid can retrieve the data which is only demanded by the user without having to render once again the whole data. This eliminates the need to interact with the server in order to deliver necessary data. With this feature, MedGuardian database files can be accessed in a more natural, desktop-like application way that improves user productivity.



## Pulldowns (Admit Source Sample)

Pulldowns and calendaring are examples of uses of the Combo Box component tool. This tool, with its sleek style, can deliver data in multiple columns versus the traditional single column mode. Particular data can easily be selected with the built-in filter functionality. A MedGuardian user achieves maximum freedom by selecting multiple records within the Combo Box. Record search can be accomplished with a wildcard or by instantly selecting a record. Minimum interaction between the server and client is maintained by using a postback architecture even though huge data is delivered. With this architecture the user also doesn't wait long for data to show up because the data is delivered in batch mode and retrieved on demand seamlessly, all without rendering again. The data retrieved is displayed without being constrained by the browser window, so the combo-box is floated against any other window.

Admit Source :

Admit Type :

Admit Referral :

Readmit :

Linked Patient(s) : \*

9 of 9 retrieved.

- 1 : Physician Referral
- 2 : Clinic Referral
- 3 : HMO Transfer
- 4 : Hospital Transfer
- 5 : SNF Transfer
- 6 : Other Facility Transfer
- 7 : Emergency Room
- 8 : Court/Law Enforcement
- 9 : Unknown

...  
his view.  
Loaded 0 of 0

### Calendars (Admit Date Sample)

Admit Date :

Admit Time :

Admit Service :

Patient Class :

November 2005

Sun	Mon	Tue	Wed	Thu	Fri	Sat
30	31	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	1	2	3
4	5	6	7	8	9	10

Today is Fri, 11 Nov 2005

Class\_Conversion\_Desc

\* Please click here to add new row...

Patient Class Conversion(s) :

- I/O: Inpatient to Outpatient
- O/I: Outpatient to Inpatient

Ready. Loaded 2 of 2

# Sample Screen

## Initial Patient Admission Screen

The MedGuardian Patient page(s) allows numerous updates and additions to patient data previously extracted from other hospital systems using the Healthnostics I-Link<sup>sm</sup> Interface Engine.

**Admission**

Admit Date :

Admit Time :

Admit Service :

Patient Class :

Patient Class Conversion(s) :

Class_Conversion_Desc
* Please click here to add new row...
O/I: Outpatient to Inpatient
I/O: Inpatient to Outpatient
O/I: Outpatient to Inpatient
I/O: Inpatient to Outpatient
O/I: Outpatient to Inpatient
O/I: Outpatient to Inpatient

Admit Source :

Admit Type :

Admit Referral :

Readmit :

Linked Patient(s) :

Linked_Patient_Desc
* Please click here to add new row...

Admit Reason :

Admit Diagnosis :

# Sample Report

## Sample Report using Microsoft Reporting Services

11 4 | of 1 > > | 100% | Find | Next | Select a format | Export

**Admission**

Admit Date:

Admit Time:

Admit Service:

Patient Class:

Patient Class Conversion(s):

Admit Source:

Admit Type:

Admit Referral:

Readmit:

Linked Patient(s):

Select a format

- Select a format
- HTML with Office Web Components
- Excel
- Web archive
- Acrobat (PDF) file
- TIFF file
- CSV (comma delimited)
- XSL file with report data