


Development and Use of Smart Anesthesia Manager (SAM) – An AIMS Based Real-Time Decision Support Module

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Background

AIMS – Anesthesia Information Management System

- Docusys AIMS - 2007
- Basic goals – improve legibility, accessibility, billing

**AIMS - mainly a DOCUMENTATION system
- limited "intelligence" to improve
quality of care and revenue**

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Opportunity

Creation of AIMS-based module with the ability to:

- Analyze real-time data
- Optimize Return On Investment
- Guide users to:
 - ♦ Improve quality of care
 - ♦ Improve patient safety
 - ♦ Improve revenue capture
 - ♦ Reduce waste and improve efficiency

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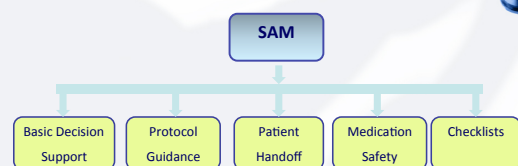
Our solution

The Smart Anesthesia Manager (SAM)

- A near real-time AIMS-based module
 - Decision support & guidance
 - Point of care tools – billing, communication, handoff
 - Barcode technology
- Developed with University of Washington resources
- Installed in 3 hospitals
 - University of Washington Medical Center
 - Harborview Medical Center
 - Ochsner Medical Center

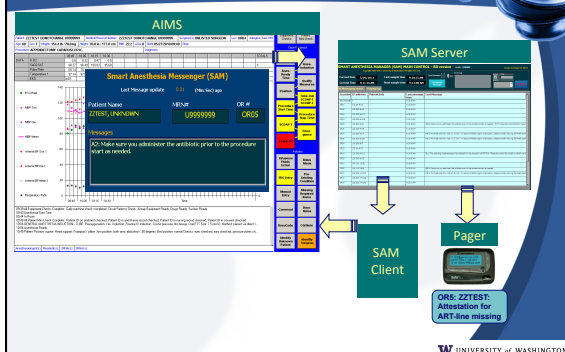
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SAM Decision Support



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Decision Support - How it works



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Rules Builder Engine

- Quick building of complex decision support rules
- Logic function library for medical decision support
- Multi-level logic and recursive rules
- Rule prioritization
- Configurable notification

Build → Parse → Execute → Notify

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Rules Builder Tool

SAPI Rules Builder
Copyright © 2005-2014 SAPI, Inc. All rights reserved. Version 3.0.0.0 (Build 100.0000)

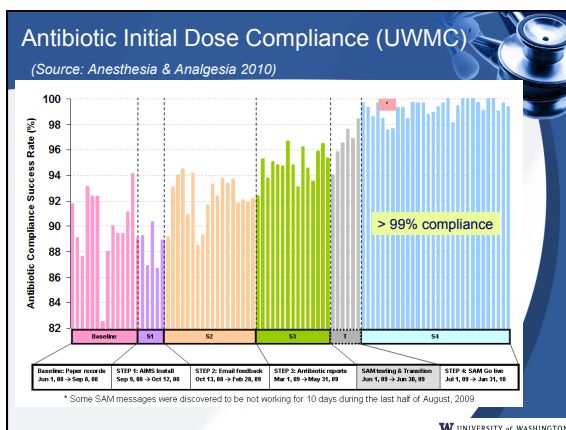
Rule Code	Category	Description	Active	Notification	Frequency
0001	Library	Library of functions to process data	Y	Push	Always
0002	Library	Apply comparison functions → Basic logic parameters	Y	Push	Always
0003	Library	Apply boolean functions → Derived logic parameters	Y	Push	Always
0004	Library	Combine basic derived parameters → Final logic parameter	Y	Push	Always
0005	Library	Final logic parameter triggers a decision rule	Y	Push	Always
0006	Library	Compose message using message functions	Y	Push	Always
0007	Library	Define priority, frequency and mode of notification	Y	Push	Always
0008	Library	Emergency alert notification	Y	Push	Always
0009	Library	Emergency alert notification	Y	Push	Always
0010	Library	Emergency alert notification	Y	Push	Always
0011	Library	Emergency alert notification	Y	Push	Always
0012	Library	Emergency alert notification	Y	Push	Always
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0100	Library	Emergency alert notification	Y	Push	Always

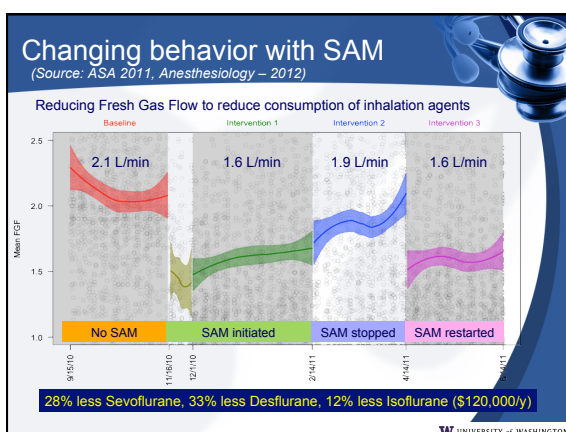
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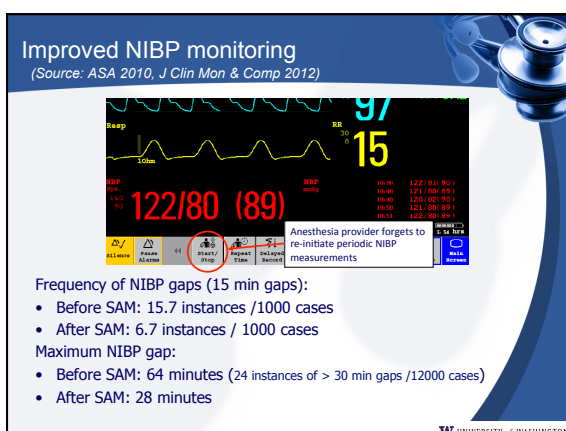
Decision support benefits

- **Quality Measures**
 - Timely antibiotic initial dose
 - Timely antibiotic redoses
 - Improved β -blocker quality measure
- **Patient Safety**
 - Reduced gaps in blood pressure monitoring
 - Better blood pressure management
- **Billing & Compliance**
 - Capture of invasive & special procedures
 - Complete capture of physician attestations
 - Improved documentation compliance and accuracy
- **Efficiency and Waste reduction**
 - Reduced inhalation agent usage

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Improved BP Management

Source: Anesthesia and Analgesia 2014

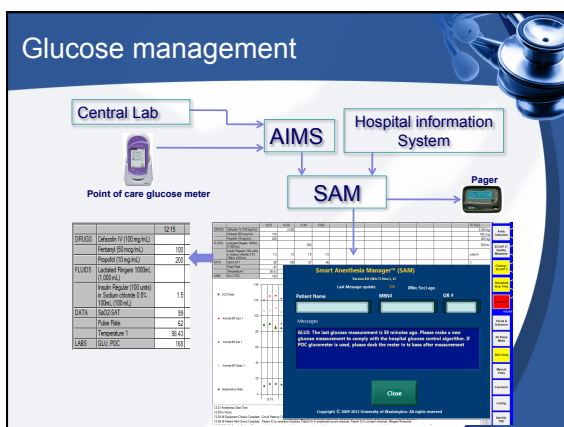
	Before SAM	After SAM
Frequency of hypotension-high anesthetic agent episodes	4.9 instances / 1000 cases	2.3 instances / 1000 cases
Maximum hypotension episode	44 minutes	15 minutes
Frequency of hypertension-phenylephrine infusion episodes	30.3 instances / 1000 cases	21.1 instances / 1000 cases
Maximum hypertension episode	30 minutes	21 minutes

Improvements at UW Medical Center

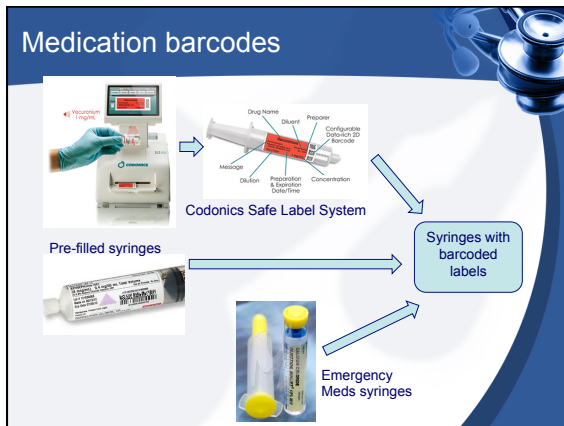
Clinical Care Item	Before SAM	After SAM
Antibiotic initial dose	85%	99%
Antibiotic redose	65%	95%
Beta blocker SCIP measure	62%	97%
Invasive line capture	-	~\$140,000
Additional compliant records	-	~1200/yr
Inhalation agent savings	-	~\$120,000
Gaps (>15min) in blood pressure monitoring	15.7 /1000 cases	6.7 /1000 cases
Blood pressure management: Hypotensive – High MAC	4.9 /1000 cases	2.3 /1000 cases
Hypertensive – Phenylephrine	30.3 /1000 cases	21.1 /1000 cases

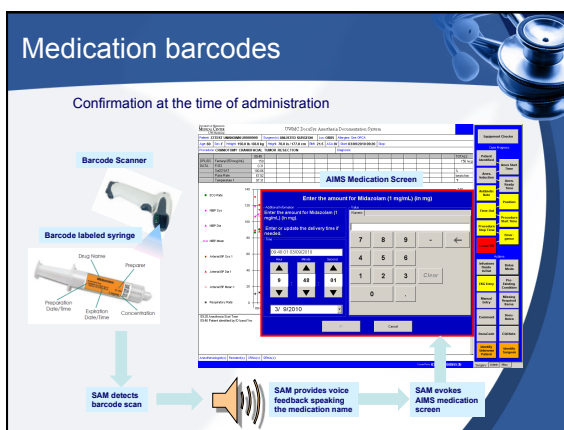
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Glucose management









PIPS checklist (APSF) (in progress)

Pre-anesthetic Induction Patient Safety (PIPS) Checklist

Patient MRN: 12345670

Time completed	Status	Item
07:35	<input checked="" type="checkbox"/>	Suction is working
07:40	<input checked="" type="checkbox"/>	Anesthesia workstation can provide ventilation with 100% oxygen under positive pressure
07:42	<input checked="" type="checkbox"/>	Upper airway status has been evaluated
07:44	<input checked="" type="checkbox"/>	Backup airway devices are immediately available
07:47	<input checked="" type="checkbox"/>	Patient's significant drug allergies and possible drug interactions noted
07:52	<input checked="" type="checkbox"/>	NPO status and aspiration risk confirmed
	<input type="checkbox"/>	Monitors are functioning with appropriate waveforms
	<input type="checkbox"/>	Audible and visual alarms are set appropriately
	<input type="checkbox"/>	Appropriate medications including resuscitation drugs are available
	<input type="checkbox"/>	Intravenous access (if indicated) is appropriate and functioning

Special considerations for this patient confirmed (may include but not limited to):

☐ Increased risk for operating room fire ☐ Increased risk for operating room fire ☐ Increased risk for operating room fire ☐ Other, please type

Close

Lessons learned

- Real-time notification is effective in changing and sustaining provider behavior
- Greater effectiveness if care item/protocol has universal "acceptance" from providers
- Data latency is a severe disadvantage
- Alert fatigue is a concern.
 - Talk with providers, observe behavioral patterns, use data

Current focus / Future directions

Decision Support

- Interface with hospital EMR
- Enhanced library of functions
- Voice prompts
- Model and protocol based decision support

Checklists & guidance

- Framework for building checklist
- Framework for building decision tree
- Navigation and guidance

Glucose management

- Fading memory algorithm
- Continuous glucose monitor trial

Medication/Blood safety

- Barcoding of infusions
- Blood product verification

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Thank you

Interface and database programmer:

Shu-Fang Newman, MS (UWMC)

Clinical Advisors and Collaborators

Decision Support:

Howard A Schwid, MD (UCI)
Gene N Peterson, MD, PhD (VCU)
Andrew Bowdle, MD, PhD (UWMC)
Srdjan Jelacic, MD (UWMC)

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Glucose Management

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Protocol based guidance

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