Analytics 101

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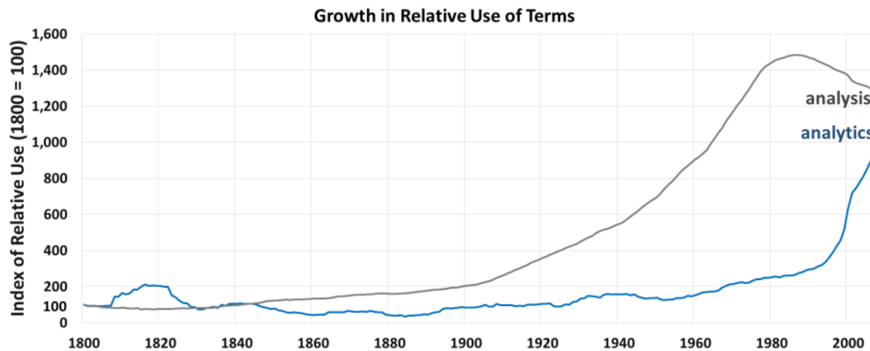
Advancing Healthcare
Improving Health

Objectives

- Define analytics
- Re-define analytics
- Provide basic principles of good analytics practice
- Address barriers to good practice
- Outline steps to establish analytics
- Discuss an example application

What is Analytics?

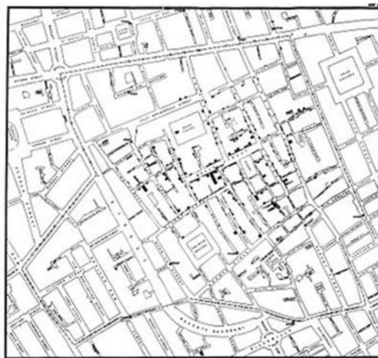
“The systematic computational analysis of data or statistics” (Google)



Analysis vs. Analytics

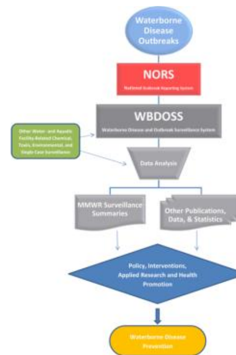
Research and Analysis

Dr. John Snow’s path-breaking Cholera study (ca. 1854)



Analytics

CDC’s Waterborne Disease and Outbreak Surveillance System

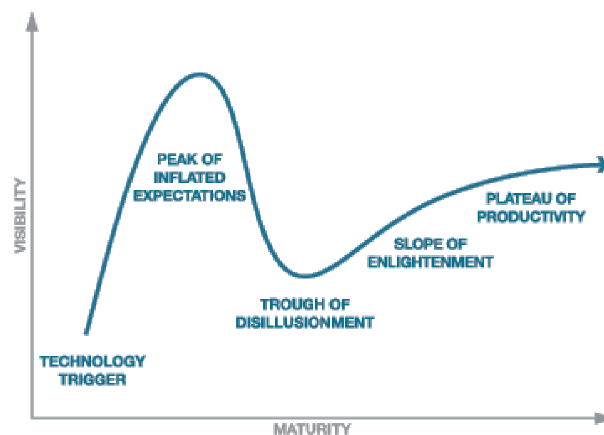


Some Observations

Measurements are usually well-established
"Data gathering" is **not** trivial (especially in health care)
Analysis is mostly automated
Reporting should be concise
Dialog with users is essential

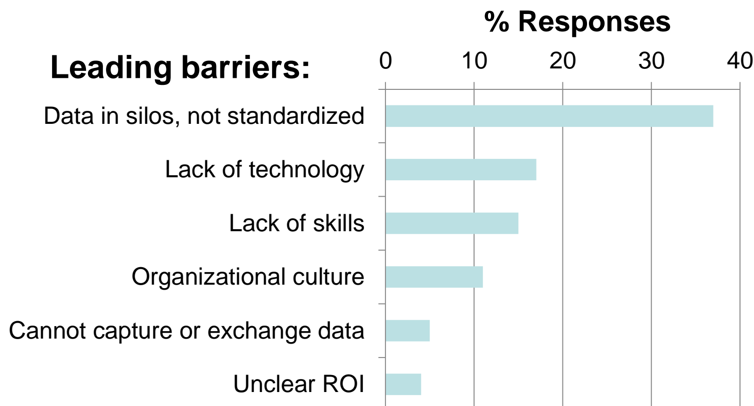
Is Analytics the Silver Bullet?

(Hype Cycle source/credit: Gartner.com)



Barriers to Healthcare Analytics

(KPMG survey of health care leaders)



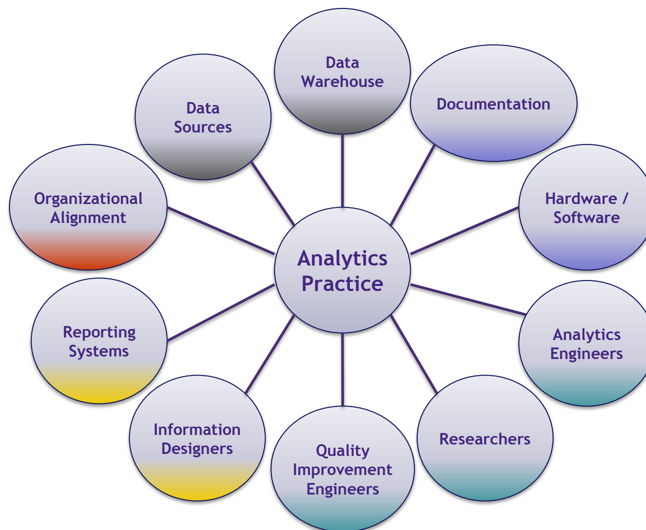
What is Analytics?

"The systematic computational analysis of data or statistics" (Google)

Maybe a better definition would be:

"The positioning and coordination of people, tools, and techniques so that organizations can systematically leverage data assets for discovery, improvement, and innovation"

Facets of Analytics Practice



Versions of Truth >1 ?

Members from the management team need reports for their presentations for the upcoming board meeting. The organization does not have an analytics data warehouse, so analysts must access production databases designed for claims processing (not analytics).

Mary	There is no standard method, so Mary creates a query on the encounters database and builds a report for the Executive Director, who then shares it with the management team.
Peter	The CFO wants more detail, so she asks Peter to add some subgroups that weren't in the original report. The subgroup totals don't sum to Mary's total, so Peter writes his own query, slightly different from Mary's, to get an internally consistent report.
Paul	Meanwhile the new analyst, Paul, creates yet another report for the Quality Director, however, he does not know to exclude inactive records because there are no standards or clear data dictionaries.
= 4	**Resulting versions of "truth"! (3 reports + actual truth)**

Recap

- Analytics is an organizational practice:
  - Decision makers must prioritize analytics
  - Most everyone plays a role (like it or not)
- Top barriers in healthcare analytics:
  - Data quality, availability
  - Organizational alignment
- First steps building analytics practice:
  - Plan ☞ Data model ☞ Manage data

Degrees of Sophistication

(another nice chart from Gartner.com)

Production *versus* Ad Hoc Analytics

- Production analytics is usually automated
  - Focus on standardized measurement
  - Should have quality controls!
- Ad Hoc is semi-automated
  - Focus on exploration
  - Requires a dedicated, documented data warehouse or data marts
  - Need more than just access to data systems

Analytics in Small Organizations

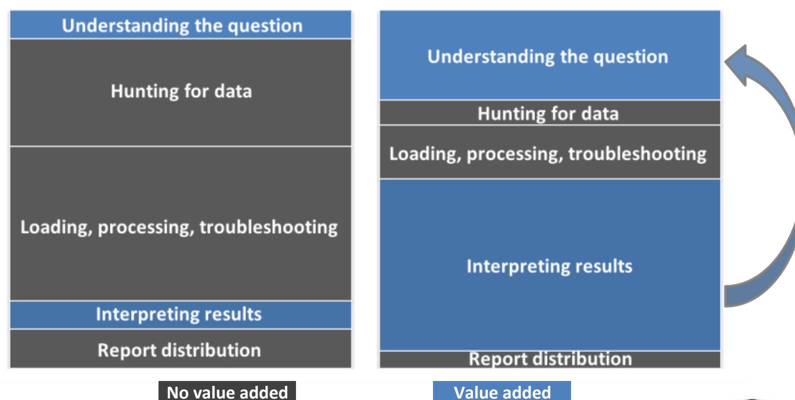
- Technology is only part of analytics
- More important is organizational practice…regardless of size of the organization
- *small data* is as useful as Big Data
  - A practice level EHR could be a useful source of small data – the key is organizing it for easier analysis

Big Data or small data?

- Don't skip your analytics plan and data model
  - Does not have to be complicated
- Data must be:
  - Correct – *must reflect reality*
  - Complete – *"null" values are usually NOT "zeros"*
  - Current – *depends on end use*
  - Consistent – *agreement among sources*
  - Documented – *or else data is nearly useless*
- Data management centrally coordinated
  - Strive for a common version of the truth

Where does your analytics bandwidth go?

Weak analytic practice: Strong analytic practice:



Where Can Analytics Help?

Think of the Triple Aim:

- Improve patient experience
  - Healthcare processes and outcomes
    - Surgical or disease specific improvement; improving satisfaction; improving readmission rates, etc.
- Improve population health
    - Chronic condition management; vaccination rates; nutrition; anti-smoking efforts; use of preventive care services
- Reduce costs through quality
    - Improve efficiency, reduce LOS, staff stability etc.

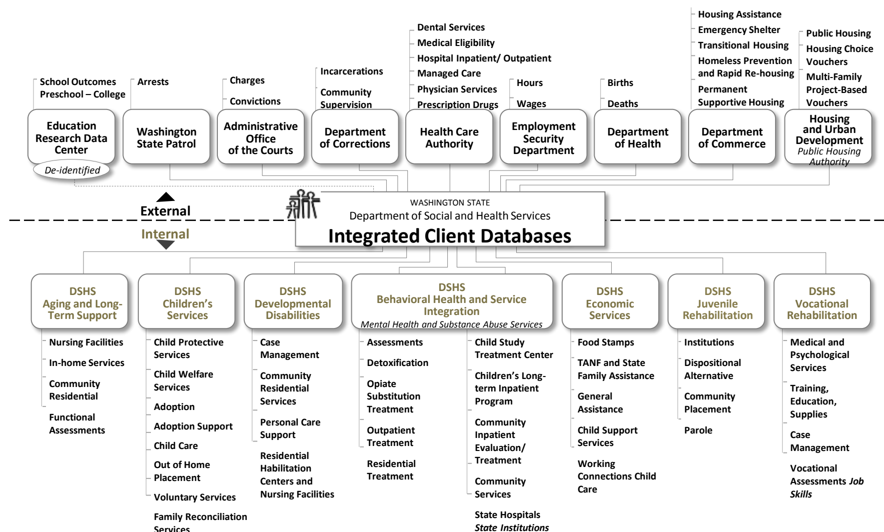
Analytics Use Cases in a Medicaid Environment

- **Program costs are often driven by a small proportion of patients with multiple health conditions,** often exacerbated by mental illness, substance use disorders, cognitive limitations or functional impairments
- **High-cost clients are often served in multiple Medicaid-funded delivery systems** (medical, long-term care, mental health, substance abuse, developmental disabilities)
- **High-cost clients often have significant social support needs** such as the need for housing or employment support, or interventions to reduce the risk of criminal justice involvement
- **Persons dually eligible for Medicare and Medicaid comprise a disproportionate share** of high-risk, high-cost Medicaid beneficiaries

Example Analytics Application: PRISM

- Predictive Risk Intelligence System
- Integrates multiple WA State data sources
  - Sources internal and external to DSHS
- A longitudinal view of Medicaid clients
- Good resource for detailed background research, identification of subgroups

Multiple Data Sources

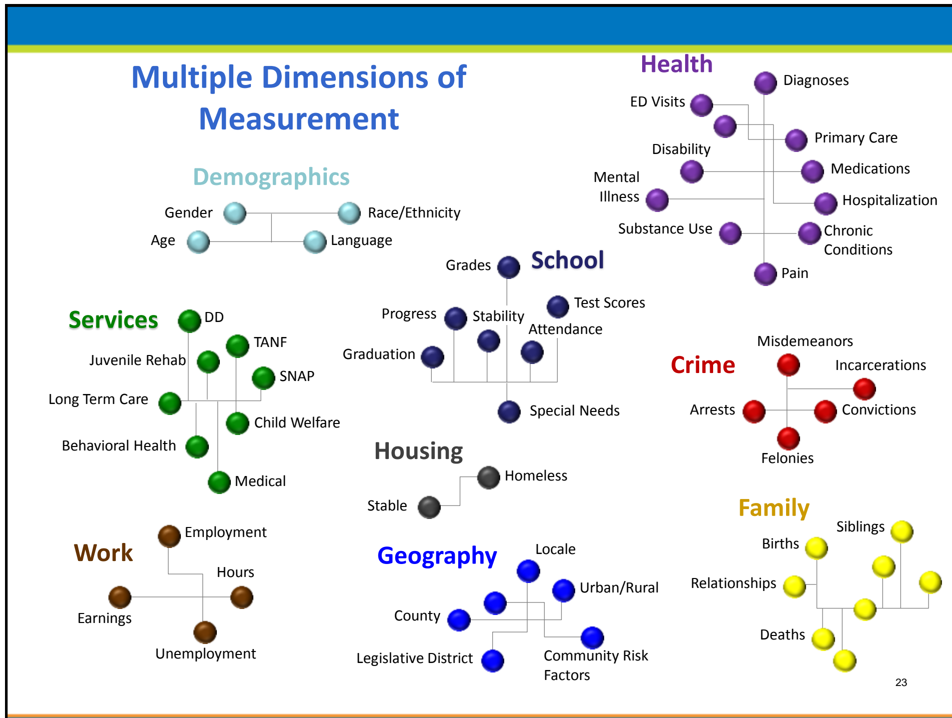


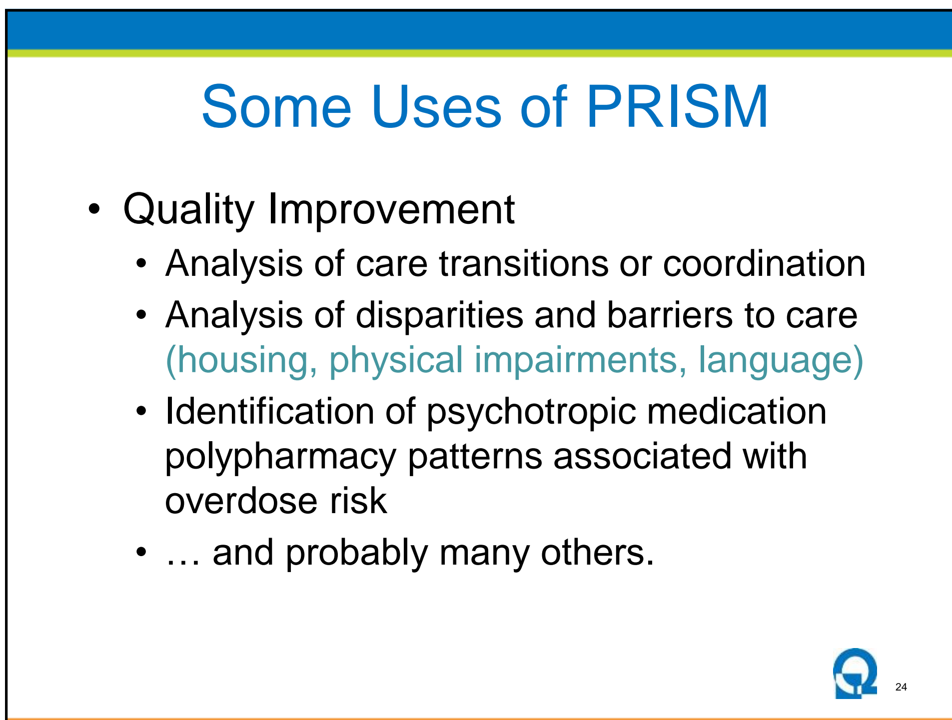
PRISM Data Sources and Features

- Data sources
  - ✓ Medical, mental health and LTSS services from multiple IT systems
  - ✓ Medicare Parts A/B/D data integration for dual eligibles
  - ✓ Long Term Services and Supports functional assessments
  - ✓ Housing status (including some local jail stay data) from the state's eligibility data system
- Data refreshed on a weekly basis for the entire Medicaid population
- Dynamic alignment of patients to health plans and care coordination organizations, with global patient look-up capability for providers
- 1,000 currently authorized users
- 700,000 page views in past 12 months

PRISM Users

- PRISM is used by:
  - ✓ Medical and behavioral health managed care organizations
  - ✓ Area Agencies on Aging
  - ✓ Health Home lead entities and their care coordination networks
- Business associate agreements and PRISM-related contract amendments govern external contracting entity access to PRISM
- PRISM risk score is a key criterion defining eligibility for Health Home services in Medicaid State Plan Amendment
- Medicare integration supports provision of Health Home services for Medicare/Medicaid "dual eligibles"
- Agreement with CMS gives state access to share of Medicare savings if Health Homes reduce Medicare costs


Multiple Dimensions of Measurement
Health
Diagnoses
ED Visits
Primary Care
Disability
Medications
Mental Illness
Hospitalization
Substance Use
Chronic Conditions
Pain
Demographics
Gender
Race/Ethnicity
Age
Language
School
Grades
Test Scores
Progress
Stability
Attendance
Graduation
Special Needs
Services
DD
TANF
Juvenile Rehab
SNAP
Long Term Care
Child Welfare
Behavioral Health
Medical
Crime
Misdemeanors
Incarcerations
Arrests
Convictions
Felonies
Housing
Homeless
Stable
Family
Siblings
Births
Relationships
Deaths
Work
Employment
Hours
Earnings
Unemployment
Geography
Locale
Urban/Rural
County
Legislative District
Community Risk Factors
23

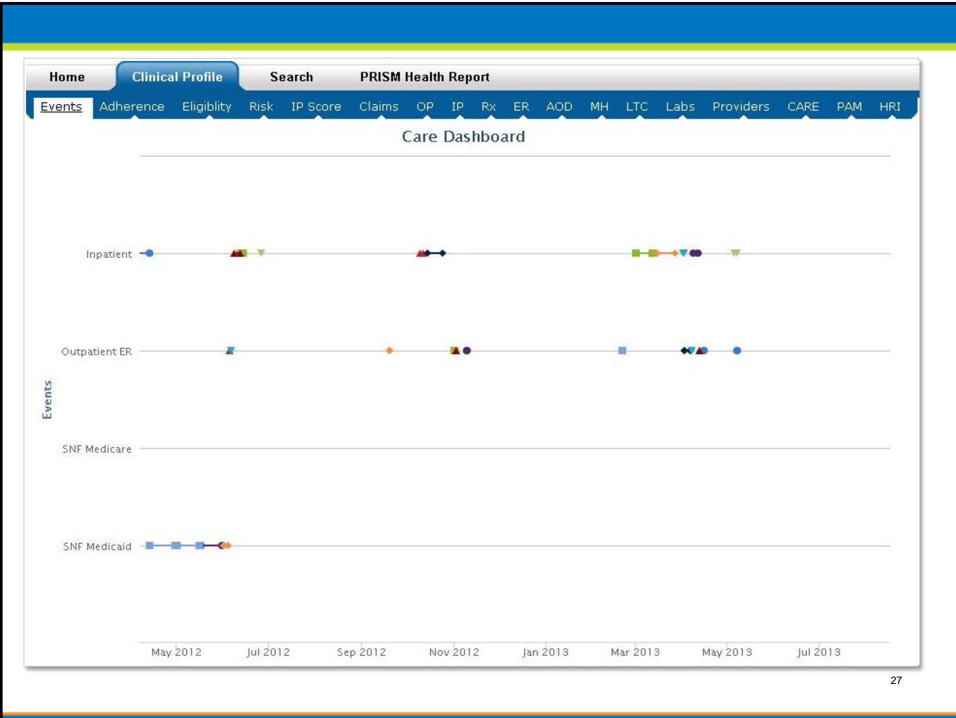

Some Uses of PRISM
• Quality Improvement
• Analysis of care transitions or coordination
• Analysis of disparities and barriers to care (housing, physical impairments, language)
• Identification of psychotropic medication polypharmacy patterns associated with overdose risk
• … and probably many others.
24

More Uses of PRISM

- Identifying Needs
  - Child health risk indicators for high-risk children (mental health crisis, substance abuse, ED use, nutrition or feeding problems)
  - Behavioral health needs (redacting information where required by state or federal law)

Even More Uses of PRISM

- Delivering the right services
  - Triaging high-risk populations to better allocate scarce care management resources
  - Informing care planning and care coordination for clinically and socially complex persons
  - Identification of potential narcotic drug-seeking behavior



Home | Clinical Profile | Search | PRISM Health Report

Events | Adherence | Eligiblity | Risk | IP Score | Claims | OP | IP | Rx | ER | AOD | MH | LTC | Labs | Providers | CARE | PAM | HRI

DEMOGRAPHICS(...)

Name:	Halle Carmine	DOB:	
Gender:		Age:	48
P1 ID (ACES):	(12356789)	Phone:	(999) 123-4567

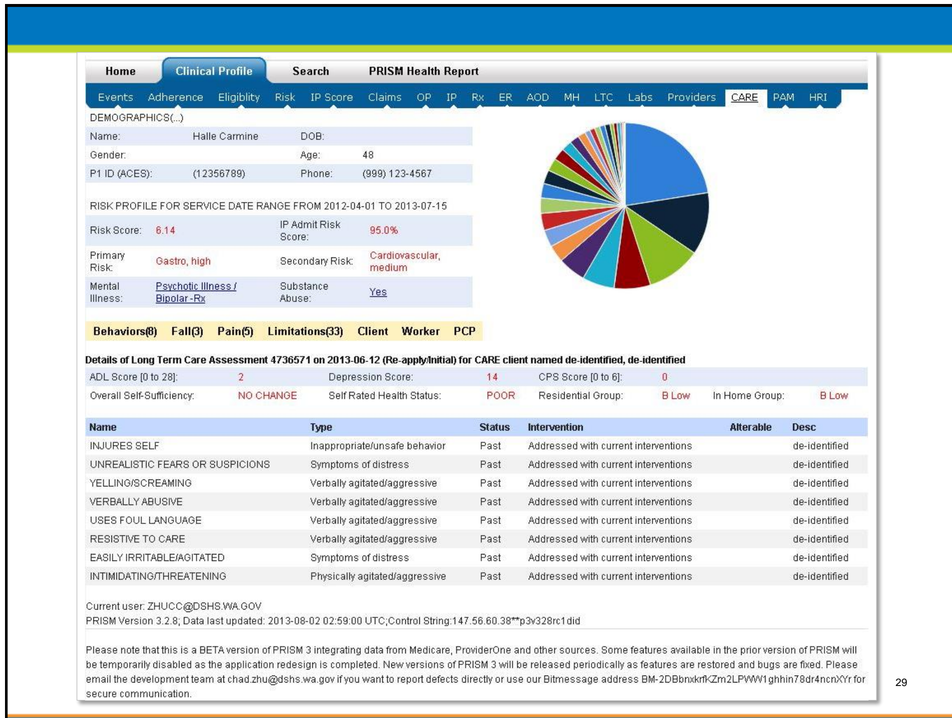
RISK PROFILE FOR SERVICE DATE RANGE FROM 2012-04-01 TO 2013-07-15

Risk Score:	6.14	IP Admit Risk Score:	95.0%
Primary Risk:	Gastro, high	Secondary Risk:	Cardiovascular, medium
Mental Illness:	Psychotic Illness / Bipolar -Rx	Substance Abuse:	Yes

Inpatient

View as PDF

Claim #	Service Start Date	Service End Date	Primary Diagnosis	Reimbursement	ER	Length of Stay	DRG	Billing Provider	Provider	E Codes
918638717	2013-05-05	2013-05-07	GRAND MAL STATUS	$10,287.48	Yes	2 days	532	de-identified		
914787391	2013-04-08	2013-04-11	UNSPECIFIED EPISODIC MOOD DISORDER	$2,835.00	Yes	3 days	430	de-identified	de-identified	
913295776	2013-04-01	2013-04-02	OTHER SPEC ALCOHOL PSYCHOSIS NOS	$1,114.00	Yes	1 days	751	de-identified	de-identified	
911835072	2013-03-15	2013-03-27	PSYCHOSIS NOS	$9,450.00	Yes	12 days	430	de-identified	de-identified	
910346328	2013-03-01	2013-03-12	RECURR DEPR PSYCHOS-MOD	$0.00	Yes	11 days	430	de-identified	de-identified	
837016768	2012-10-14	2012-10-24	VARICELLA PNEUMONITIS	$14,244.49	Yes	10 days	540	de-identified	de-identified	
835657509	2012-10-09	2012-10-11	OTHER ACUTE PAIN	$6,060.25	Yes	2 days	463	de-identified	de-identified	FALL NEC
822510620	2012-06-26	2012-06-26	POISON-MEDICINAL AGT NOS	$2,991.36	Yes	1 days	449	de-identified	de-identified	POISON-DRUG/MEDICIN NEC
820876920	2012-06-12	2012-06-14	ALCOH DEP NEC/NOS-UNSPEC	$2,228.00	Yes	2 days	749	de-identified	de-identified	
821035946	2012-06-08	2012-06-12	ALCOHOL WITHDRAWL	$3,342.00	Yes	4 days	744	de-identified	de-identified	
812988900	2012-04-02	2012-04-13	PNEUMONIA, ORGANISM NOS	$9,419.00	Yes	11 days	193	de-identified	de-identified	



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DEMOGRAPHICS(...)
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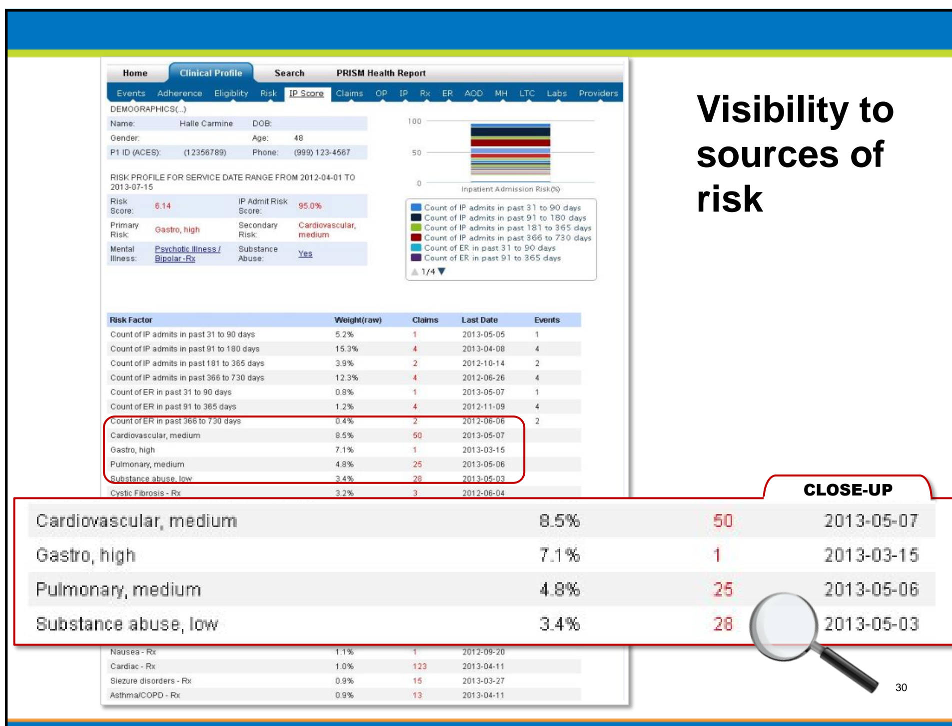
Gender: Age: 48
P1 ID (ACES): (12356789) Phone: (999) 123-4567
RISK PROFILE FOR SERVICE DATE RANGE FROM 2012-04-01 TO 2013-07-15
Risk Score: 6.14 IP Admit Risk Score: 95.0%
Primary Risk: Gastro, high Secondary Risk: Cardiovascular, medium
Mental Illness: Psychotic Illness / Bipolar -Rx Substance Abuse: Yes
Behaviors(8) Fall(3) Pain(5) Limitations(33) Client Worker PCP
Details of Long Term Care Assessment 4736571 on 2013-06-12 (Re-apply/Initial) for CARE client named de-identified, de-identified
ADL Score [0 to 28]: 2 Depression Score: 14 CPS Score [0 to 6]: 0
Overall Self-Sufficiency: NO CHANGE Self Rated Health Status: POOR Residential Group: B Low In Home Group: B Low
Name Type Status Intervention Alterable Desc
INJURES SELF Inappropriate/unsafe behavior Past Addressed with current interventions de-identified
UNREALISTIC FEARS OR SUSPICIONS Symptoms of distress Past Addressed with current interventions de-identified
YELLING/SCREAMING Verbally agitated/aggressive Past Addressed with current interventions de-identified
VERBALLY ABUSIVE Verbally agitated/aggressive Past Addressed with current interventions de-identified
USES FOUL LANGUAGE Verbally agitated/aggressive Past Addressed with current interventions de-identified
RESISTIVE TO CARE Verbally agitated/aggressive Past Addressed with current interventions de-identified
EASILY IRRITABLE/AGITATED Symptoms of distress Past Addressed with current interventions de-identified
INTIMIDATING/THREATENING Physically agitated/aggressive Past Addressed with current interventions de-identified
Current user: ZHUCC@DSHS.WA.GOV
PRISM Version 3.2.8; Data last updated: 2013-08-02 02:59:00 UTC;Control String:147.56.60.38**p3v328rc1did
Please note that this is a BETA version of PRISM 3 integrating data from Medicare, ProviderOne and other sources. Some features available in the prior version of PRISM will be temporarily disabled as the application redesign is completed. New versions of PRISM 3 will be released periodically as features are restored and bugs are fixed. Please email the development team at chad.zhu@dshs.wa.gov if you want to report defects directly or use our Bitmessage address BM-2DBbnxkrfKZm2LPWW1ghhin78dr4ncnXYr for secure communication.
29



Visibility to sources of risk
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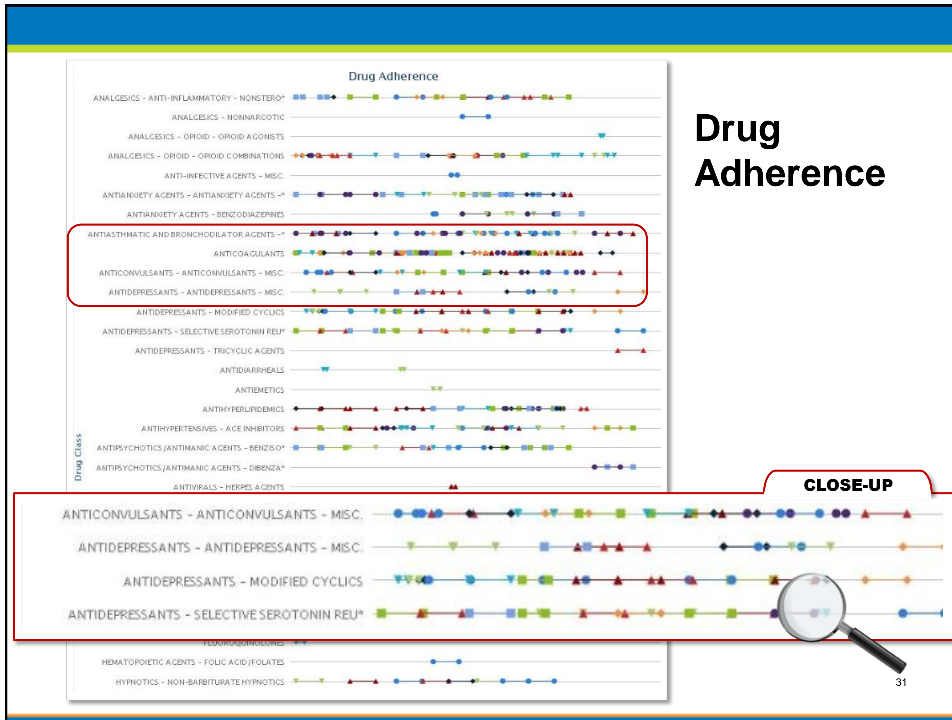
100
50
0
Inpatient Admission Risk(%)
Count of IP admits in past 31 to 90 days
Count of IP admits in past 91 to 180 days
Count of IP admits in past 181 to 365 days
Count of IP admits in past 366 to 730 days
Count of ER in past 31 to 90 days
Count of ER in past 91 to 365 days
1/4
Risk Factor Weight(raw) Claims Last Date Events
Count of IP admits in past 31 to 90 days 5.2% 1 2013-05-05 1
Count of IP admits in past 91 to 180 days 15.3% 4 2013-04-08 4
Count of IP admits in past 181 to 365 days 3.9% 2 2012-10-14 2
Count of IP admits in past 366 to 730 days 12.3% 4 2012-06-26 4
Count of ER in past 31 to 90 days 0.8% 1 2013-05-07 1
Count of ER in past 91 to 365 days 1.2% 4 2012-11-09 4
Count of ER in past 366 to 730 days 0.4% 2 2012-06-06 2
Cardiovascular, medium 8.5% 50 2013-05-07
Gastro, high 7.1% 1 2013-03-15
Pulmonary, medium 4.8% 25 2013-05-06
Substance abuse, low 3.4% 28 2013-05-03
Cystic Fibrosis - Rx 3.2% 3 2012-06-04
CLOSE-UP
Cardiovascular, medium 8.5% 50 2013-05-07
Gastro, high 7.1% 1 2013-03-15
Pulmonary, medium 4.8% 25 2013-05-06
Substance abuse, low 3.4% 28 2013-05-03
Nausea - Rx 1.1% 1 2012-09-20
Cardiac - Rx 1.0% 123 2013-04-11
Siezure disorders - Rx 0.9% 15 2013-03-27
Asthma/COPD - Rx 0.9% 13 2013-04-11
30



On the Healthcare Analytics Horizon

- Real-time Analytics
  - Cross-setting care management
  - Integration with social media and “apps”
- Predictive Analytics
  - Improving diagnoses, use of genomic info
  - Manage medications (reduce risk, side effects)

Take Home Points

Analytics can be described as:

“The positioning and coordination of people, tools, and techniques so that organizations can systematically leverage data assets for discovery, improvement, and innovation

Take Home Points

- Analytics is more than just a “department” in your organization
- Begin with a plan and a data model
- High quality “small data” is valuable
- Small HCOs don’t need a huge investment
  - Take stock and build a plan
  - Build analytics into workflows

Questions?

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