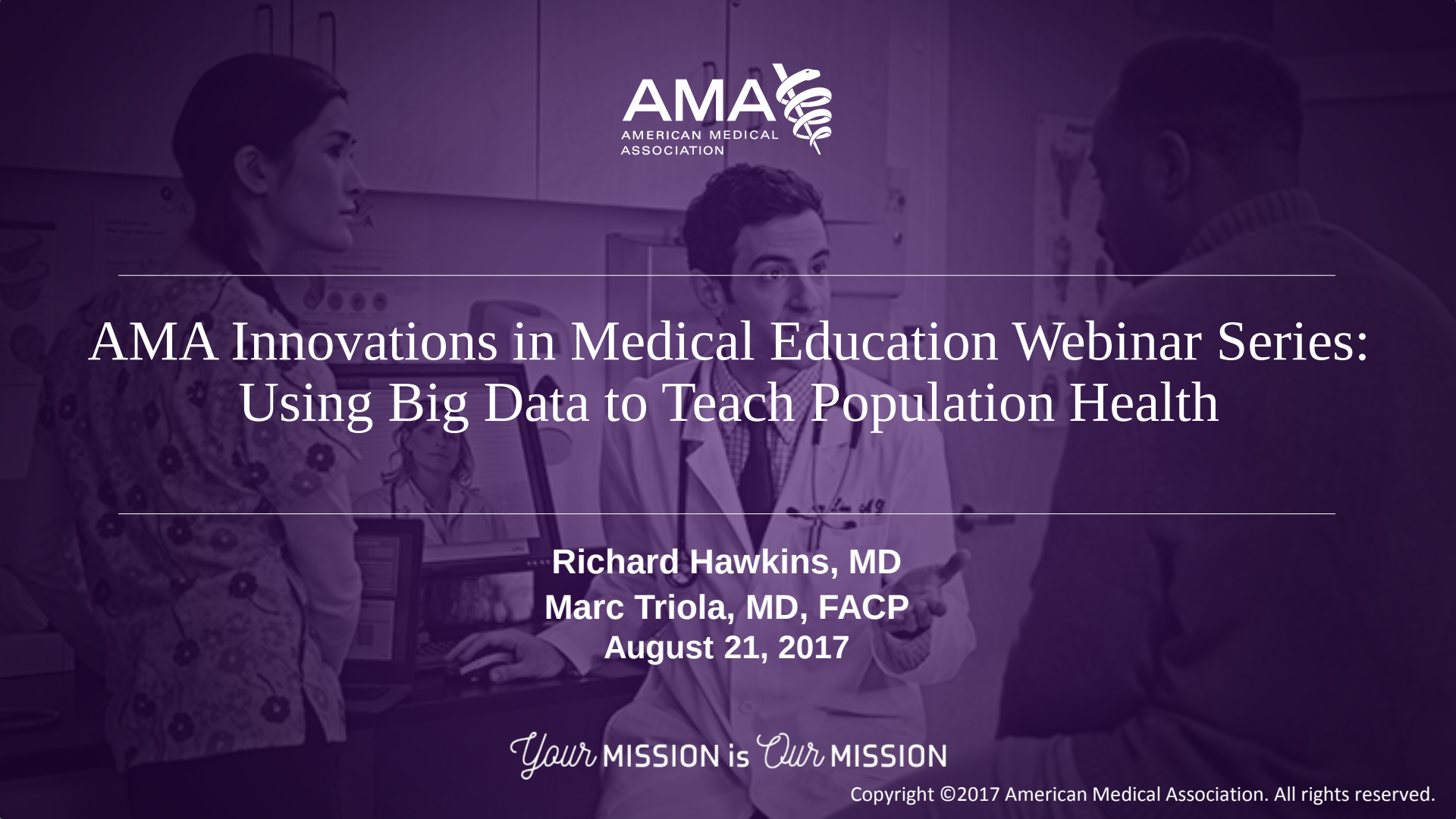

AMA Innovations in Medical Education Webinar Series: Using Big Data to Teach Population Health

Richard Hawkins, MD
Marc Triola, MD, FACP
August 21, 2017

Your MISSION is Our MISSION

Today's Host

- Richard Hawkins, MD, Vice-President, Medical Education Outcomes, American Medical Association

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MEDICINE

THE UNIVERSITY OF CHICAGO
PRITZKER SCHOOL OF MEDICINE

Objectives

- Learn about the development of a new curriculum to teach Health Systems Science in which students answer health system-level questions using publicly available patient databases
- Learn how these databases have been used by students to focus on disparities in care and explain variations in quality and cost across hospitals
- Understand how improving population health by leveraging big data can result in changes health care delivery
- Learn how to implement experiential activities like these at your own institution to teach important skills for the future of health care

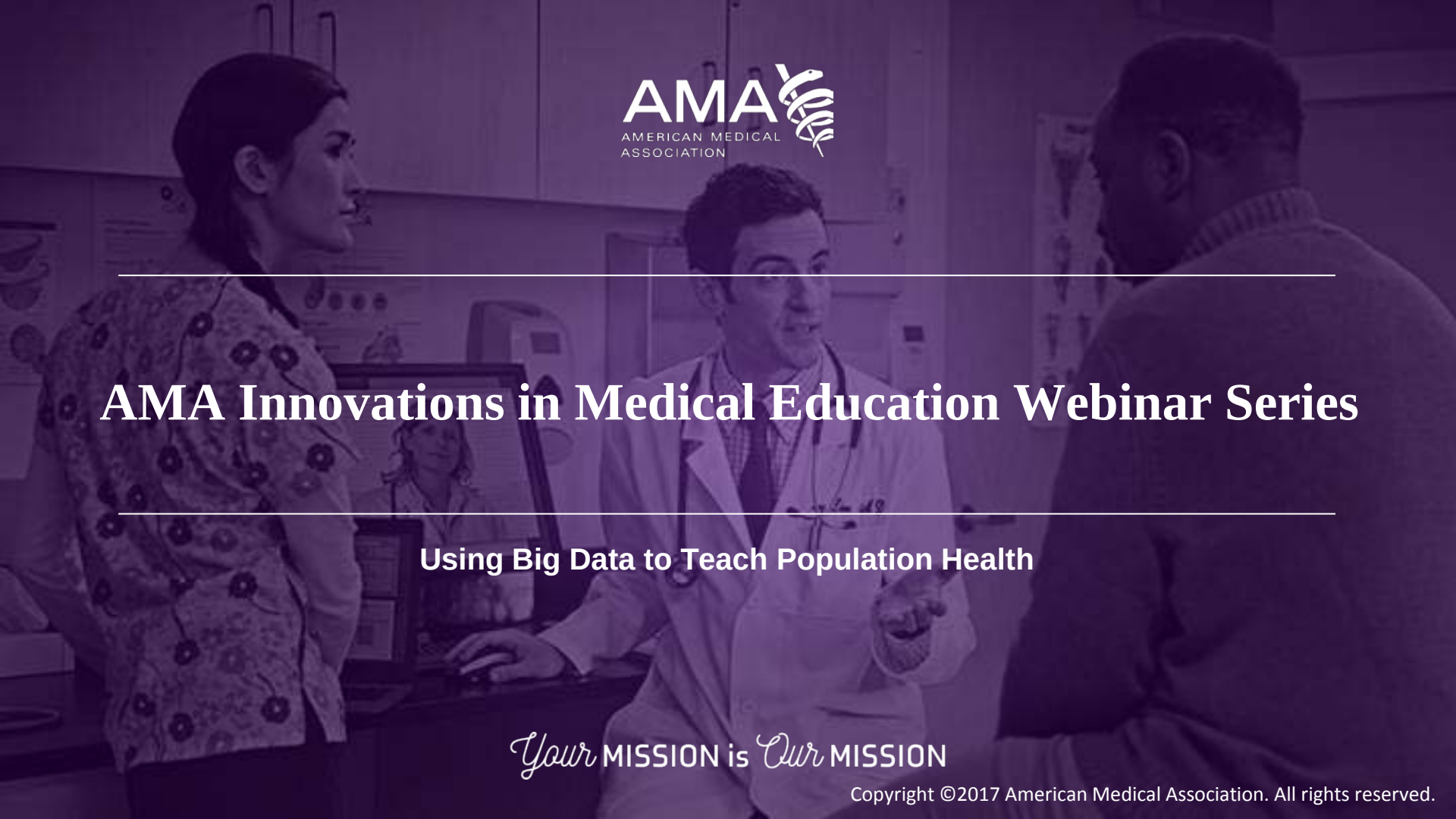
Presenter

Marc Triola, MD, FACP

Associate Dean for Educational Informatics at NYU School of Medicine

Founding director of the NYU Langone Medical Center Institute for Innovations in Medical Education

Associate Professor of Medicine.



AMA Innovations in Medical Education Webinar Series

Using Big Data to Teach Population Health

Your MISSION is Our MISSION

NYU Langone Health

Using Big Data to Teach Population Health

ace.iime.cloud

Marc M. Triola, MD
Institute for Innovations in Medical Education

The need for Health Systems Science (HSS) education

- Changes in our health care delivery system are driving new competencies for physicians
- HSS: Person-Centered Care; Population-Centered Care; High-Value Care; Team-Based Care; Health Policy, Economics and Technology; Leadership
- Driven by large digital datasets from electronic medical record systems, claims systems, large clinical and research registries
- Learning to navigate these datasets will be a key emerging competency of 21st century physician-leaders

Health Systems Science (HSS)

- Student participation in HSS educational initiatives have been shown to improve their skills of quality and safety, and benefited their health care delivery organizations.
- HSS education is most successful when students are engaged, motivated, and participate in an “authentic role” within the health care system.
- Most commonly this is a hands-on experiential exercise

Health Care by the Numbers (HCBN)

- With funding from the American Medical Association's Accelerating Change in Medical Education grant program, we developed an HSS curriculum at NYU School of Medicine focused on Population-Centered Care.
- Our goal was to utilize real patient-level clinical data that reflected the 'system' at our medical school's university, and affiliate hospitals; the diverse and complex New York City; and New York state as a whole.
- By using real clinical data on a large scale, we sought to craft a curriculum that included an authentic experiential learning opportunity at its core. We called the curriculum Health Care by the Numbers (HCBN).

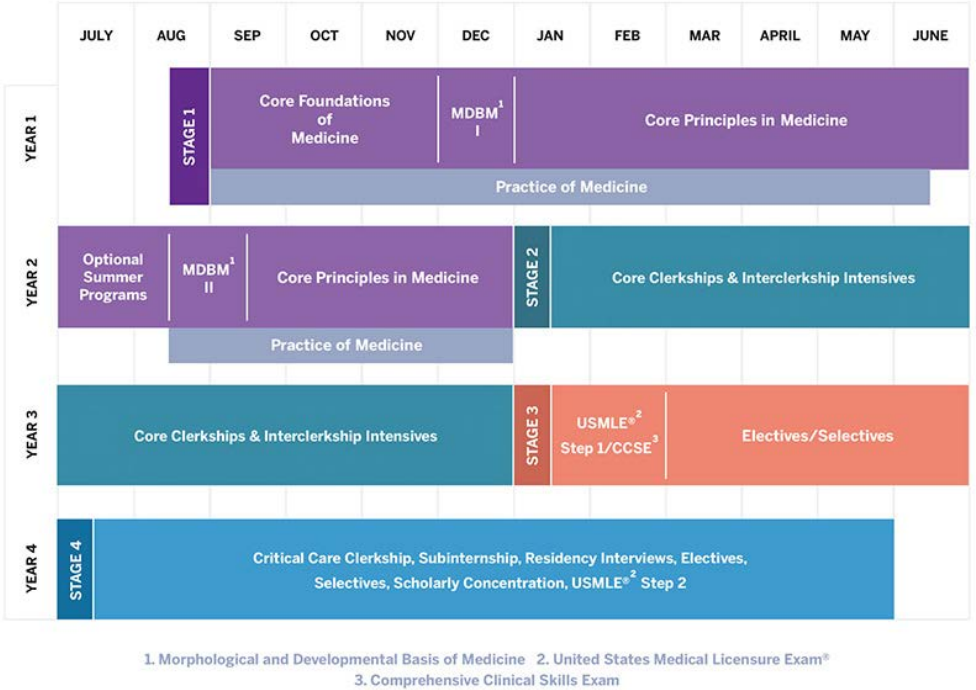
Health Care by the Numbers (HCBN)

- Central component: A student-driven project in which pairs of students identify a system-level clinical question they will answer using a large clinical database

- Students practice skills core to Population-Centered Care:
  - developing a testable hypothesis across large numbers of patients
  - outlining a methodological approach
  - synthesizing / communicating their findings.

Health Care by the Numbers (HCBN)

HCBN is implemented in the latte
course, just prior to our students
The HCBN curriculum, and the c
NYU School of Medicine student



NYU Langone Health

HCBN Didactics

Four didactic one-hour lectures:

- Orientation to the project, the timeline of the curriculum and the core concepts of a panel approach to patients.
- The ongoing transformation of healthcare and the tools used by faculty across our medical center for population health and panel management
- Measuring value in healthcare and the approaches to using administrative and clinical data to improve value
- Incentives in healthcare, including payment models, and how incentives affect behavior of providers, patients, and delivery systems

HCBN Student Project

- Students are divided into teams of two to define a clinical question they will evaluate for their experiential learning project.
- Their questions could cover any topic or aspect of care, as long as it was answerable by the data contained in the clinical database.
- Each proposed student question required approval by faculty

HCBN Student Project

- Students have five weeks to work with their teammate to perform their analyses and prepare a presentation on their findings and any implications for the health care system.
- During that time:
  - Required to meet with a Medical Librarian for a structured search to find existing literature on their topic
  - Optional office hours with faculty in Health Systems Science, Informatics, and Biostatistics
- Students presented their findings using a standardized template to their Practice of Medicine course groups (3 teams per group)

HCBN Creating the Database

- Established by New York Public Health law in 1979, New York State Department of Health Statewide Planning and Research Cooperative System (SPARCS) collects patient-level demographics, provider details, diagnoses, procedures, costs, and charges for all inpatient admissions to all 227 New York hospitals.
- Free for public use and includes detailed patient-level records for each of the 2.2 million inpatient admissions yearly in New York.
- https://www.health.ny.gov/statistics/sparcs/

HCBN - SPARCS Clinical Database

- Demo and tour
  - http://ace.iime.cloud/sparcs/

NYU Langone Health | Home | Curriculum | Clinical Data | SPARCS Project

NYU School of Medicine - Health Care By The Numbers Curriculum

This site lets you explore real clinical data from the New York State Department of Health Statewide Planning and Research Cooperative System (SPARCS). Data from years 2013, and 2014 are included - over 4.5 million patient-level records. View and download the full SPARCS data sets. View the 'Data Dictionary' for SPARCS (PDF). This NYU School of Medicine Curriculum is funded by the **AMA Accelerating Change in Medical Education Program**.

Hospital Profiles | SPARCS Project Guide | SPARCS Faculty Guide

Search for a diagnosis/procedure: This system uses APR-DRG terms to search the SPARCS database.

Search other APR-DRG's ...

Most Common | Most Specialized | Highest Charges | Mortality | All APR-DRG Codes

20 Most Common Admissions by APR-DRG Code for 2014

Description	Count	Avg. LOS	Avg. Charges	Avg. Cost	Sum of all 2014 Charges
NEONATE BIRTHWT >2499G, NORMAL NEWBORN OR NEONATE W OTHER PROBLEM	202,834	2.4	$7,291.02	$2,617.63	$1,478,865,743
VAGINAL DELIVERY	149,626	2.4	$14,597.30	$6,609.20	$2,184,134,500
SEPTICEMIA & DISSEMINATED INFECTIONS	84,721	8.2	$57,544.10	$22,095.20	$4,875,191,739
CESAREAN DELIVERY	76,962	3.8	$24,822.10	$10,871.80	$1,910,359,919
HEART FAILURE	54,218	5.8	$36,847.40	$14,163.10	$1,997,791,842
OTHER PNEUMONIA	42,164	5.0	$29,996.30	$11,670.00	$1,264,764,931

10 Highest Average Charge APR-DRG Codes for 2014

Description	Count	Avg Charge
NEONATE BWT <1500G W MAJOR PROCEDURE	249	$1,130,350
HEART &/OR LUNG TRANSPLANT	203	$979,083
NEONATE W ECMO	42	$886,863
EXTENSIVE 3RD DEGREE BURNS W SKIN GRAFT	32	$633,158
NEONATE BIRTHWT 500-749G W/O MAJOR PROCEDURE	327	$625,633
TRACHEOSTOMY W MV 96+ HOURS W EXTENSIVE PROCEDURE OR ECMO	2,901	$600,566
NEONATE BIRTHWT 750-999G W/O MAJOR PROCEDURE	510	$549,702
LIVER TRANSPLANT &/OR INTESTINAL TRANSPLANT	360	$506,076
NEONATE BWT 1500-2499G W MAJOR PROCEDURE	184	$504,764
NEONATE BWT 1000-1249G W RESP DIST SYND/OTH MAJ RESP OR MAJ ANOM	588	$468,955

10 Highest Sum Total Charges APR-DRG Codes for 2014

Description	Count	Sum Total for all 2014 Patients
SEPTICEMIA & DISSEMINATED INFECTIONS	84,721	$4,875,191,739
VAGINAL DELIVERY	149,626	$2,184,134,500
HEART FAILURE	54,218	$1,997,791,842
CESAREAN DELIVERY	76,962	$1,910,359,919
REHABILITATION	30,533	$1,894,147,117
KNEE JOINT REPLACEMENT	36,503	$1,875,415,449
SCHIZOPHRENIA	35,899	$1,828,894,718
PERCUTANEOUS CARDIOVASCULAR PROCEDURES W/O AMI	20,879	$1,824,640,931
HIP JOINT REPLACEMENT	31,304	$1,799,676,656
TRACHEOSTOMY W MV 96+ HOURS W EXTENSIVE PROCEDURE OR ECMO	2,901	$1,742,240,959

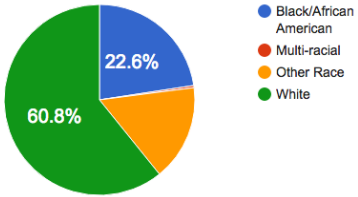
HEART FAILURE

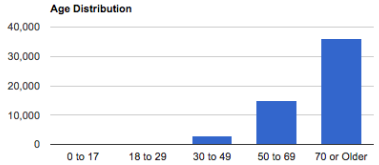
54,218 admissions to New York hospitals in 2014.

Data derived from the **2014** New York State Department of Health SPARCS. These data reflect **in-patient discharge data only**.

Demographics

50% 50%





Payors and Charges

$36,847

2014 Average Charges per Admission

Lowest: $0 ~ Highest: $4,302,120

Payor	Avg. Charges	Avg. Costs	# Patients
Medicare	$36,832	$13,636	41,933
Medicaid	$38,949	$17,971	6,840
Private Health Insurance	$35,598	$13,616	2,204
Blue Cross/Blue Shield	$37,642	$13,713	1,983
Self-Pay	$24,773	$12,668	669
Managed Care, Unspecified	$33,680	$12,913	160
Federal/State/Local/VA	$30,393	$13,800	150
Miscellaneous/Other	$23,135	$9,186	134
Unknown	$24,305	$10,644	102
Department of Corrections	$39,177	$23,764	43

Clinical Outcomes

5.82 Days

2014 Average Length of Stay

2.52 / 4

2014 Avg. Severity of Illness Score

Patient Disposition:	Count
Home or Self Care	22,447
Home w/ Home Health Services	15,371
Skilled Nursing Home	8,728
Expired	2,172
Short-term Hospital	1,775
Left Against Medical Advice	1,015
Hospice - Home	684
Inpatient Rehabilitation Facility	634
Hospice - Medical Facility	616
Facility w/ Custodial/Supportive Care	255
Medicare Cert Long Term Care Hospital	144
Another Type Not Listed	140
Hosp Basd Medicare Approved Swing Bed	100
Psychiatric Hospital or Unit of Hosp	55
Court/Law Enforcement	28
Federal Health Care Facility	27
Cancer Center or Children's Hospital	20
Medicaid Cert Nursing Facility	5
Critical Access Hospital	2

2014 results Click on a column header to sort ascending or descending.

Hospital	# Discharges	Avg. Charges	Avg. Costs	Avg. Severity Score	Avg. LOS	# Expired
Adirondack Medical Center-Saranac Lake Site	55	$17,932.09	$13,480.07	2.45	3.89	6
Albany Medical Center Hospital	396	$44,988.03	$14,022.38	2.56	6.87	13
Albany Memorial Hospital	128	$15,589.63	$5,701.19	2.80	4.18	8
Alice Hyde Medical Center	71	$8,955.92	$3,684.70	2.39	4.10	2
Arnot Ogden Medical Center	309	$19,576.26	$7,718.84	2.46	5.56	9
Auburn Memorial Hospital	267	$16,374.26	$5,689.16	2.61	5.03	18
Aurelia Osborn Fox Memorial Hospital	120	$10,177.78	$5,030.04	2.28	5.93	10
Bellevue Hospital Center	362	$41,950.71	$31,952.46	2.21	7.01	6
Bertrand Chaffee Hospital	45	$10,073.62	$3,852.33	2.36	3.78	0
Bon Secours Community Hospital	140	$29,269.91	$8,793.91	2.82	4.66	7
Bronx-Lebanon Hospital Center - Concourse Division	666	$16,965.43	$15,905.72	2.41	5.36	11
Brookdale Hospital Medical Center	550	$33,556.20	$17,430.52	2.55	6.49	18
Brookhaven Memorial Hospital Medical Center Inc	476	$60,407.39	$10,509.67	2.66	7.29	26
Brooklyn Hospital Center - Downtown Campus	444	$31,715.31	$10,608.81	2.29	6.65	20
Brooks Memorial Hospital	128	$12,131.66	$10,947.73	2.52	4.33	8
Buffalo General Hospital	709	$20,257.87	$9,272.51	2.66	5.60	30
Calvary Hospital Inc	144	$47,140.05	$28,069.38	2.37	21.18	127

Download raw APR-DRG data as CSV (Excel) files

Download data for all NY State hospitals that treated this condition:

Download all hospitals - 2014

Download all hospitals - 2013

Download a smaller 2014 dataset for a selected group of 8 hospitals:

Download 8 Hospitals Only

2014 data for this DRG from NYU Hospitals and Affiliates:

NYU Hospitals Center

NYU Hospital for Joint Diseases

NYU Lutheran Medical Center

Bellevue Hospital Center

HEART FAILURE (APR-DRG 194)

Data below are derived from the **2014** New York State Department of Health Statewide Planning and Research Cooperative System (SPARCS).

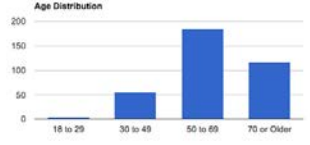
Bellevue Hospital Center

362 admissions in 2014

Demographics

35% 65%

Race	# Pts.	
Black/African American	128	35.36%
Other Race	186	51.38%
White	48	13.26%



Payors and Charges

$41,951

2014 Average Charges per Admission

Lowest: $6,344 – Highest: $193,601

Payor	Avg. Charges	Avg. Costs	# Patients	%
Medicare	$41,505	$31,613	166	45.86%
Medicaid	$41,281	$31,443	136	37.57%
Self-Pay	$33,290	$25,356	32	8.84%
Department of Corrections	$62,573	$47,660	14	3.87%
Blue Cross/Blue Shield	$51,771	$39,432	10	2.76%

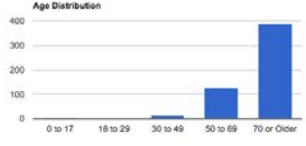
NYU Hospitals Center

533 admissions in 2014

Demographics

46% 54%

Race	# Pts.	
Black/African American	73	13.70%
Multi-racial	2	0.38%
Other Race	99	18.57%
White	359	67.35%



Payors and Charges

$59,326

2014 Average Charges per Admission

Lowest: $4,589 – Highest: $350,785

Payor	Avg. Charges	Avg. Costs	# Patients	%
Medicare	$57,884	$12,348	387	72.61%
Private Health Insurance	$66,734	$15,093	76	14.26%
Blue Cross/Blue Shield	$61,878	$13,062	30	5.63%
Medicaid	$53,684	$11,141	27	5.07%

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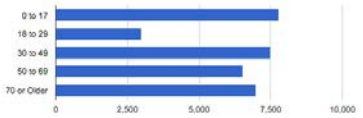
Return to Hospital List

Compare to another hospital: Choose... Go

NYU Hospitals Center

2014 Age Distribution



2014 Payers:

Blue Cross/Blue Shield	5,235
Federal/State/Local/VA	52
Medicaid	3,263
Medicare	8,132
Miscellaneous/Other	127
Private Health Insurance	14,021
Self-Pay	965

2014 Patient Race:

Black/African American	2,759
Multi-racial	346
Other Race	8,001
White	20,689

Most common DRG Codes | Payment & Value of Care | Re-Admissions | Timely Care | Complications

Conditions treated in 2014

Click on a column header to sort ascending or descending.

DRG	Count	Avg. Charge	Avg. Cost	Sum all Charges	Sum all Costs	Avg. LOS
NEONATE BIRTHWT >2499G, NORMAL NEWBORN OR NEONATE W OTHER PROBLEM (640)	4750	$13,464	$6,342	$63,955,017	$30,124,780	2.25
VAGINAL DELIVERY (560)	3865	$15,894	$6,854	$61,431,693	$26,489,910	2.30
SEIZURE (53)	1508	$91,629	$7,364	$138,176,867	$11,105,000	4.04
CESAREAN DELIVERY (540)	1453	$46,712	$17,102	$67,873,154	$24,849,908	4.27
SEPTICEMIA & DISSEMINATED INFECTIONS (720)	841	$100,027	$20,583	$84,122,824	$17,310,691	7.76
CRANIOTOMY EXCEPT FOR TRAUMA (21)	602	$214,491	$41,755	$129,123,664	$25,136,387	5.60
REHABILITATION (860)	555	$112,752	$34,772	$62,577,188	$19,298,669	13.04
HEART FAILURE (194)	533	$59,326	$12,739	$31,620,568	$6,789,887	5.51
MAJOR SMALL & LARGE BOWEL PROCEDURES (221)	403	$136,230	$27,030	$54,900,530	$10,892,903	6.56
PERCUTANEOUS CARDIOVASCULAR PROCEDURES W/O AMI (175)	399	$214,089	$46,184	$85,421,611	$18,427,239	4.57
PROCEDURES FOR OBESITY (403)	379	$84,834	$17,691	$32,151,982	$6,704,873	2.15
CHEMOTHERAPY (693)	323	$85,458	$16,524	$27,602,989	$5,337,104	5.46
KIDNEY & URINARY TRACT INFECTIONS (463)	293	$39,904	$9,435	$11,691,873	$2,764,568	4.16
OTHER PNEUMONIA (139)	287	$49,621	$11,554	$14,241,164	$3,316,127	4.60
CELLULITIS & OTHER BACTERIAL SKIN INFECTIONS (383)	279	$32,700	$8,497	$9,123,273	$2,370,653	3.88
DORSAL & LUMBAR FUSION PROC EXCEPT FOR CURVATURE OF BACK (304)	271	$235,567	$48,746	$63,838,538	$13,210,259	5.76
OTHER RESPIRATORY & CHEST PROCEDURES (121)	261	$102,409	$22,676	$26,728,798	$5,918,444	4.10

VAGINAL DELIVERY

149,626 admissions to New York hospitals in 2014.

Payors and Charges

$14,597

2014 Average Charges per Admission

Lowest: $496 ~ Highest: $736,154

Payor	Avg. Charges	Avg. Costs	# Patients
Medicaid	$14,679	$7,058	75,230
Private Health Insurance	$15,595	$6,207	38,355
Blue Cross/Blue Shield	$13,789	$5,995	29,427
Managed Care, Unspecified	$12,695	$5,770	2,023
Self-Pay	$11,768	$6,673	1,866
Federal/State/Local/VA	$8,560	$7,513	1,652
Medicare	$13,301	$6,722	726
Miscellaneous/Other	$9,475	$5,157	231
Unknown	$17,048	$5,963	74
Department of Corrections	$24,461	$8,187	42

Hospital	Payer	Avg. Charge
Olean General	Blue Cross	**$4,442.95**
New York Presbyterian	Blue Cross	**$21,421.53**

NYU Langone Health

HCBN - Results

- Introduced to the entire first-year medical student class in 2014 and has been run yearly since.
- To date, 225 student pairs have answered questions using the clinical database we created.
- 74 student pairs in the 2014 HCBN cohort:
  - 8 project questions required significant revision upon review by faculty.
  - 15 teams participated in at least one of the optional office hours covering informatics, biostatistics, and health systems.

HCBN - Results

- Students most interested in factors contributing to disparities in care and geographic variations in quality/availability.
- The most common factors chosen by students:
  - patient's source of payment (23%)
  - the race of the patient (18%)
  - the location of the hospital (15%)
- Most common clinical conditions chosen:
  - Cardiovascular (23%)
  - Mental-health (18%)

HCBN - Selected Student Questions

- Does hospital caseload relate to the length of stay for patients with heart failure?
- How does day-of-week of admission for acute MI relates to patient outcomes in terms of mortality and/or length of stay?
- How does the gender and racial composition of patients admitted with a diagnosis of major depressive disorder change between various age ranges?
- Is Cesarean delivery being performed equally conservatively among various racial/ethnic groups?
- Is the availability of residency positions an indicator of a hospital's billed amount to the privately insured?

HCBN - Selected Student Questions

- Is there a difference in sepsis mortality rates between teaching hospitals (University-affiliated) and non-teaching hospitals in New York?
- We plan to use SPARCS data to compare outcomes of patients with sepsis in 2012 to patients with sepsis from 2013 to the present. The reason we chose to look at the clinical outcomes in these two time periods is the implementation of new laws in New York that require hospitals to take certain steps in identifying and treating septic patients.

HCBN - Lessons Learned

- Faculty development is key
- Faculty and students can use the same datasets both in the classroom and for original research
- Can access data from affiliate hospitals
- Data sets are too big and unwieldy for learners to access directly

More resources

- Overall website:
  - http://ace.iime.cloud
- SPARCS database:
  - http://ace.iime.cloud/sparcs/
- Other clinical data sets for education:
  - http://ace.iime.cloud/clinicaldata/


MEDICAL CENTER

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AMA Innovations in Medical Education Webinar Series: Using Big Data to Teach Population Health

Questions

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Future Events

Continue the discussion	Future webinars	ChangeMedEd 2017
Please join us to ask questions of our panelists at: https://ama-assn.org/communities/accelerating-change-in-medical-education • Role of big data in managing population health • Challenges in using big data in healthcare	October 23 at 3 p.m. Central **Health Systems Science** January 2018 **Interprofessional Education**	**Mark your calendars:** CHANGEMEDED™ | 2017 *Cultivating a community of innovation* September 14-16 in Chicago www.ama-assn.org/events/changemeded-2017-national-conference