Biomedical Engineering for Global Health

Lecture Five

Unit Two

Every nation, whether it has many healthcare resources or only a few, must make decisions about how to use those resources to best serve its population.

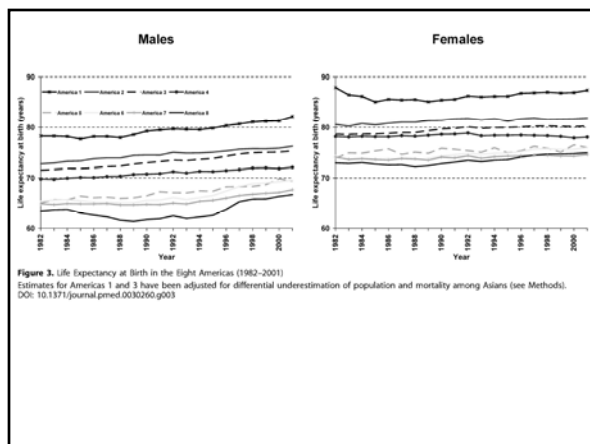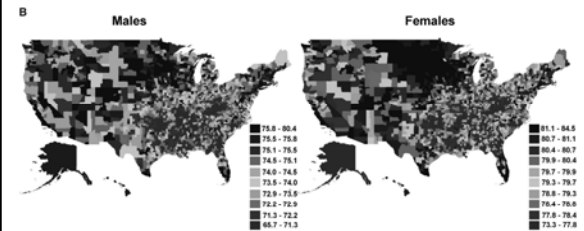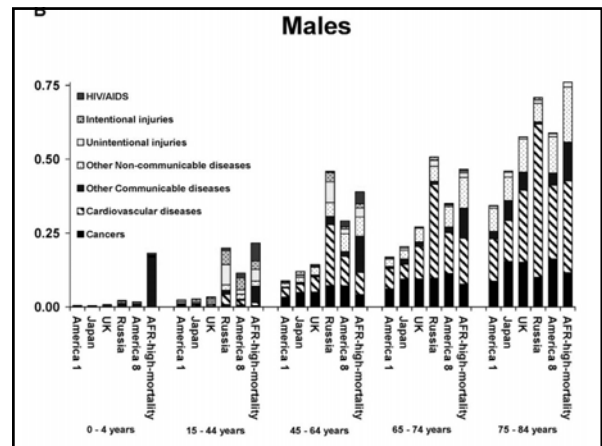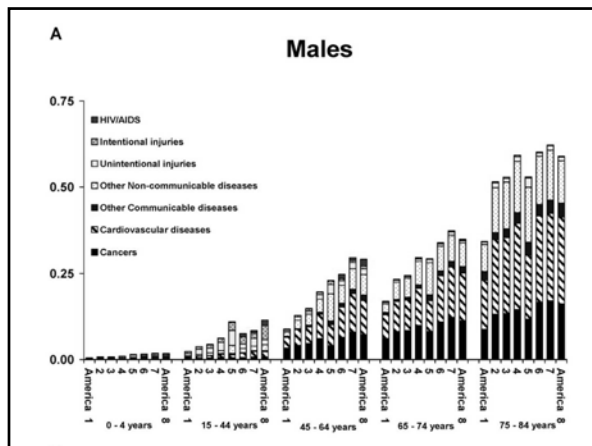OPEN ACCESS Freely available online   PLOS MEDICINE

Eight Americas: Investigating Mortality Disparities across Races, Counties, and Race-Counties in the United States

Christopher J. L. Murray[1,2,3], Sandeep C. Kulkarni[2,4], Catherine Michaud[2,3], Niels Tomijima[2], Maria T. Bulzacchelli[3], Terrell J. Iandiorio[3], Majid Ezzati[1,2*]

1 Harvard School of Public Health, Boston, Massachusetts, United States of America, 2 Harvard University Initiative for Global Health, Cambridge, Massachusetts, United States of America, 3 Center for Population and Development Studies, Harvard University, Cambridge, Massachusetts, United States of America, 4 University of California San Francisco, San Francisco, California, United States of America

What is the difference in life expectancy between the America with the longest life expectancy and the America with the shortest life expectancy?

Figure 1. County Life Expectancies by Race

Deaths were averaged for 1997–2001 to reduce sensitivity to small numbers and outliers.
(A) Life expectancy at birth for black males and females. Only counties with more than five deaths for any 5-y age group (0–85) were mapped, to avoid unstable results.
(B) Life expectancy at birth for white males and females.
DOI: 10.1371/journal.pmed.0030260.g001

Figure 3. Life Expectancy at Birth in the Eight Americas (1982–2001)
Estimates for Americas 1 and 3 have been adjusted for differential underestimation of population and mortality among Asians (see Methods).
DOI: 10.1371/journal.pmed.0030260.g003

Figure 2. Construction of the Eight Americas from 8,288 Race-County Units
DOI: 10.1371/journal.pmed.0030260.g002

Males (Panel A)

Males (Panel B)
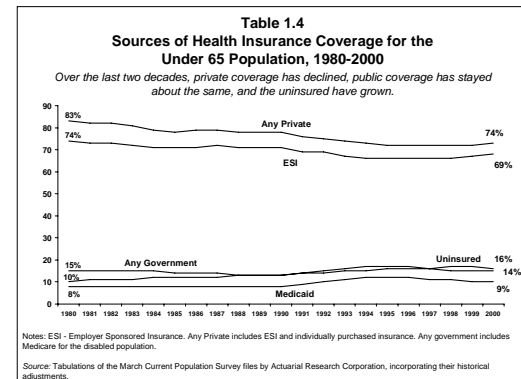
Overview of Lecture 5

- Health Systems
  - What is a health system?
  - Goals of a health system
  - Functions of a health system
- Types of health systems
- Performance of Health Systems
- Examples of health systems

- How have health care costs changed over time?
- Health Care Reform in the US
- Eight Americas

How Many $ to Gain a Year of Life?

- Need a way to quantify health benefits
  - How much bang do you get for your buck?
  - Ratio
    - Numerator = Cost
    - Denominator = Health Benefit
  - Several examples
    - $$/year of life gained
    - $$/quality adjusted year of life gained (QALY)
    - $$/disability free year of life gained (DALY)
  - Can we use this to make decisions about what we pay for?

League Table

Therapy	Cost per QALY
Motorcycle helmets, Seat belts, Immunizations	Cost-saving
Anti-depressants for people with major depression	$1,000
Hypertension treatment in older men and women	$1,000-$3,000
Pap smear screening every 4 years (vs none)	$16,000
Driver's side air bag (vs none)	$27,000
Chemo in 75 yo women with breast CA (vs none)	$58,000
Dialysis in seriously ill patients hospitalized with renal failure (vs none)	$140,000
Screening and treatment for HIV in low risk populations	$1,500,000

**Table 1.4
Sources of Health Insurance Coverage for the
Under 65 Population, 1980-2000**

Over the last two decades, private coverage has declined, public coverage has stayed about the same, and the uninsured have grown.

Notes: ESI - Employer Sponsored Insurance. Any Private includes ESI and individually purchased insurance. Any government includes Medicare for the disabled population.

Source: Tabulations of the March Current Population Survey files by Actuarial Research Corporation, incorporating their historical adjustments.

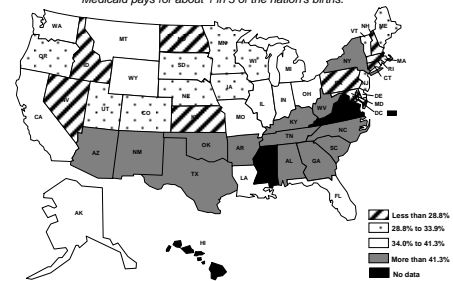*Centers for Medicare & Medicaid Services*

What Happens When You Don't Have Health Insurance?

- United States
  - If you meet certain income guidelines, you are eligible for Medicaid
    - Texas: TANF (welfare) recipients, SSI recipients
  - Eligibility rules and coverage vary by state
  - State pays a portion of the costs, federal govt. matches the rest

http://www.coaccess.com/images/mcdCard.gif

Table 3.30
Births Financed by Medicaid as a Percent of Total Births by State, 1998
Medicaid pays for about 1 in 3 of the nation's births.

Legend:
- Less than 28.8%
- 28.8% to 33.9%
- 34.0% to 41.3%
- More than 41.3%
- No data

Note: CO, GA 1997 data; KY, NJ, VT 1996 data.
Source: Maternal and Child Health (MCH) Update: States Have Expanded Eligibility and Increased Access to Health Care for Pregnant Women and Children, National Governors Association, February, 2001, Table 23, at http://www.nga.org.

Centers for Medicare & Medicaid Services

What Happens When Medicaid Doesn't Cover a Service?

- Oregon – July, 1987
  - Oregon state constitution required a balanced state budget, surplus returned to taxpayers
  - Voted to end Medicaid coverage of transplants
    - Typically 10 transplants performed per year
    - $100,000-$200,000 per transplant
    - $1.1 M cost to state (federal govt. pays the rest)
  - Voted to fund Medicaid coverage of prenatal care
    - Would save 25 infants who die from poor prenatal care

A Tale of Two Children

- Oregon – August, 1987
  - Coby Howard
    - 7 year old boy
    - Developed leukemia
    - Required a bone marrow transplant
    - Was denied coverage
    - Mom appealed to legislature, denied coverage
    - Mom began media campaign to raise $$
    - Raised $70k ($30k short of goal)
    - Coby died in December, 1987
  - Coby was "forced to spend the last days of his life acting cute" before the cameras
    - Ira Zarov, attorney for patient in similar circumstances

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A Tale of Two Children

- Oregon, 1987
  - David Holliday
    - 2 year old boy
    - Developed leukemia
    - Moved to Washington state, lived in car
    - Washington state
      - Medicaid covered transplants
      - No minimum residency requirement

Health Systems Face Difficult Choices

- Primary goal of a health system:
  - Provide and manage resources to improve the health of the population
- Secondary goal of a health system:
  - Ensure that good health is achieved in a fair manner
  - Protect citizens against unpredictable and high financial costs of illness
  - In many of the world's poorest countries, people pay for care out of their own pockets, often when they can least afford it
  - Illness is frequently a *cause* of poverty
  - Prepayment, through health insurance, leads to greater fairness

Health Systems

- Reflects historical trends in:
  - Economic development
  - Political ideology
- Provide four important functions:
  1. Generate human resources, physical infrastructure & knowledge base to provide health care
  2. Provide health care services
     - Primary clinics, hospitals, and tertiary care centers
     - Operated by combination of government agencies and private providers
  3. Raise & pool economic resources to pay for healthcare
     - Sources include: taxes, mandatory social insurance, voluntary private insurance, charity, personal household income and foreign aid
  4. Provide stewardship for the healthcare system, setting and enforcing rules which patients, providers and payers must follow
   - Ultimate responsibility for stewardship lies with the government

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Activity

Create Your Own Health System

Types of Health Systems

- Economic Classification
- Political Classification:
  - Entrepreneurial
    - Strongly influenced by market forces, some government intervention
  - Welfare-oriented
    - Government mandates health insurance for all workers, often through intermediary private insurance agencies
  - Comprehensive
    - Provide complete coverage to 100% of population almost completely through tax revenues
  - Socialist
    - Health services are operated by the government, and theoretically, are free to everyone
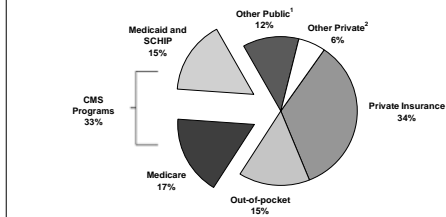

Types of Health Systems

	Entrepreneurial	Welfare Oriented	Comprehensive	Socialist
High Income Developed	United States	Canada Germany Japan Australia	United Kingdom Spain Greece	Soviet Union
Middle Income Developing	Philippines Thailand South Africa	Peru Brazil Egypt Malaysia	Costa Rica Israel	Cuba North Korea
Low Income Developing	Kenya Bangladesh	India Burma	Sri Lanka Tanzania	China Vietnam

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Slide 1
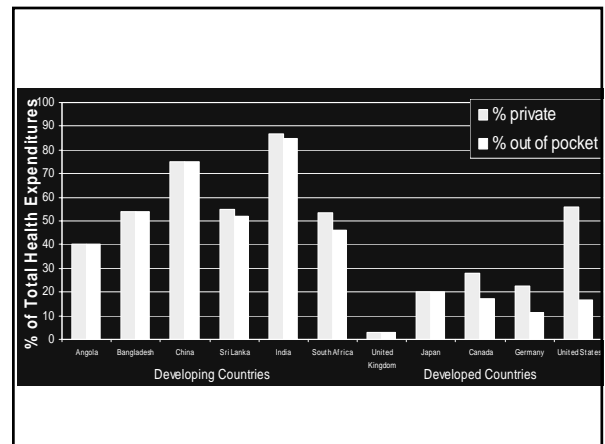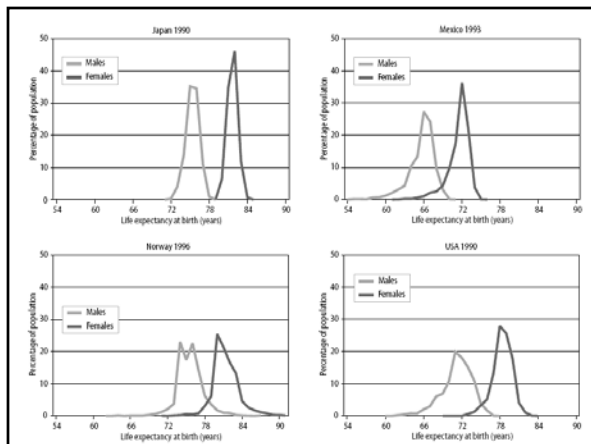
Entrepreneurial US Health Care System

- Private Insurance
  - Conventional
  - Managed Care: HMOs, PPOs, POS
- Government
  - Medicare
  - Medicaid
  - SCHIP
- Uninsured

Slide 2

The Nation's Health Dollar, CY 2000
Medicare, Medicaid, and SCHIP account for one-third of national health spending.

- Other Public[1] 12%
- Other Private[2] 6%
- Medicaid and SCHIP 15%
- Private Insurance 34%
- CMS Programs 33%
- Medicare 17%
- Out-of-pocket 15%

Total National Health Spending = $1.3 Trillion

[1] Other public includes programs such as workers' compensation, public health activity, Department of Defense, Department of Veterans Affairs, Indian Health Service, and State and local hospital subsidies and school health.
[2] Other private includes industrial in-plant, privately funded construction, and non-patient revenues, including philanthropy.
Note: Numbers shown may not sum due to rounding.
Source: CMS, Office of the Actuary, National Health Statistics Group.

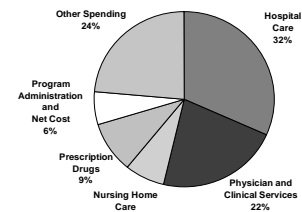*Centers for Medicare & Medicaid Services*

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Slide 3

WHERE
does the money
come from?

45% GOVERNMENT

40% PRIVATE SOURCES

15% OUT OF POCKET

Centers for Medicare & Medicaid Services

Slide 4

The Nation's Health Dollar, CY 2000
Hospital and physician spending accounts for more than half of all health spending.

- Other Spending 24%
- Hospital Care 32%
- Program Administration and Net Cost 6%
- Prescription Drugs 9%
- Nursing Home Care 7%
- Physician and Clinical Services 22%

Total Health Spending = $1.3 Trillion

Note: Other spending includes dentist services, other professional services, home health, durable medical products, over-the-counter medicines and sundries, public health, research and construction.
Source: CMS, Office of the Actuary, National Health Statistics Group.

Centers for Medicare & Medicaid Services

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Slide 5

WHERE
does the money go?

1/3 HOSPITAL CARE

1/5 DOCTOR'S FEES

1/10 PRESCRIPTION DRUGS

Spending concentrated on a small # of sick people

Centers for Medicare & Medicaid Services

Slide 6

Table 1.25
Percent of GDP Spent on Health Care by OECD Country, 1960-1999

The U.S. has had a higher share of GDP spent on health than the OECD median for the past four decades.
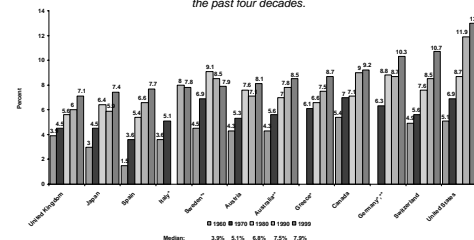

*For some years, no data was available.
**1997 data was used because 1999 was not available.
Note: The data is arrayed by spending growth from 1990 to 1999. The medians include all OECD countries.

Median:	1960	1970	1980	1990	1999
	3.9%	5.1%	6.8%	7.5%	7.9%

Source: OECD Health Data 2002.

Centers for Medicare & Medicaid Services

Slide 1

**Do we spend
MORE in the US?**

YES

By % of GDP

By absolute amount

Slide 2

Slide 3
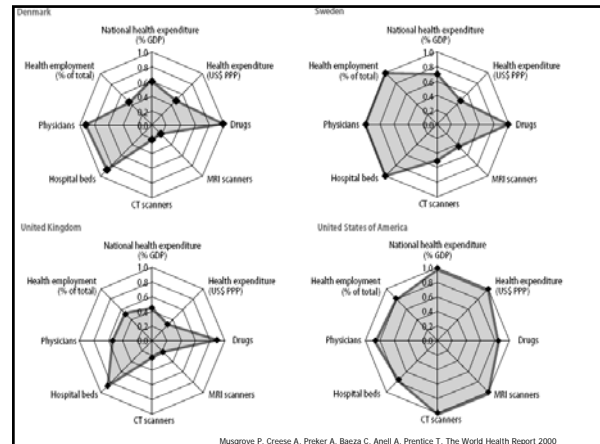
Welfare-Oriented
Canadian Health Care System

- Five Principles
  - Comprehensiveness, Universality, Portability, Accessibility, Public administration
- Features
  - All 10 provinces have different systems (local control)
  - One insurer - the Provincial government
    - costs shared by federal & provincial govts
  - Patients can choose their own doctors
  - Doctors work on a fee for service basis, fees are capped

http://www.globalsecurity.org/intell/world/canada/images/canada-flag.gif

Slide 4

Canadian Health Care - History

- Before 1946
  - Canadian system much like current US system
- 1946
  - Tommy Douglass, premier of Saskatchewan, crafted North America's first universal hospital insurance plan
- 1949
  - BC and Alberta followed
- 1957
  - Federal govt adopted Hospital Insurance and Diagnostic Services Act
  - Once a majority of provinces adopted universal hospital insurance plan, feds would pay half costs
- 1961
  - All provinces had hospital insurance plans

Slide 5

Canadian Health Care - History

- 1962
  - Saskatchewan introduced full-blown universal medical coverage
- 1965
  - Federal govt offers cost-sharing for meeting criteria of comprehensiveness, portability, public administration and universality
- 1971
  - All Canadians guaranteed access to essential medical services
- 1970-1980s
  - Rising medical costs, low fees to doctors
  - Doctors began to bill patients themselves

Slide 6

Canadian Health Care - History

- 1984
  - Canadian Health Act outlawed "extra billing"
  - "One-tiered service"
  - Some provinces capped physician incomes
  - Ontario physicians went on strike
- 1998
  - Federal government cut contributions to social programs from $18.5 billion to $12.5 billion Canadian
  - Today, fed govt pays only about 20% of medical care costs on average

Canadian Health Care – Comparisons to US System

- Costs
  - Canada spends 9% of GDP on health care
  - US spends 14% of GDP on health care
- Popular?
  - 96% of Canadians prefer their system to that of US
- Simplicity
  - Canadian medicare – 8 pages long
  - US Medicare – 35,000 pages long

Canadian Health Care – Comparisons to US System

- Life Expectancy
  - Canadians have 2nd longest expectancy of all countries
  - US ranks 25th
- Infant Mortality Rates
  - Canada – 5.6 deaths per 1000 live births
  - US – 7.8 deaths per 1000 live births
- Average physician income
  - Canada - $120,000
  - US - $165,000

Canadian Health Care - Problems

- Portability
  - Quebec and a few others will only pay doctors in other provinces up to its set fees
  - Many clinics post signs "Quebec medicare not accepted"
- Coverage of services
  - Some provinces charge health insurance premiums (many employers pay, subsidized for low income)
  - Few provinces offer drug plans (97% of Canadians are covered, private insurance)
  - Routine dentistry and optical care not covered by any province

Canadian Health Care - Problems

- Waiting times
  - 12% of Canadians waited >4 months for non-emergency surgery
  - Canadians wait average of 5 months for a cranial MRI
  - Americans wait an average of 3 days

Canadian Health Care - Problems

- Emergence of for-profit care
  - In exchange for an extra fee, facilities offer quicker access to medicare-insured services
  - Movement toward a two-tiered system like US
- Poor Availability of Advanced Technology
  - No way to fund new medical equipment
  - Waiting times high for ultrasound, MRI

Indian Health Care System

- Health system is at a crossroads
  - Fewer people are dying
  - Fertility is decreasing
  - Communicable diseases of childhood being replaced by degenerative diseases in older age
- Reliance on private spending on health in India is among the highest in the world
  - More than 40% of Indians need to borrow money or sell assets when hospitalized

http://mospi.nic.in/flag.jpg

Indian Health Care System

- Geographic disparities in health spending and health outcomes
  - Southern and western states have better health outcomes, higher spending on health, greater use of health services, more equitable distribution of services

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Indian Health Care System

State	Prenatal Care	Institutional Deliveries	Immunization Rates
India	28% (2-95%)	34% (5-100%)	54% (3-100%)
Kerala	85%	97%	84%
Gujarat	36%	46%	58%
Bihar	10%	15%	22%

Indian Health Care System: Goals

- How to work with private health providers
- Test new health financing systems
- Analyze pharmaceutical policies
  - New international trade regimes
  - Emergence of new infectious diseases
  - How to make HIV drugs affordable in India
- Develop strategies to increase number of trained health care workers
- Maximize benefits from health research and technology development

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Angola

http://discover.npr.org/features/feature.jhtml?wfId=1144226

Angolan Health Care System

- Angola – moving from crisis to recovery
  - 27-year long civil war
    - Rebels of UNITA and government forces
    - Ended in April, 2002
    - 1 million people died in the conflict (total pop 13M)
    - 4 million fled, many to neighboring countries
    - 3.8 million Angolans have now returned to their areas of origin
    - Many people have precarious access to food
- 70% of country's 13 million live on < than $0.70 /day

http://www.flags.net/elements/small_gifs/AGLA001.GIF

Angolan Health Care System

- UN World Food Programme
  - Provides food to an average of 1.7 million people per month
  - 740,000 people receive rations through food-for-work program
- Infrastructure Needs
  - 500 roads need reconstruction
  - Many key bridges are unstable
  - Millions of landmines scatter the countryside
- Corruption
  - Angola produces 900,000 barrels of oil per day
  - Massive corruption has undermined donor confidence

Angolan Health Care System

- Overall public health situation is critical
  - One in four children dies before age 5
  - Measles – claims 10,000 children per year
- UN Agencies conducted vaccination campaigns – National Immunization Days
  - 7 million children vaccinated for measles
  - 5 million children vaccinated against polio
  - Working to implement routine immunization programs
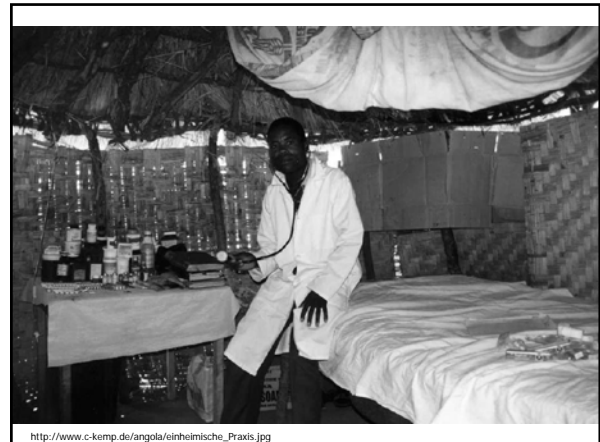
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