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Harnessing the Power of Big Data in Medical Education: Strengths, Uses, and Challenges

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What is Big Data?

Large and complex datasets that traditional data processing methods struggle to handle.

Case study

NHS Killing fields 2013

The INDEPENDENT

Consultants told to supervise new doctors to end NHS 'killing season'

JEREMY LAURANCE | MONDAY 28 MAY 2012

It is known as "Black Wednesday" – the start of the "killing season" in the NHS, when a fresh crop of medical graduates starts on the wards.

The first Wednesday in August marks the arrival of 6,000 newly qualified doctors, quaking in their crisp white coats. As they take

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London Evening Standard

Bid to end NHS 'killing season'

The day newly qualified medical graduates start their jobs has become known as 'Black Wednesday'

June 2012

patients are put at risk when junior doctors start work, a NHS medical director conceded as he outlined measures to end the so-called health service "killing season".

Young medics will now have to shadow their senior colleagues as part of a scheme designed to counter a 10% spike in death rates observed each August as they begin their jobs.

Dr Bruce Keogh said all first-year doctors will spend a minimum of four days in a mandatory shadowing role

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Junior doctors making mistakes.
(PMID:9519958)

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Baldwin PJ, Dodd M, Wrate RM
Lancet [1998, 351(9105):804]

Type: Letter, Research Support, Non-U.S. Gov't
DOI: 10.1016/S0140-6736(05)78931-5

Abstract

Highlight Terms
Gene Ontology(2)

Most people assume that mistakes made by junior doctors are attributable to the long working hours and lack of sleep, yet the evidence to support this is equivocal.1 and 2 As part of a 10-year study of a cohort of UK junior doctors,3 the nature, frequency, and cause of mistakes were investigated.The results come from the annual survey when the doctors were in a junior training grade (Senior House Officers) in hospital, 1993 to 1996. Compliance with questionnaires was 85% or more. Questions were asked about working conditions (Attitudes to Work questionnaire4 subjected to factor analysis5) and frequency and nature of clinical mistakes. We defined three grades of mistake: minor mistakes in the past month, where the patient had not suffered any pain or discomfort, and had not been in any danger, but for which corrective action was or should have been taken; moderate mistakes in the past 2 months, where the patient suffered pain, discomfort, temporary or permanent disability as a result, but where there was no danger to life; and major mistakes made in the past year, where the patient's life had been endangered or the patient had died. Participants were asked to describe each mistake and, from 1994, detail the circumstances.In 1993, 77% of the doctors reported making one or more minor mistakes in the past month. As these were too frequent for reliable recall of details, they were excluded from further data collection. The proportion of doctors making moderate mistakes was 39% in

BMJ

BMJ 2012;344:e67 doi: 10.1136/bmj.e67 (Published 10 January 2012) Page 1 of 2

EDITORIALS

Higher senior staffing levels at weekends and reduced mortality

The association is clear but the effects of the grade and specialty of key personnel are not

Andrew F Goddard *director*[1], Peter Lees *founding director*[2]

OPEN ACCESS Freely available online

Early In-Hospital Mortality following Trainee Do First Day at Work

Min Hua Jen[1]*, Alex Bottle[1], Azeem Majeed[2], Derek Bell[3], Paul Aylin[1]

1 Dr Foster Unit at Imperial College, Department of Primary Care and Social Medicine, Imperial College London, London, United Kingdom, **2** De and Social Medicine, Imperial College London, London, United Kingdom, **3** Department of Medicine, Imperial College London, Chelsea and West United Kingdom

Abstract

Background: There is a commonly held assumption that early August is an unsafe period to be admitte England, as newly qualified doctors start work in NHS hospitals on the first Wednesday of August. We inve in-hospital mortality is higher in the week following the first Wednesday in August than in the previous v

Methodology: A retrospective study in England using administrative hospital admissions data. Two retrospe all emergency patients admitted on the last Wednesday in July and the first Wednesday in August for 200 followed up for one week.

Principal Findings: The odds of death for patients admitted on the first Wednesday in August was 6% high CI 1.00 to 1.15, p = 0.05) after controlling for year, gender, age, socio-economic deprivation and co-m subdivided into medical, surgical and neoplasm admissions, medical admissions admitted on the first August had an 8% (OR 1.08, 95% CI 1.01 to 1.16, p = 0.03) higher odds of death. In 2007 and 2008, wher

The July effect: Real or urban myth

Either way, smooth assimilation of new residents is k

From the April ACP Hospitalist, *copyright © 2011 by the American College of Physicians*

By Charlotte Huff

Susan George, FACP, was reviewing some data before patient safety rounds with residents at Saint Vincent Hospital when she noticed a slight uptick in medication reconciliation errors during July and August of last year.

There were no serious adverse events and the discrepancies were typically minor, involving omission of vitamins or as-needed medications rather than more worrisome medications like beta blockers, said Dr. George, associate program director of the internal medicine residency program at the Worcester, Mass. hospital. Still, medication reconciliation is just one example of the many tasks and skills new doctors have to pick up during residency that can greatly impact patient safety.

Medical Errors Are Third Leading Cause of Death in the U.S.

- A recent Johns Hopkins study claims more than 250,000 people in the U.S. die every year from medical errors. Other reports claim the numbers to be as high as 440,000.
- Medical errors are the third-leading cause of death after heart disease and cancer.
- Advocates are fighting back, pushing for greater legislation for patient safety.

Analysis

Medical error—the third leading cause of death in the US

BMJ 2016 ; 353 doi: https://doi.org/10.1136/bmj.i2139 (Published 03 May 2016)
Cite this as: *BMJ* 2016;353:i2139

Importance of Big Data in Medical Education

- **Revolutionizing education: Customization, personalization, and adaptive learning.**
- **Enhancing decision-making: Data-driven insights for educators and institutions.**
- **Improving student outcomes: Identifying trends, strengths, and areas for improvement.**

Strengths of Using Big Data in Medical Education

- **Predictive Analytics: Anticipating student performance based on historical data and Identifying students at risk of underperformance.**
- **Personalized Learning: Tailoring educational content to individual learning styles. Adaptive learning platforms to cater to diverse student needs.**
- **Continuous Feedback: Real-time assessment and feedback for students and educators leading to prompt identification of knowledge gaps.**

Application in Medical Education

- **Virtual Patient Simulations**

Simulating medical scenarios for hands-on learning.

Collecting data on decision-making and problem-solving skills.

- **Learning Analytics**

Analyzing student engagement and interaction with digital resources.

Adapting curriculum based on learner behavior.

- **Research Opportunities**

Mining data for medical education research.

Contributing to evidence-based educational practices.

Challenges in Implementing Big Data in Medical Education

NUS National University of Singapore

Privacy and Security

Protecting sensitive student and patient data.

Ensuring compliance with privacy regulations.

Infrastructure and Technology

Investing in robust technological infrastructure.

Overcoming compatibility issues with existing systems.

Ethical Considerations

Balancing the use of data for educational purposes while respecting ethical norms.

Ensuring transparency in data collection and usage.

Future Trends

Integration of Augmented Reality and Virtual Reality for immersive learning experiences.

Recommendations for Implementation

Collaboration and Partnerships

Foster collaborations between educational institutions, technology providers, and healthcare organizations.

Professional Development

Provide training and support for educators to effectively use and interpret Big Data.

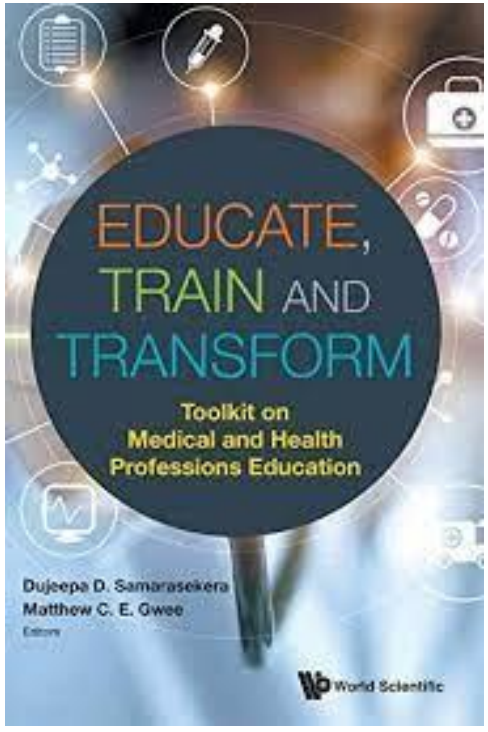
Continuous Evaluation

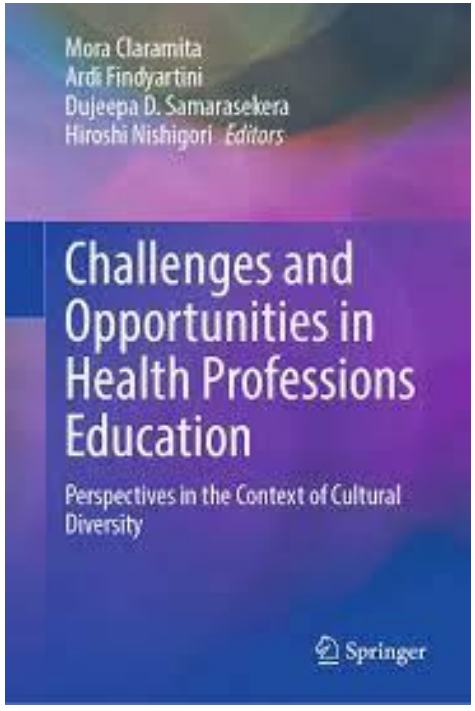
Regularly assess the impact of Big Data on medical education.

Adapt strategies based on feedback and evolving technologies.

Conclusion

- **Big data will be the norm in future.**
- **We need to understand how to use them to improve the learning environment.**
- **Be cognizant of the challenges and develop systems. and processes to implement the use of big data in ones own educational practice environment.**





THANK YOU!

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