

Health Reform in Australia: Activity Based Funding, My Health Record, AI Big Data, Nursing System

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Our mission is to enhance local, institutional and international health system decision-making through evidence; and use systems sciences and translational approaches to provide innovative, evidence-based solutions to specified health care delivery problems.

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我々の使命は、現場の、制度上の、国際的な医療制度の意思決定をエビデンスに基づいて行うことを促進すること、及び、システム科学や変革を促すアプローチを駆使することによってヘルスケア提供上の個々の問題に対して画期的でエビデンスに基づく解決方法を提供することである。

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Australian Institute of Health Innovation





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Foundation Director, AIHI; Director, Centre for Healthcare Resilience and Implementation Science
- **Professor Enrico Coiera**
Director, Centre for Health Informatics
- **Professor Johanna Westbrook**
Director, Centre for Health Systems and Safety Research



Agenda

1. Funding models
2. My Health Record
3. Artificial Intelligence
4. Big data example—the CareTrack Kids study
5. Nursing system



論点

1. 医療財源配分モデル

2. My Health Record

(松山注) 普及しつつあるPHRの呼称

3. Artificial Intelligence

4. Big data example— the

Care Track Kids study

(松山注) JB教授が数年前に実施した研究の名称

1. Activity based funding (ABF)



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- Hospitals in Australia receive funding based on the number and mix of patients they treat
- ABF is the system by which governments monitor, manage and administer the funding of healthcare provided by public hospitals
- The National Weighted Activity Unit (NWAU) is the unit of measurement for the activity based funding system

1. 活動量に基づく財源配分 (ABF)

- オーストラリアの公立病院は、治療を行った患者の数と疾病構成に基づいて財源配分を受けている。
- ABFは、それによって、公立病院が提供しているヘルスケアの財源配分を、政府がモニター・運営・管理している制度である。
- The National Weighted Activity Unit (NWAU) 全国加重活動単位とは、活動量に基づく財源配分制度の計測単位である。

“An NWAU is a measure of health service activity expressed as a common unit, against which the national efficient price (NEP) is paid. It provides a way of comparing and valuing each public hospital service (whether it is an admission, emergency department presentation or outpatient episode), by weighting it for its clinical complexity”

NWAU 全国加重活動単位とは、共通単位で表現される医療サービス量であり、それに対して the national efficient price (NEP) 全国効率価格が支払われる。

(松山注)全国効率価格とは、地域事情や患者重症度がコストに与える影響を反映させた上で、その医療サービスを効率的に提供したと仮定した場合にかかる医療コストのこと

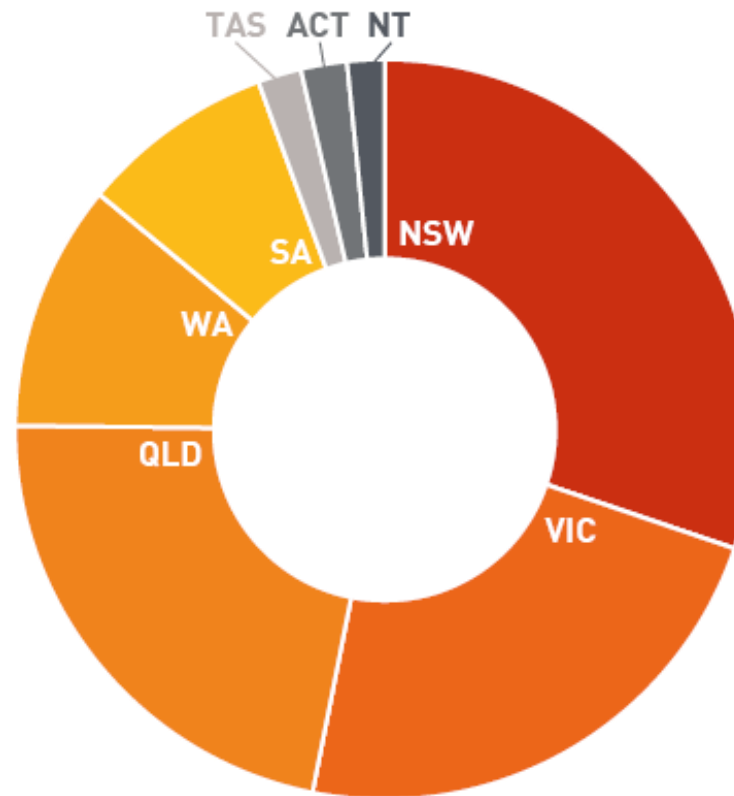
それは、公立病院のサービス(入院、救急、外来といった出来事)を比較し評価する方法を提供するものであり、臨床上の複雑さに基づいてウェイト付けがされている。

National funding payments



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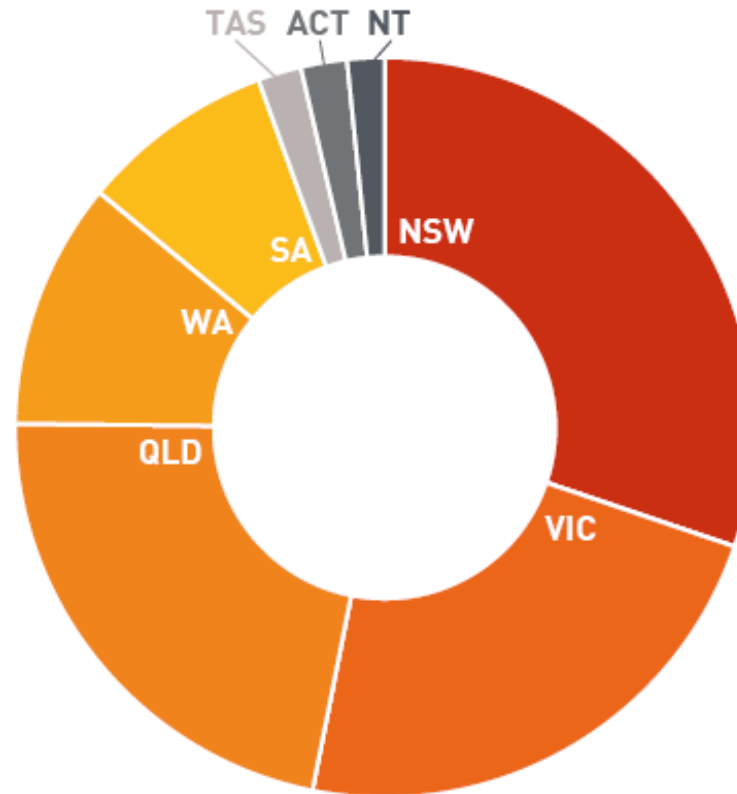
**Number of
estimated NWAU
provided by states
and territories for
commonwealth
activity based
funding purposes**



+	New South Wales	1,731,562
+	Victoria	1,314,041
+	Queensland	1,263,410
+	Western Australia	618,967
+	South Australia	486,690
+	Tasmania	108,968
+	Australian Capital Territory	115,604
+	Northern Territory	93,194

国から州・準州に対する支払額

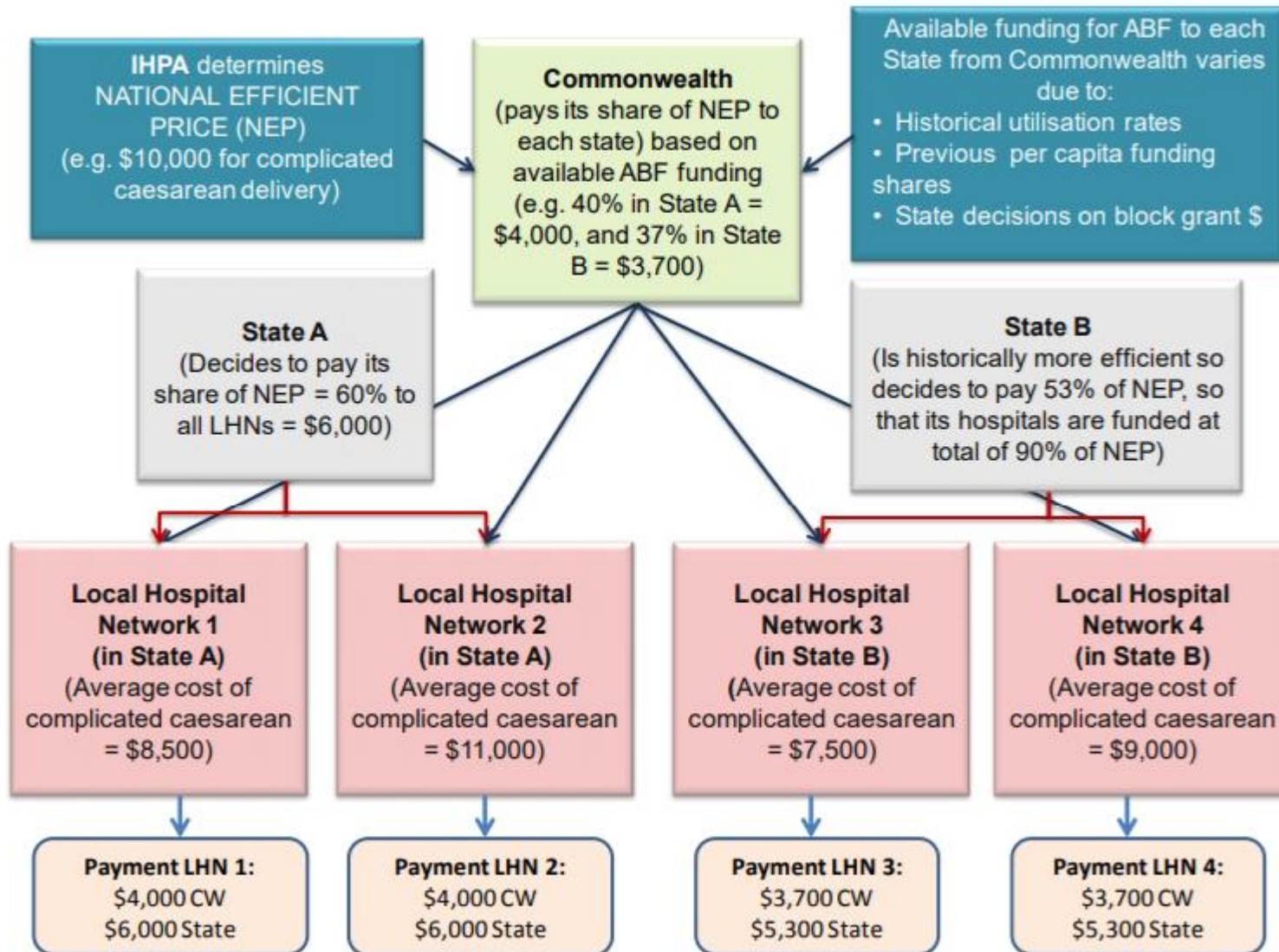
国から活動量に基づく
財源配分が行われる時
に使われた州や準州の
全国加重活動単位の
評価値



州と準州の名称と支払額

- + New South Wales 1,731,562
- + Victoria 1,314,041
- + Queensland 1,263,410
- + Western Australia 618,967
- + South Australia 486,690
- + Tasmania 108,968
- + Australian Capital Territory 115,604
- + Northern Territory 93,194

Some benefits ...

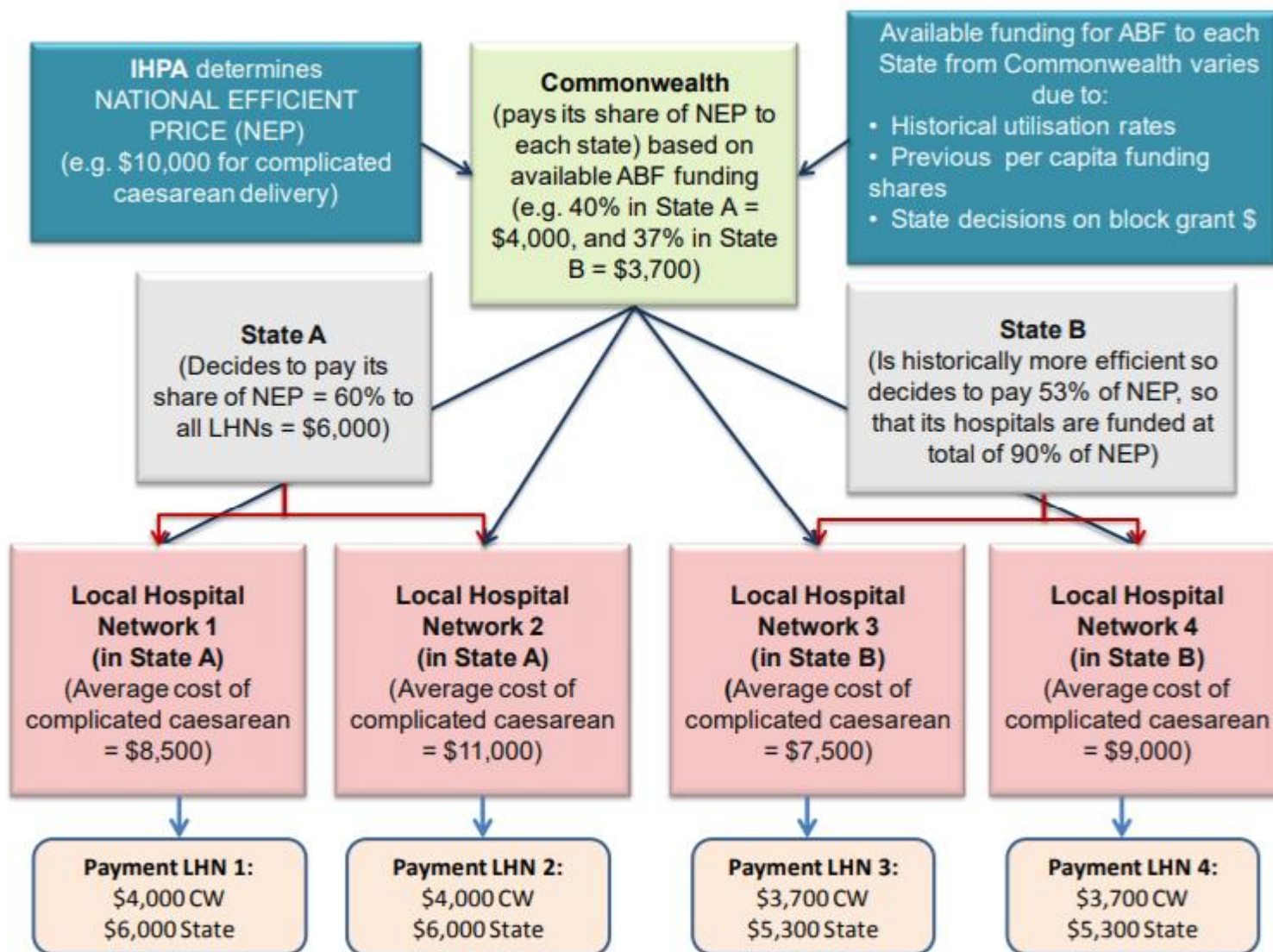


- Allows local health districts and governments to **meet the needs** of a specific population
- Creating an **equitable** commissioning system and allocation of funds

活動量に基づく財源配分の長所…



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- 地方の医療圏や政府が特定の住民集団のニーズに応え易くする
- 財源の公平な配分の仕組み作りにつながる



Activity-Based Funding of Hospitals and Its Impact on Mortality, Readmission, Discharge Destination, Severity of Illness, and Volume of Care: A Systematic Review and Meta-Analysis

Karen S. Palmer^{1*}, Thomas Agoritsas^{2,3}, Danielle Martin⁴, Taryn Scott², Sohail M. Mulla², Ashley P. Miller⁵, Arnav Agarwal², Andrew Bresnahan⁶, Afeez Abiola Hazzan², Rebecca A. Jeffery⁷, Arnaud Merglen⁸, Ahmed Negm⁹, Reed A. Siemieniuk¹⁰, Neera Bhatnagar¹¹, Irfan A. Dhalla¹², John N. Lavis^{2,13}, John J. You², Stephen J. Duckett¹⁴, Gordon H. Guyatt²

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Evidence ...

- Transitioning to ABF is associated with important policy- and clinically-relevant changes
- Substantial increases in admissions to post-acute care following hospitalization = implications for system capacity and equitable access to care
- Decision-makers should plan for likely increases in post-acute care admissions, and aware of uncertainty around impacts on other critical outcomes

エビデンス …

- 活動量に基づく財源配分に移行することは、重要な政策の変化、臨床上の変化につながる。
- 急性期病院を退院した後に続く入院に対する需要が急増する。これは、医療制度の対応能力、ケアへの公平なアクセス確保が問われることを意味する。
- 政策当局は、急性期後の入院需要の増加に対応する計画を立てねばならないし、他の臨床上のアウトカムに何らかの影響があることに留意する必要がある。

2. My Health Record

- **Approximately 23% of Australia's population is registered for a My Health Record**
- My Health record allows consumers to control what goes into their health record, and who is allowed access to it. You can choose to share your health information with doctors, hospitals and other healthcare providers



2. My Health Record

- オーストラリア国民の約23%が My Health Record に登録している。
- My Health record は、国民一人ひとりが自分の電子診療録に何を記載するのか、誰がそれにアクセスできるかを決める権限を与えた仕組みである。
国民は、自分の電子診療録を医師、病院その他の医療サービス提供者と共有することを選択することができる。





Find out more



Trials / Got a letter



What's new?



Privacy and Security



For Healthcare Providers

Welcome to My Health Record

My Health Record is a secure online summary of your health information. You can control what goes into it, and who is allowed to access it. You can choose to share your health information with your doctors, hospitals and other healthcare providers.

Want to know more?

- Visit our [frequently asked questions](#);
- Find out about the [benefits of having a record](#);
- Learn more about [privacy and security](#); or
- View the [latest My Health Record statistics](#).



Register

Register yourself or register your children for a My Health Record.

(If you have an MCO as if this is the first



Some benefits ...

- Improved coordination of care (e.g. new GP can easily access your previous records)
- Improved patient safety (e.g. prescription and dispense records are uploaded—reduced risk of medication error)
- Disease risk screening and personalised healthcare decisions (e.g. using an algorithm, individuals at high risk of certain conditions can be easily identified)

My Health Recordの長所…

- 医療ケアの組み合わせを向上させることができる
(例) 初めて受診したプライマリケア医師が患者の過去の診療録に容易にアクセスできる)
- 患者の安全を向上できる
(例) 処方や投薬の記録が分かるので処方薬ミスのリスクが減少
- 疾病リスク検査や個別化医療に役立つ
(例) アルゴリズムを使うことによって、ある特定の疾患のリスクが高い人を簡単に判定できる

Some precautions ...



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The E-health Literacy Demands of Australia's My Health Record: A Heuristic Evaluation of Usability

by Louisa Walsh, MStratComm; Bronwyn Hemsley, PhD; Meredith Allan; Natalie Adams; Susan Balandin, PhD; Andrew Georgiou, MSc, FCHSM, FACHI, FSc, RCPA, PhD; Isabel Higgins, RN, MN, PhD; Shaun McCarthy, LLB; and Sophie Hill, MA, PhD

Some precautions ...

- Heuristic evaluation demonstrated that many usability-related elements of My Health Record cater poorly to users at risk of having low e-health literacy
- Usability issues have been identified as an important barrier to use of personal health records internationally, and the findings of this evaluation demonstrate that usability issues may be substantial barriers to the uptake and use of My Health Record

幾つかの注意点・・・

- 評価研究によって発見されたこと (Heuristic evaluation) は、My Health Record の使い勝手をよくすると思い込んでいた要素の多くが、e-health に対する理解度が浅い利用者には役立っていないということ。
- 使い勝手の問題は、PHRを国際的に利用しようとする場合に重大な障害になることが確認されている。この発見は、My Health Recordの活用をさらに高めようとする時に、使い勝手の問題が大きな障害になることを示唆している。

The value of ehealth

- **Electronic Health Records** decrease nurse but increase doctor data entry times, improve record completeness, but appear *not* associated with improvements in care quality
- **Care pathways and plans** reduce practice variation by increasing compliance with standards of care, can improve process metrics (e.g. test ordering, drug order sets) but typically do *not* impact outcomes (e.g. LOS, death)

- **Electronic Health Records** 電子診療録は、データ入力時間については看護師の負担を減らし医師の負担を増やす。しかし、医療の質向上には関係していないように思われる。(ここの訳は要再チェック)
- **Care pathways and plans** 治療パスとプランは、標準的治療への一致度を高めることによって医療のバラツキを減らし、治療プロセスの合理性を高めることができる(例えば、検査指示や投薬指示内容)、しかし、典型的には治療結果に影響を与えない(例えば、入院日数や死亡)

3. Artificial Intelligence (AI)

**In an era where software can detect tumours faster
and more cheaply than radiologists and oncologists
AI is set to transform how health care is delivered
and consumed**



3. 人工知能 (AI)

ソフトウェアが放射線医(画像診断医)や癌専門医よりも早くかつ安く腫瘍を探索できる時代においては、ヘルスケアが提供され消費される在り方を AI が変革することになる。



Some benefits ...



- AI is changing the way we do things and has the potential to help solve complicated problems in health care
- Ability to leverage health information technology (HIT) improving patient care and population health, and reduce healthcare expenditures

AI の長所 ...



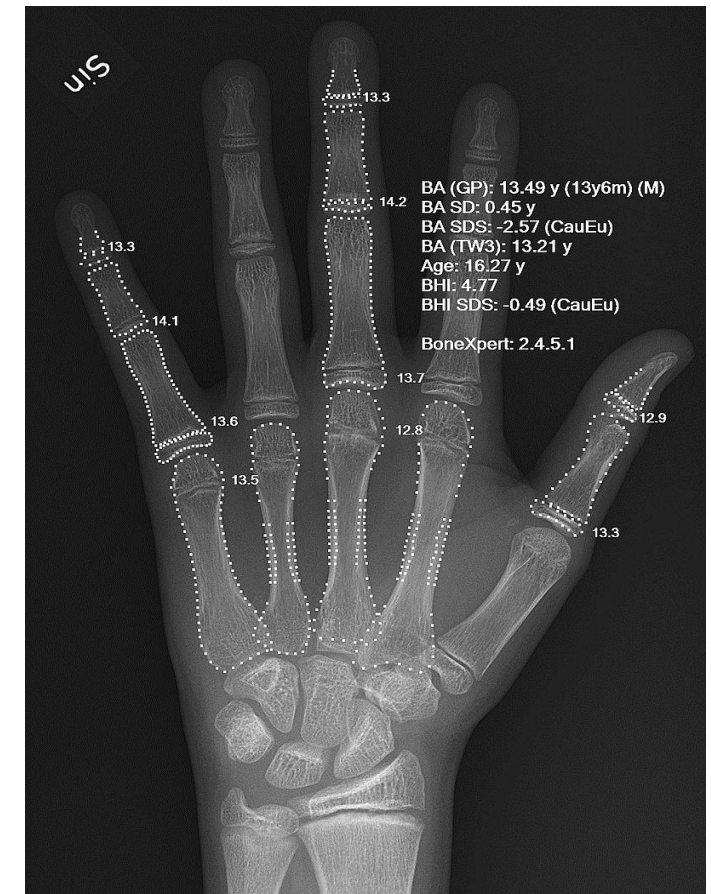
- AI は我々が物事に取り組む方法を変革したり、ヘルスケアにおける複雑な問題を解決することを助けてくれる潜在能力を有している。
- 医療情報技術(HIT)が患者ケアや人間集団の健康を向上させたり医療費を削減したりする力を強化する。

Example



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- AI in health care is the use of software and algorithms to analyse, detect and make predictions using complex health data
- E.g. X-rays with automatic calculation of bone age using computer software



[Häggström, 2017. Xray of hand]

例



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- ヘルスケアにおける AIとは、複雑な医療データを使って分析、探索、予測するためのソフトウェアとアルゴリズムの利用である。
- (例) コンピューター・ソフトウェアを使って骨年齢を自動的に計算するX線装置。



Some thoughts on ehealth ...



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- E-health is a **complex intervention in a complex system**
- E-health may be **amongst the most complex** of health service interventions we have ever attempted
- It's not technical, its **socio-technical**

- E-healthは、複雑なシステムにおける複雑な介入である
- E-healthは、我々がかつて経験したことのない最も複雑な医療サービスの介入かも知れない。
- それは、技術的ではなく社会技術的なものである。

Some thoughts on ehealth ...



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- Adaptation continues
“post implementation” i.e.
implementation never
stops
- First ‘law’ of informatics:
focus on the problem not
the technology



ehealth について思うこと...

- ehealthへの取り組みは“次は何か”の繰り返しである。つまり、その実行は止まるところがない。
- インフォマティクスの第一の法則は、テクノロジーにではなく**問題にフォーカス**することである。



Implementation of AI



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Editorial

Artificial intelligence in health care: within touching distance



Replacing the doctor with an intelligent medical robot is a recurring theme in science fiction, but the idea of individualised medical advice from digital assistants like Alexa or Siri, supported by self-surveillance smartphone data, no longer seems implausible. A scenario in which medical information, gathered at the point of care, is analysed using sophisticated machine algorithms to provide real-time actionable analytics seems to be within touching distance. The creation of data-driven predictions underpins personalised medicine and precision public health. Medical practice has so far been largely unchanged by the digital revolution that has

in which AI can bring benefits to health care. Although some providers have moved to electronic health records, information contained is often produced for purposes other than research, for example, reimbursement or audit, and therefore could be confounded, inaccurate, or lack the clinical resolution to yield meaningful insights. Large amounts of big health data are still recorded as text and extracting clinically significant information using natural language processing methods is a challenging task.

Despite the excitement around these sophisticated AI technologies, very few are in clinical use. Translating technical success to meaningful clinical impact is the



ian Hooton/Science Photo Library

Implementation of AI

- Despite the excitement around these sophisticated AI technologies, very few are in clinical use
- Translating technical success to meaningful clinical impact is the next great challenge
- This step requires development of a framework for assessing and comparing the performance of AI technology

医療へのAIの導入

- 洗練された AI 技術を巡る熱狂にも関わらず、臨床現場での使用は未だほとんどない。
- AI の技術上の成功を臨床に対する意義のあるインパクトに変革することは、次なる偉大なチャレンジである。
- そのためには、AI 技術による臨床上の成果を評価し比較する仕組みを構築することが求められる。

4. Big data: CareTrack Kids

- By analysing the electronic health records of children in Australia aged 0-5 years we were able to estimate adherence to best practice guidelines across 17 common paediatric conditions



4. ビッグデータ: CareTrack Kids

- オーストラリアの0歳～5歳の子供の電子診療録を分析することによって、我々は、よく見られる17の小児疾患の医療においてベスト・プラクティス・ガイドラインとの一致度を評価することができた。



4. Big data: CareTrack Adults



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- Computer-assisted telephone interviews and retrospective review of the medical records (for 2009–2010) of a sample of at least 1000 Australian adults to measure compliance with 522 expert consensus indicators representing appropriate care for 22 common conditions

4. ビッグデータ: CareTrack Adults



- コンピューターに支援された電話インタビューという方法を使って、1千名以上のオーストラリアの大人たちの2009年～2010年の診療録を遡及して調査、よくある22の疾患について適切なケアであると専門家たちのコンセンサスが得られている522の指標に対する一致度を計測した。

Results: CareTrack Adults



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Condition

Coronary Artery Disease

Dyspepsia

Chronic Heart Failure

Hypertension

Low Back Pain

Panic Disorder

Chronic Obstructive Pulmonary Disease

Diabetes

Venous thromboembolism

Osteoporosis

Depression

Atrial Fibrillation

Cerebrovascular Accident

Community Acquired Pneumonia

Osteoarthritis

Preventive Care

Surgical Site Infection

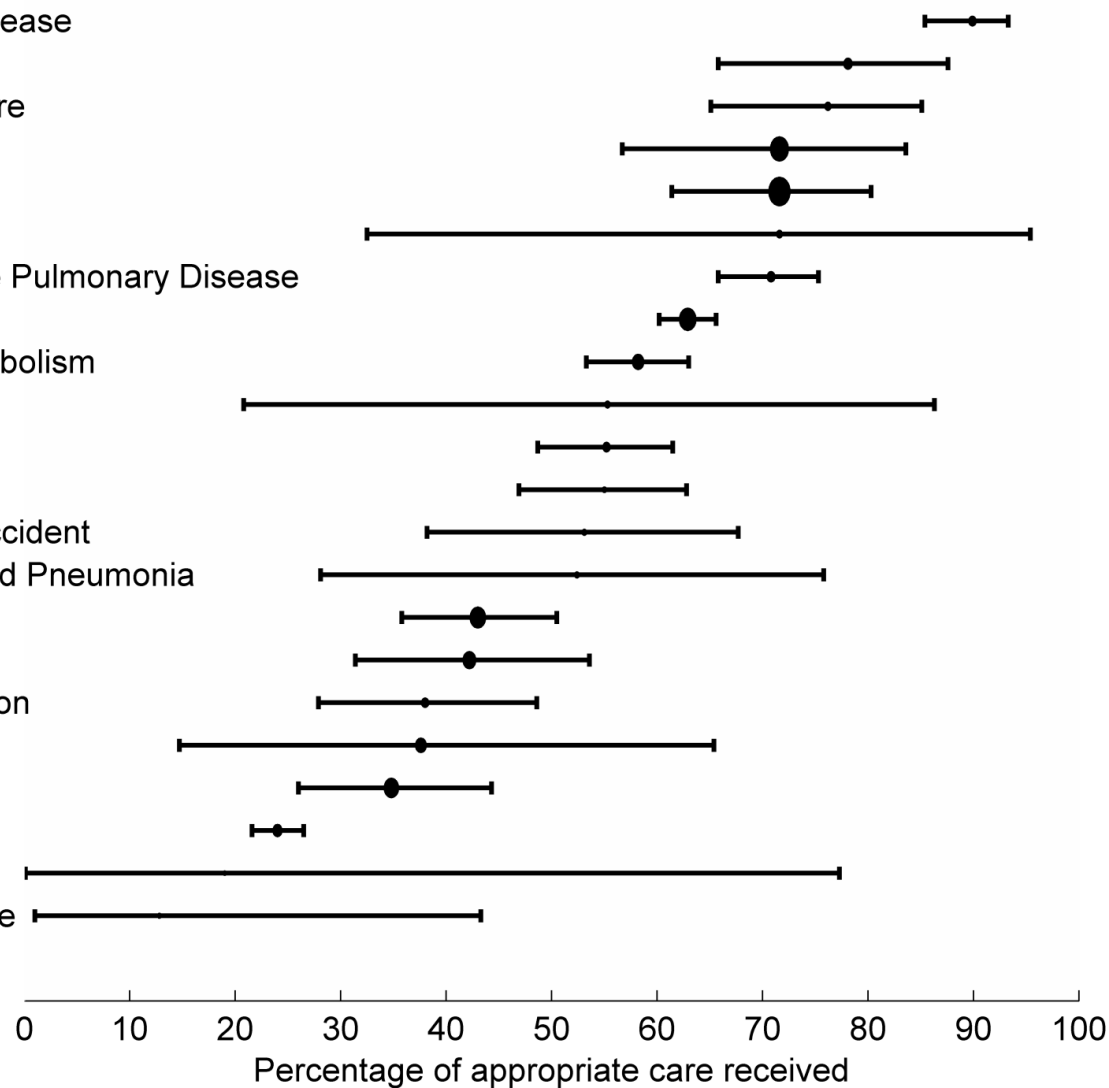
Asthma

Hyperlipidemia

Obesity

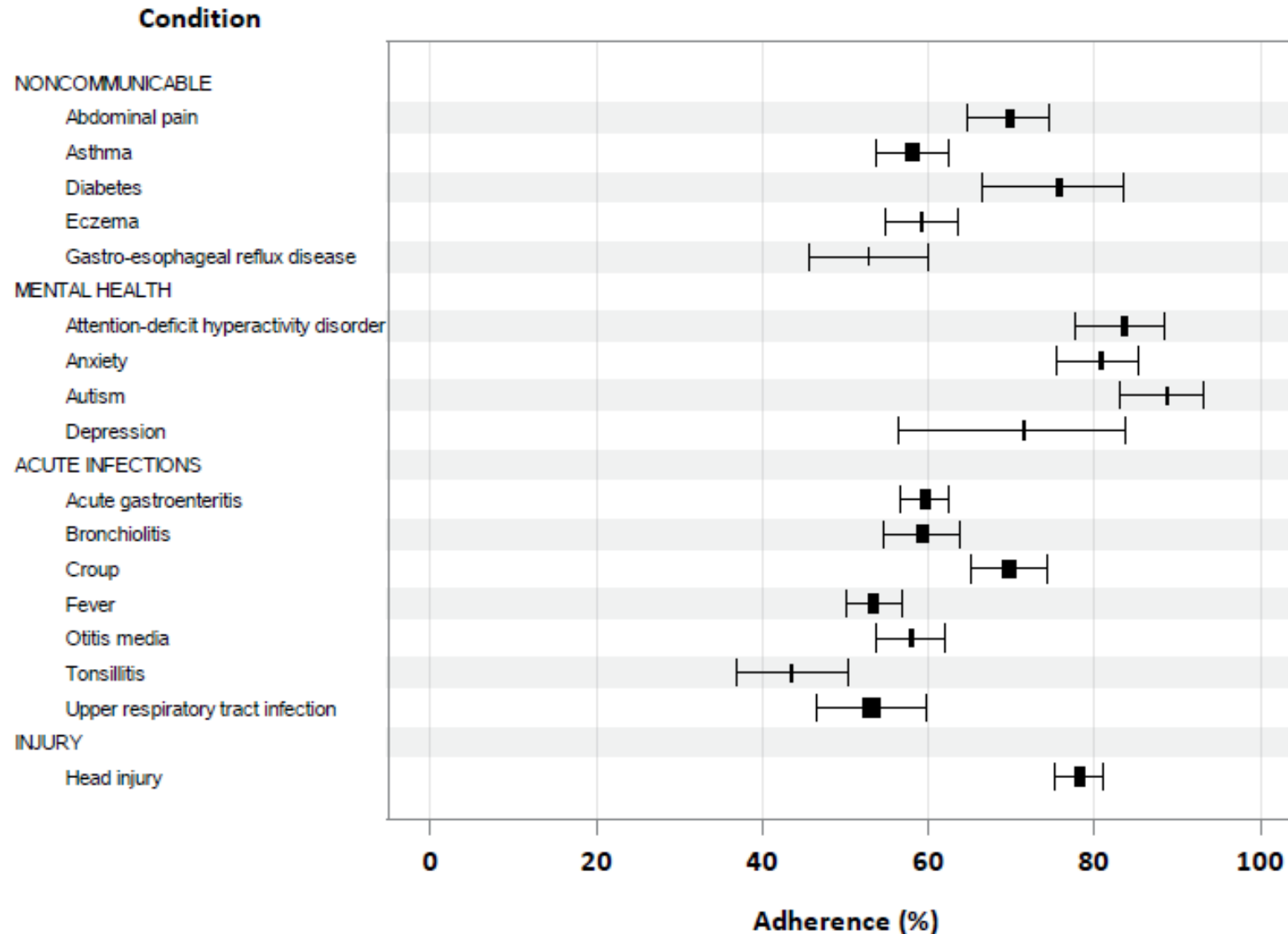
Antibiotic use

Alcohol Dependence



[Runciman WB, Hunt TD, Hannaford NA, Hibbert PD, Westbrook JI, Coiera EW, Day RO, Hindmarsh DM, McGlynn EA, and Braithwaite J. (2012) CareTrack: assessing the appropriateness of health care delivery in Australia. *Medical Journal of Australia*, 197:2.]

Results: CareTrack Kids



[Braithwaite J, Hibbert P, Jaffe A, White L, Cowell C, Harris M, Runciman W, Hallahan AR, Wheaton G, Williams H, Murphy E, Molloy CJ, Wiles LK, Ramanathan S, Arnold G, Ting HP, Hooper TD, Szabo N, Wakefield JG, Hughes CF, Schmiede A, Dalton C, Dalton S, Holt J, Donaldson L, Kelley E, Lilford R, Lachman P, and Muething S. (2018) The quality of health care for children in Australia, 2012-2013. *Journal of the American Medical Association*, 319(11):1113-1124.]

5. Nursing in Australia

- To become a Registered **Nurse in Australia** you need to complete a 3-year Bachelor of **Nursing**, which is available at most **Australian** universities
- After you complete your Registered **Nurse** course, you have to apply to the AHPRA (**Australian** Health Practitioner Regulation Agency) to practice as a Registered **Nurse**

5. Nursing in Australia

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5. オーストラリアの看護師教育

- オーストラリアで正看護師になるには、大学で3年間看護学を学ぶ必要がある。看護学科はほとんどの大学に開設されている。
- 看護学科を修了した後、正看護師として働くためには、AHPRA (Australian Health Practitioner Regulation Agency) に登録しなければならない。

Nurse-to-patient ratio

The minimum nurse staffing ratios in Australia necessary for **safe** patient care are **1:4** for morning shifts, **1:4** for afternoon shifts and **1:7** for night shifts, relative to the number of patients on the ward

But ... most hospitals have an average nurse to patient ratio of **5.3**

看護師配置基準



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患者の安全を確保するための病棟における看護師の配置基準
(看護師と患者数の比率)は次のようになっている。

午前 1対4

午後 1対4

夜間 1対7

しかし、多くの病院では、平均で1対5.3になっている。

Nurse-to-patient ratio



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Check for updates

European Journal of
Cardiovascular
Nursing



EUROPEAN
SOCIETY OF
CARDIOLOGY®

Review Article

The effect of nurse-to-patient ratios on nurse-sensitive patient outcomes in acute specialist units: a systematic review and meta-analysis

Andrea Driscoll¹, Maria J Grant², Diane Carroll³, Sally Dalton⁴, Christi Deaton⁵, Ian Jones⁶, Daniela Lehwaldt⁷, Gabrielle McKee⁸, Theresa Munyombwe⁹ and Felicity Astin¹⁰

European Journal of Cardiovascular Nursing
2018, Vol. 17(1) 6–22

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DOI: 10.1177/1474515117721561

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Nurse-to-patient ratio



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- Nurse-to-patient ratios influence many patient outcomes, most markedly in hospital mortality
- Requirements of patients differ between specialties
- **More nurses = safer patients**



看護師配置基準



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- 患者数に対する看護師数の割合は、多くの患者のアウトカム、とりわけ病院における死亡率に大きな影響を与えている。
- 患者が必要とする看護師数は、診療の専門分野によって異なる。
- **看護師が多いほど患者は安全になる**





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How is technology advancing nursing in Australia?



Nursing Informatics 2016

W. Sermeus et al. (Eds.)

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doi:10.3233/978-1-61499-658-3-329

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大学の看護学科の授業に看護情報学を組み込む

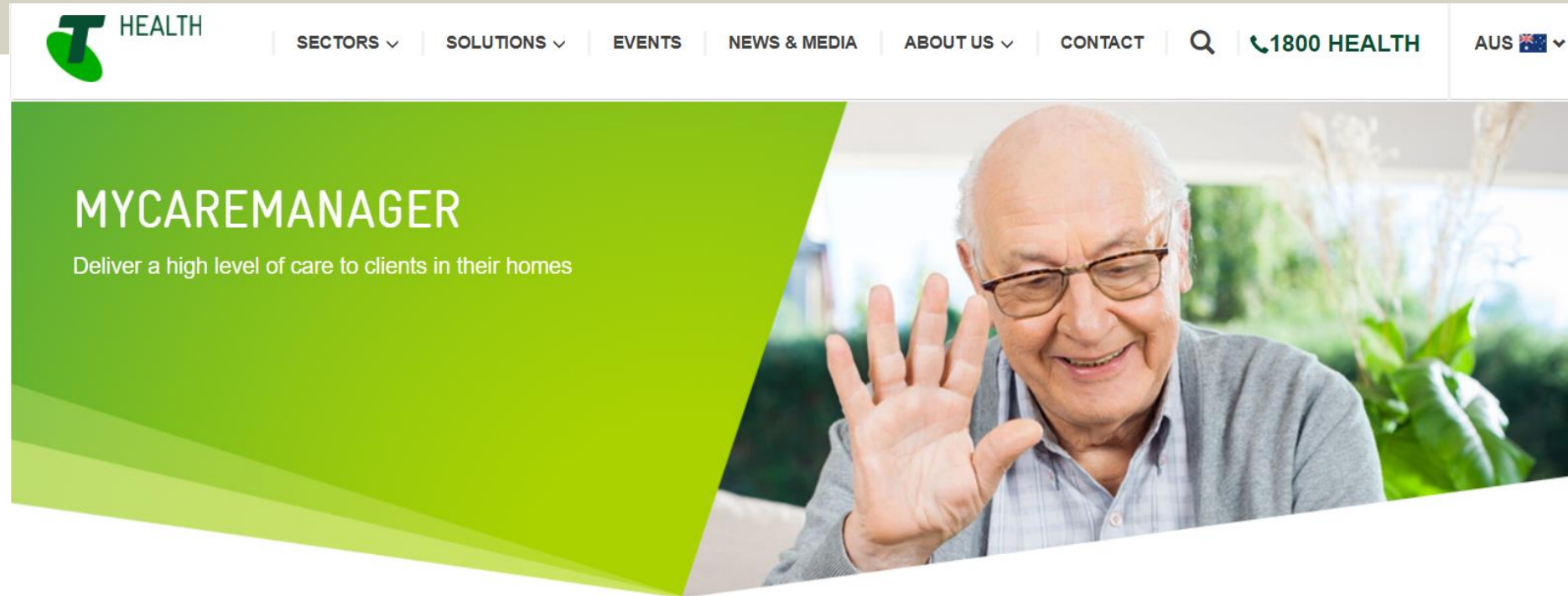
Embedding Nursing Informatics Education into an Australian Undergraduate Nursing Degree

Elizabeth CUMMINGS^{1a}, Eun Hee SHIN^a, Carey MATHER^a, Evelyn HOVENGA^b

^a*School of Health Sciences, University of Tasmania, Australia*

^b*eHealth Education Pty Ltd, Melbourne, Australia*

Telehealth



患者が処方薬を正しく服用しているか、あるいは患者の血圧を看護師が遠隔モニターするツール

Through Telstra [MyCareManager](#) telehealth platform, nurses are able to watch patients take their medicine or check their blood pressure

PAAS/ MK4000



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患者が受診する時の利便性を高めるツール

- The MK4000 kiosk and Patient Automated Arrival System (PAAS)
- Patients scan a barcoded appointment letter to self-check in
- A map on the kiosk screen points the patient to their clinic's waiting room as the system informs staff of the patient's arrival



Finally: on the complexity of implementation



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**Why is implementation of
ehealth (and everything
else!) so difficult?**

The 'knowledge pipeline'

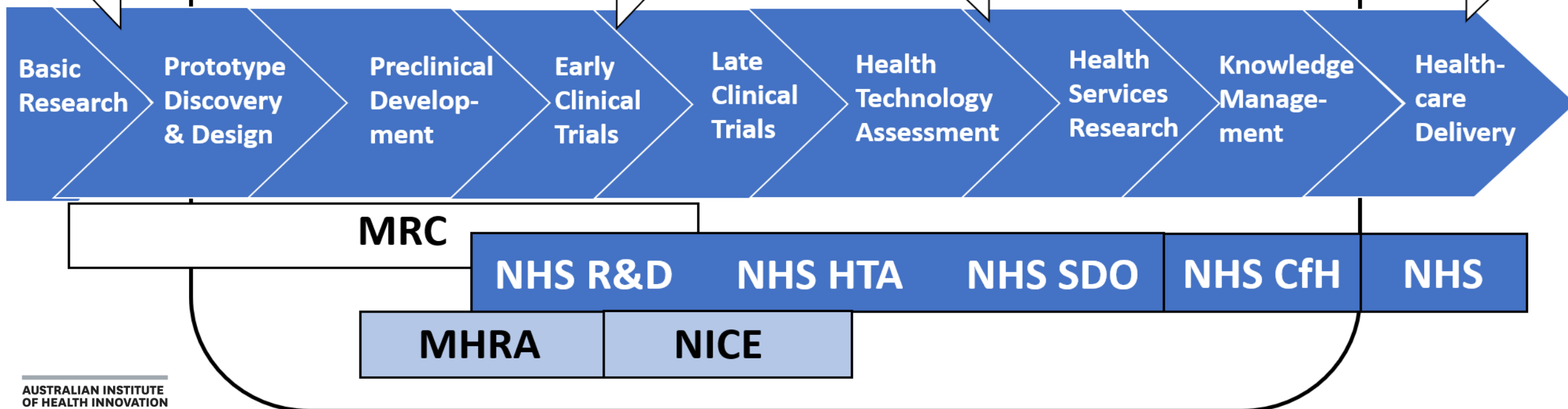


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Critical Path within UK health research

"First Gap in Translation"

"Second Gap in Translation"

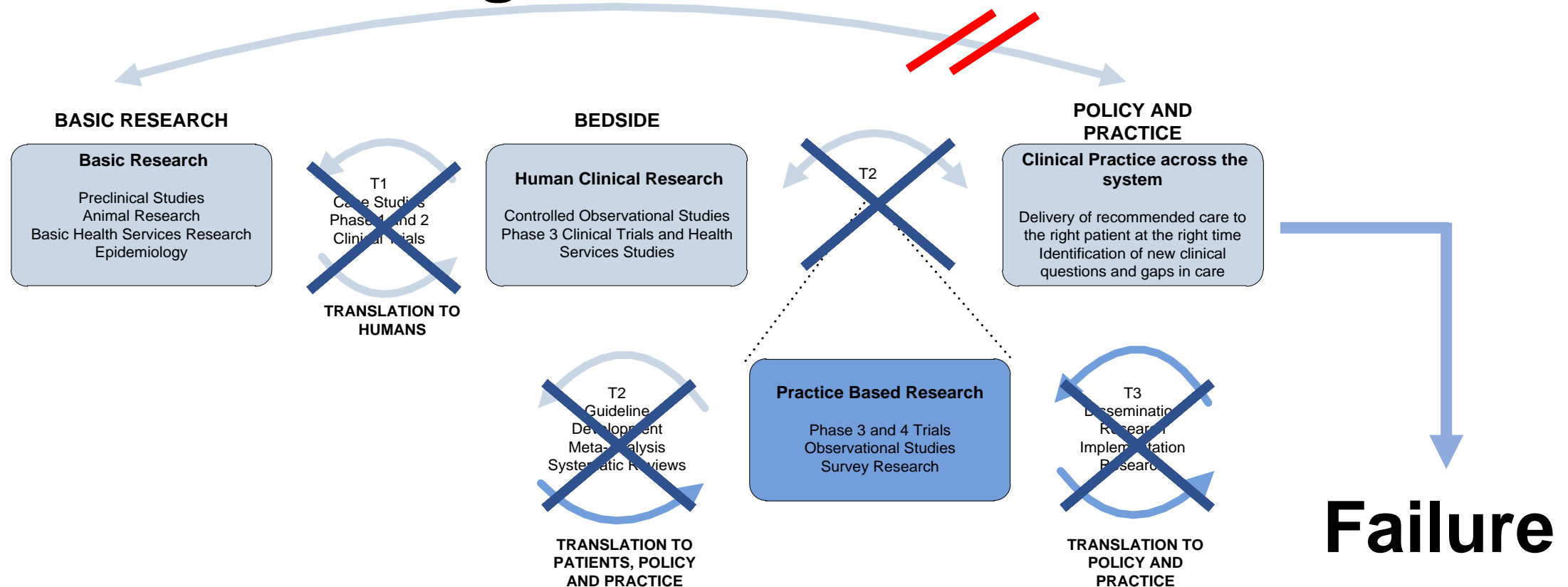


The pipeline is an idealisation



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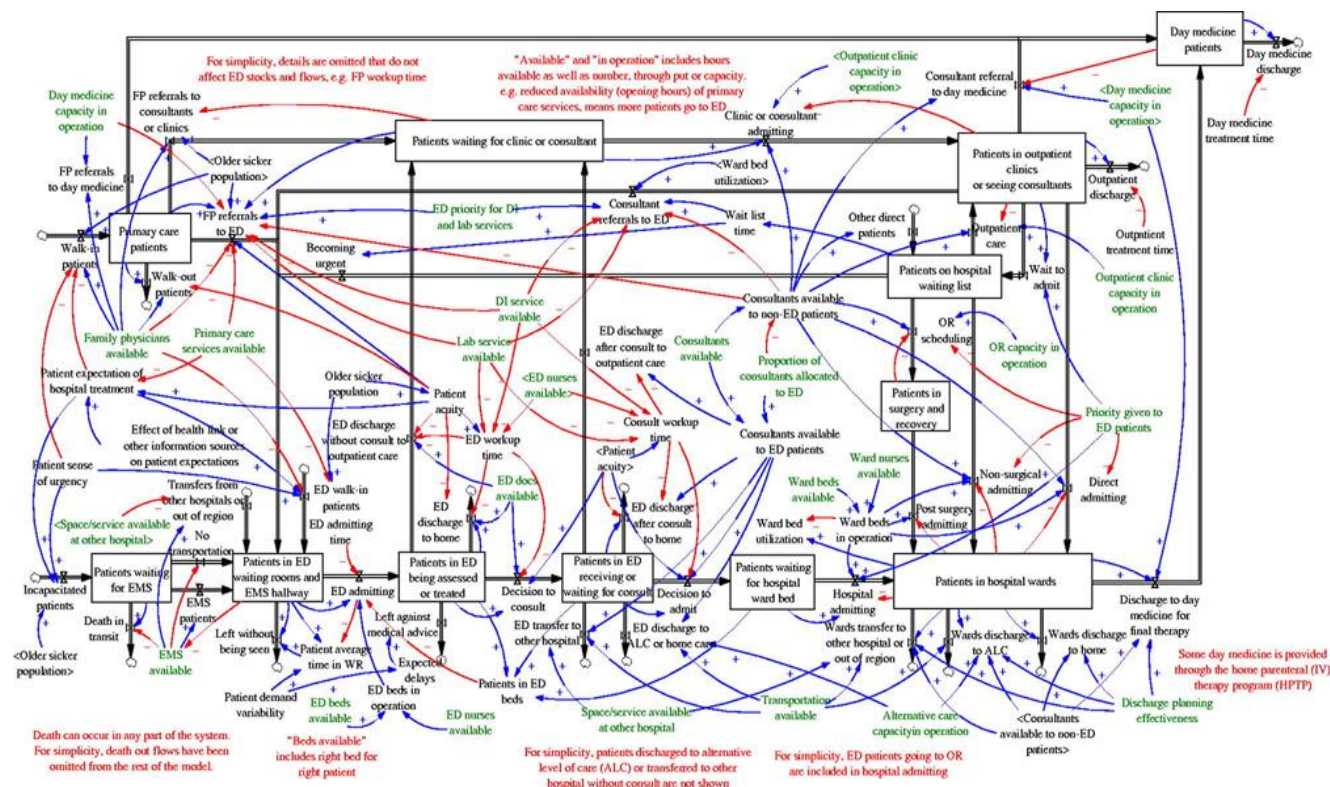
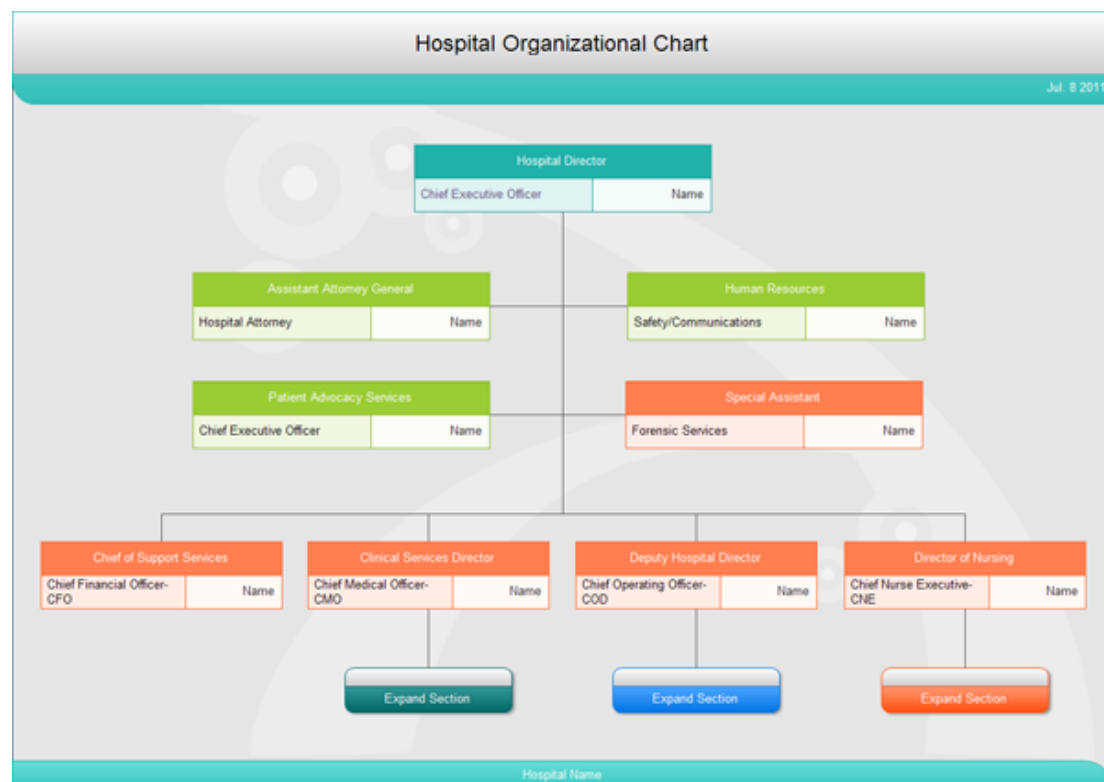
Blockages and fractures



Enter complexity science



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Complexity Science in Healthcare: *A WHITE PAPER*



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OF HEALTH INNOVATION
Faculty of Medicine and
Health Sciences

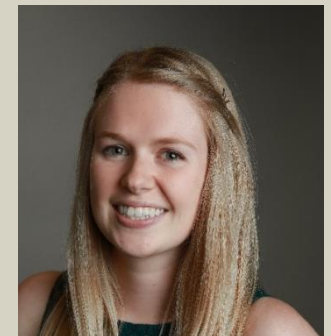


Complexity Science in Healthcare

ASPIRATIONS, APPROACHES,
APPLICATIONS AND
ACCOMPLISHMENTS: A WHITE PAPER

Jeffrey Braithwaite, Kate Churruarín, Louise A Ellis, Janet Long, Robyn
Clay-Williams, Nikki Damen, Jessica Herkes, Chiara Pomare, Kristiana
Ludlow

Australian Institute of Health Innovation, Macquarie University, Australia



Finally: on the complexity of implementation



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- Improving performance in the face of complexity is hard (flattened landscapes manifest as inertia)
- Modularity (e.g. bundles) and middle-out strategies can minimise complexity
- Information apoptosis (programmatic decommissioning) can reduce complexity
- Diminishing returns in additional fitness for same effort as you move up the fitness peak

最後に： 実効の複雑性について



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- 複雑性に直面してパフォーマンスを向上させることは厳しい
(flattened landscapes manifest as inertia)
- 規格化(例えば: 束ねる)とmiddle-out strategies は複雑性を最小化できる。
- 情報のapoptosis(細胞消滅) (programmatic decommissioning プログラムに従った廃棄) は複雑性を減らすことができる。
- 適合性のピークを高めようとする時に、同じ努力で追加の適合性を得ようすると成果を減じることになる。

Recent Published Books

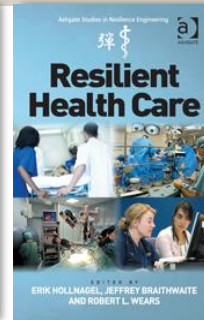


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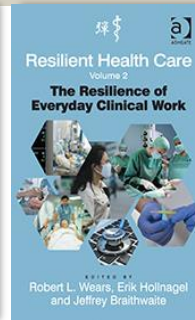
Published



2010



2013



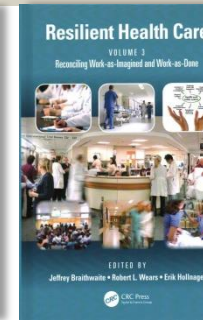
2015



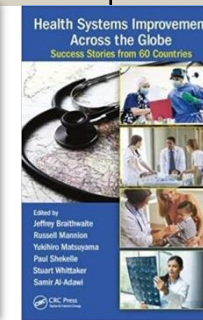
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2016



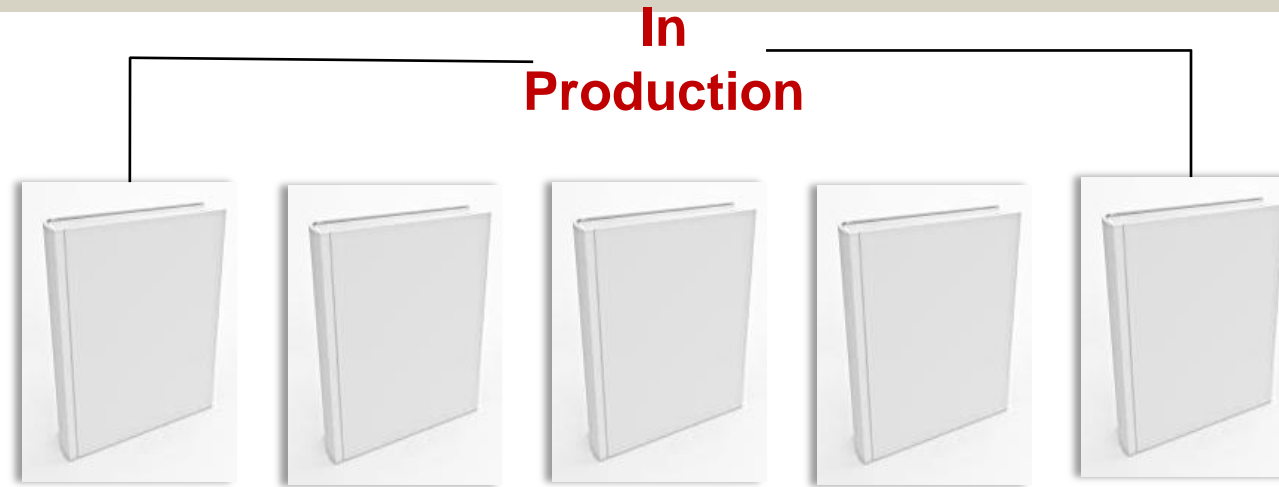
2017



2017

- Culture and Climate in Health Care Organizations
- Resilient Health Care
- The Resilience of Everyday Clinical Work
- Healthcare Reform, Quality and Safety: Perspectives, Participants, Partnerships and Prospects in 30 Countries
- The Sociology of Healthcare Safety and Quality
- Reconciling Work-as-imagined and Work-as-done
- Health Systems Improvement Across the Globe: Success Stories from 60 Countries

Forthcoming Books



- **Health Care Systems: Future Predictions for Global Care**
- **Gaps: the Surprising Truth Hiding in the In-between**
- **Surviving the Anthropocene**
- **Field Guide to Resilient Health Care**
- **Counterintuitivity: How your brain defies logic**

Contact details



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Wikipedia: http://en.wikipedia.org/wiki/Jeffrey_Braithwaite