THOR

The Health and Occupation Research network

21st Century Occupational Health Reporting and Surveillance

Report of a workshop on The Health and Occupation Research network reporting schemes

29 March 2018, Manchester, UK

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http://www.coeh.man.ac.uk/thor

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EXECUTIVE SUMMARY

Reliable data on occupational ill-health is important for identifying priorities in policy interventions as well as assessing the effectiveness of such interventions. One source of occupational ill-health data is The Health and Occupation Research (THOR) network, hosted by the Centre for Occupational and Environmental Health (COEH) at the University of Manchester. A workshop was held on 29 March 2018 to bring together experts in the field of health surveillance, digital data collecting and data mining techniques to explore opportunities for innovations in data collection, data analysis and data insights which could provide the UK with a cost effective, sustainable model to enable evidence based policy decisions in the area of work and health. Following a number of plenary presentations, breakout discussion sessions were held on 'Technological advances and data linkage' and 'Physician engagement'. Various opportunities were identified to improve the current reporting schemes, which ranged from relatively minor changes (eg improvement of feedback to reporters) to more substantial activities (developing an accessible database, utilising mobile technologies, and using routine health data records). Following the outcomes of this workshop, a joint team from the Health and Safety Executive (HSE) and COEH will meet to develop one or more joint proposals to develop methods to improve occupational ill-health data in the UK.

BACKGROUND

Vital to the prevention of ill-health associated with work, as well as the promotion of health at work and the maintenance of 'work ability' is the availability of good quality data regarding work-related ill-health (WRIH) burden and risks. Such data are critical in risk assessment central to preventing WRIH as enshrined in regulatory guidance, as they inform the risk assessments and management process.

A key source of WRIH data in the UK is The Health and Occupation Research (THOR) network[1], hosted by the Centre for Occupational and Environmental Health (COEH) at the University of Manchester and partially funded by the Health and Safety Executive (HSE). Having commenced with chest physician reporters in 1989 THOR, as it is now known, comprises a number of schemes to enable different groups of physicians (chest physicians, dermatologists, occupational physicians and general practitioners) to voluntarily report incident cases of WRIH throughout the UK (Carder et al., 2017). THOR is an important source of data for HSE, contributing to the HSE Annual Health and Safety Statistics publication (THOR ill-heath statistics have been granted National Statistics status by the UK Statistics Authority) and being HSE's preferred data source for asthma and dermatitis[2][3]. In general, THOR data are one of the main sources of statistical information with which HSE (and others) determine their priorities and work programmes on occupational health (Money et al., 2015).

Central to the longevity of THOR is the loyalty of the participating physicians coupled with an established reporting structure and well developed methodologies for determining incidence, trends in incidence and identifying novel causes. It is therefore important to ensure that the necessary steps are taken for THOR to continue as a valuable WRIH resource into the future. However, as THOR is a voluntary reporting scheme and physicians do not get paid to participate, there are some problems in terms of recruitment of physicians to the schemes, and reporting fatigue.

In addition, the rapid increase of digitisation in the health domain and the increased

1 http://www.coeh.man.ac.uk/thor
2 http://www.hse.gov.uk/statistics/preferred-data-sources.pdf
3 http://www.hse.gov.uk/statistics/tables/index.htm

availability of a range of communications channels available to citizens and practitioners, has greatly enhanced availability of health related data. These developments, taken together, provide an environment in which the opportunities for future occupational health surveillance and reporting look different to current practices. This workshop aims to explore these.

Within the University of Manchester there are several other reporting schemes (e.g. TARN – Trauma Audit and Research Network[4]; and NDEC – National Drug Evidence Centre[5]). In addition, the University of Manchester leads the Health e-Research Centre[6], which specifically aims to improve the collection and use of health data, and has expertise in health informatics[7]. Hence, there is a wide and high level of expertise in the area of collection and use of health data. We intended to bring together a group of interested scientists from University of Manchester as well as HSE to discuss the future need for occupational ill-health data and how to best collect these, making best use of existing data sources, whilst also making sure that we can continue to monitor trends in occupational ill-health over time.

AIM OF THE WORKSHOP

The aim of the workshop was to bring together experts in the field of health surveillance, digital data collecting and data mining techniques to explore opportunities for innovations in data collection, data analysis and data insights which could provide the UK with a cost effective, sustainable model to enable evidence based policy decisions in the area of work and health.

Specific objectives included:

1) Exploration of opportunities for innovations in the occupational health reporting schemes, including digital methods for data recording, use of social media, data mining, clinic practices etc.,
2) Prioritisation of potential innovations in the context of impact (both negative and positive) on tracking of occupational ill-health and the ability to compare with

[4] https://www.tarn.ac.uk/
[5] http://research.bmh.manchester.ac.uk/epidemiology/NDEC
[6] https://www.herc.ac.uk/
[7] http://research.bmh.manchester.ac.uk/healthinformatics

historic data

3) Draft plan for developing and implementing innovations.

PROGRAMME OF THE WORKSHOP

The workshop consisted of a number of plenary presentations in the morning followed by a break out session to discuss different themes. The programme of the workshop is provided on the Page 7. The presentations provided an overview of the THOR reporting schemes as well as a presentation on current approaches to engage with physicians. There was also a presentation on HSE's priorities for occupational health data, while two presentations provided insights into some ongoing work at the University of Manchester in relation to novel methods for data collection and the availability and use of databases with routinely collected health data.

The afternoon session involved two discussion groups discussing the following themes:

Group 1

- Technological advances,
- Data linkage and data mining, and

Group 2

- Physician engagement.

LOCATION - Room 2.05

9.45-10.00	Welcome and introduction (Professor Martie Van Tongeren)
10.00-10.30	History of THOR (Dr Melanie Carder)
10.30-11.00	Novel methods for data collection (Prof Niels Peek)
11.00-11.15am	Coffee break (room G.33)
11.15-11.45	Health and Safety Executive priorities and needs (Professor Andrew Curran)
11.45–12.15	Physician engagement (Dr Dil Sen and Dr Martin Seed)
12.15-13.15	Lunch (room G.33)
13.15-13.45	Databases of electronic health records in the UK (Professor Evangelos Kontopantelis)
13.45-14.00	Introduction to breakout groups
14.00-15.00	Breakout group discussions Breakout group 1 Technological advances and data linkage (led by Prof Andrew Curran) Breakout group 2 Physician engagement (led by Dr Dil Sen/Martin Seed)
3-3.15pm	Coffee break (Room G.33)

LOCATION - Room 2.05

3.15-4pm	Report back from breakout groups and discussion
4-4.15pm	Conclusion and follow up plan

CHARGES FOR THE BREAKOUT GROUPS

Theme 1 Technological advances

The importance of making the reporting task as simple as possible and not over-burdening the physician is well recognised. THOR reporting originated with a postal report card but since 2007 the option to report via a web form has also been introduced (with newer schemes such as THOR-GP being exclusively electronic reporting). However, uptake of electronic reporting methods has been relatively low (approximately one third of non-GP reporters) with physicians citing barriers such as multiple work-places and the lack of a designated work-station. Within this theme we aimed to identify likely barriers to reporting within the existing methods, how they may be overcome, and the potential role of alternative reporting methods such as the use of a mobile phone app. We also explored the role of social media and other technological advances in surveillance schemes such as THOR, [or as complementary approaches?].

Questions for discussion

- How can we encourage physicians to submit their case information using online platforms such as a web-form? What are the barriers preventing them from doing so?
- Would a mobile-phone app be a viable reporting option? Have such methods been applied successfully elsewhere?
- Are there any other technological advances that could make reporting easier for physicians participating in surveillance schemes such as THOR?
- What is the role, if any, of social media in occupational health surveillance (e.g. in relation to physician participation, reporting, dissemination of information)?

Theme 2 Data linkage and data mining

The first aim of this theme was to explore the potential of linking THOR with other extant databases. Advantages of data linkage could include the refinement of estimates of WRIH burden (for example by increasing the accuracy of numerators/denominators) or improvement of the data collection process (for example by exporting data to THOR from existing clinician based databases). The theme explored what other databases are available, what data are collected, whether occupational data are collected (and if not, whether there is the scope for it to be collected) and the feasibility of data linkage with THOR. The second

aim of this theme explore the role of data mining techniques in surveillance systems such as THOR.

Questions for discussion

- What database with electronic health records current exists that could be used for OH surveillance or research?
- Could any of these databases be used in conjunction with THOR data and what would be the benefits of such data linkage for occupational disease surveillance?
- What is the role of data mining in occupational disease surveillance?
- Are their opportunities to include occupational data in electronic health records in future? If so, what are these and what needs to be done to include such information?

Theme 3 Physician engagement

Participation in THOR is voluntary so both recruitment and retainment of physicians in THOR can be challenging, particularly in times of increased workload, changing work patterns and reduced resources. In addition to minimising the burden of reporting it is important to provide meaningful benefits to the physicians for participating. Existing benefits of THOR participation include regular feedback in the form of quarterly and annual reports, access to an ad hoc enquiry service as well as opportunities to attend meetings, and collaborate with colleagues and THOR researchers to publish work based on collected data. We have also developed an online THOR related educational initiative, EELAB (Zhou et al., 2017), which (for some of THOR schemes) has been accredited for CPD purposes. The aim of this theme was to explore barriers to physician participation/engagement and possible future innovative methods to increase physician engagement/participation.

Questions for discussion

- What are the likely barriers to physicians participating in surveillance schemes such as THOR?
- What are the main incentives for physicians to participate and how can these be improved?

- What steps could be taken to reduce reporter 'fatigue', increase recruitment and retainment?
- How could we improve the value of educational tools such as EELAB?

WORKSHOP NOTES

Breakout Session 1 & 2 – Data linkage / technological advances

Led by Andrew Curran

Members included: Martie Van Tongeren; Annemarie Money; Melinda Lyons; Donald Cairns; Andy Darnton; Ian Hall; Laura Adelman; Yiqun Chen; Nick Warren; Tom Lawrence; Evangelos Kontopantelis; Andy Jones; Andy Povey.

Much of the discussion focussed on linkage possibilities with databases such as CPRD, electronic health record, injury data, DWP databases etc. THOR does not collect any identifiable data such as NHS number or national insurance number, therefore, although theoretically the consensus was that being able to link was the ideal scenario, there were too many practical / ethical issues to overcome this.

Would geographical data linkage be possible? This was also problematic given the fact that often, especially for the clinical schemes, the cases reported were those at the top of the surveillance pyramid, so there would be difficulties in identifying these cases.

The discussion moved onto whether it was worth pursuing consent from the patients via the reporting physicians; this would entail a different level of engagement from the physicians which could bring its own problems, i.e. over-burdening the physicians and whether this would have an impact of cases reported.

Actions:

- **Martie and team to produce a document mapping existing databases and possibilities and limitations of linking to THOR.**

Discussion around technological developments highlighted that any advances need to always be user dependent and that what was developed for clinicians would not necessarily be applicable for patients. If the evidence from the clinical schemes is that card based

reporting is the preferred method, then web based reporting should not be forced on the reporters to the detriment of the scheme.

Practical considerations around ease of access for reporters were discussed; participating physicians noted that usernames and passwords were sometimes difficult to remember, so were there alternative ways that the doctors could log on? Ways to simplify the system without compromising security?

Advice from the group on developing an app for reporting was that it was preferable to ensure that the website was mobile enabled, rather than offer an app – but again, the user of the service should be taken into account in the development of any technology.

Social media presence was discussed in terms of ways to improve this and possibly to redirect the focus to identifying new hazards / jobs / industry sectors etc. Noted that we have a centre twitter and Facebook account, consensus was that there should be a THOR surveillance twitter account.

Actions:

- **THOR web developer to investigate alternative / easier ways for reporters to log onto the THOR portal**
- **THOR team to consider setting up THOR surveillance twitter account**

<u>Breakout Session 3 – Physician participation, engagement and retainment</u>

Led by Dil Sen

Members included**:** Martin Seed, Jenny Hoyle, Chris Barber, David Fishwick, Maria Panagioti, Ian Lambert, Siti Rusdhy, Nazia Zarin, Melanie Carder

Two main themes were discussed centred on barriers to reporting and recruiting:

Barriers to reporting

Ease of reporting - the ability to be able to report there and then i.e. immediately after seeing patient or at the end of clinic (when have access to clinical records) was considered important.

The general assumption that electronic reporting is always easier is not correct – especially if reporters have to find web-page, remember username and password etc.. It would be useful if the electronic reporting forms would automatically store username and passwords (i.e. reporters stay logged in unless explicitly log out). Similarly if certain fields could be autocompleted (unless specifically told otherwise) e.g. whether physician is full-time or part-time. The development of a mobile phone app for reporting cases was encouraged, although the uptake amongst physicians is likely to be mixed.

However, some reporters will prefer using the cards as it is often quicker to write on details on a reporting card. For some, the reporting card also acts as a prompt to remember to report.

The development of a desktop app is probably not feasible for practical and logistical reasons and the need to get permission to install such software on NHS computers.

Recruitment/retainment of reporters

The group emphasised the need to endorse THOR/engage with the reporters more as to why it is important to participate in schemes such as THOR. Most physicians have very little time, time allowed per consultation decreased, need to feel it's a worthwhile exercise.

More personalised feedback would be useful – e.g. a signed pdf saying thank-you for reporting, this is what you've reported, this is what others have reported etc. Electronic reporters can currently get a print-out of previously reported cases (but this doesn't include a thank-you etc) but card reporters don't get anything (other than the quarterly and annual reports).

Suggested we could survey reporters to ask them how they would like to report (app, web, card etc). Are younger reporters more likely to use electronic methods?

The issue of duplicate reporting was discussed – physician won't always report the case at first visit as might want to wait for test results etc. Sometimes they forget whether a case has already been reported. Could there be a prompt (e.g. if report same age, gender, postcode) saying 'you've recently reported something similar, is this a different case?).

EELAB, which provides opportunities to earn CPD points, is currently only available for GP and OP reporters via the reporting websites. It may be beneficial to extend this to SWORD and EPIDERM to incentivise reporting. This might require additional specialty specific learning modules to be created although it was commented that the existing modules on occupational asthma and contact dermatitis, that are currently available to OPRA and THOR-GP reporters, might also have educational value to sample SWORD and EPIDERM reporters respectively.

The development of a tool available for reporters to allow them to interrogate the THOR database (in real time) could be a useful addition.

In general, it was advised that engagement with professional societies is important e.g. BTS, SOM, BAD etc and to have a presence at the various meetings in order to publicise THOR – link into courses (e.g. BTS short course) to recruit physicians during their training stage

Actions

- Enable reporting forms to automatically store username and passwords
- Autocomplete of fields
- Thank-you pdf of reported cases
- Prompt for duplicate reporting
- Survey of reporters as to preferred reporting methods
- Develop mobile reporting app
- Continue to develop EELAB for chest physicians and dermatologists
- Investigate possibility of enabling physicians to interrogate THOR database
- Improve THOR endorsement (e.g. via recruitment information/methods, engagement with societies, presence at meetings etc)

CONCLUSIONS

This workshop was organised to develop ideas for improving the reporting mechanisms, incentivise physicians to report voluntarily and identify other sources of information that could be used, in conjunction with the current reporting scheme, to increase the usefulness of the data.

It was clear from the discussions during the workshop that various opportunities exist for making improvements in these areas. A number of these are relatively minor and could, with a modest level of resources, be implemented in the current reporting schemes. For example, these would include the development of mobile phone app and extending EELAB to chest physicians and dermatologists.

Other areas for development require further exploration, possibly in the form of one or more research projects. For example, the systematic review of electronic health records on the presence of occupational data would be a useful activity, and could form the basis of small joint project between HSE and the University of Manchester. This project should aim to determine i) if useful information is currently being collected; ii) if so, how can these electronic records be mined to extract the occupational data; and iii) how can occupational data collection be improved within routine health records. In addition, the development of a database that could be viewed interrogated by reporters and other stakeholders, and would improve the dissemination and use of the data, would require more substantial resources.

Specifically, the following specific actions were identified

- COEH to produce a document mapping existing databases and possibilities and limitations of linking to THOR.
- COEH web developer to investigate alternative / easier ways for reporters to log onto the THOR portal and make some modifications to increase user friendliness. This will also include ensuring that the website is mobile phone friendly. We will also consider including automatic thank you letters.
- COEH to consider setting up THOR surveillance twitter account
- We will consider carrying out a survey of reporters as to preferred reporting methods
- COEH will continue to develop EELAB for chest physicians and dermatologists
- COEH to improve THOR endorsement (e.g. via recruitment information/methods, engagement with societies, presence at meetings etc)

In addition, HSE and COEH (within the Thomas Ashton Institute) will meet during the summer months of 2018 to develop a detailed plan for continued funding for the THOR schemes. This will include:

- Continued data collection to ensure that HSE can use the occupational health data to track progress on current programmes (through HSE funding).
- A proposal for innovations in occupational ill-health data collection and dissemination. This proposal will include development of new and additional data collection methods that will improve our knowledge on occupational ill health incidence and trends in the UK. The proposal will also include development of methods to use existing data sources (if appropriate) and development of improved data dissemination of data (e.g. through accessible database).

REFERENCES

Carder M, Hussey L, Money A, Gittins M, McNamee R, Stock SJ, Sen D, Agius RM. The Health and Occupation Research Network (THOR) - an evolving surveillance system. SHAW 2017; 8(3):231-236

Money A, Carder M, Hussey L, Agius RM. The utility of information collected by occupational disease monitoring systems. Occup Med (Lond) 2015;65:626-631

Zhou Y, Dodman J, Hussey L, Sen D, Rayner C, Zarin N, Agius RA. Electronic, Experiential, Learning, Audit and Benchmarking (EELAB): An innovative educational resource in occupational medicine. Occup Med (Lond) 2017 Jul 1;67(5):363-370.

ANNEX POWERPOINT PRESENTATIONS

1. Professor Martie Van Tongeren

   21st century occupational health reporting and surveillance

2. Dr Melanie Carder

   Overview of The Health and Occupation Research (THOR) surveillance scheme

3. Professor Neils Peek

   21st century occupational health reporting and surveillance

4. Professor Andrew Curran

   21st Century Occupational Health Reporting and Surveillance

5. Dr Dil Sen & Dr Martin Seed

   Physician engagement

6. Professor Evangelos Kontopantelis

   Primary Care Databases – Analysing Electronic Health Records

MANCHESTER 1824

The University of Manchester

THOMAS ASHTON INSTITUTE of Risk and Regulatory Research

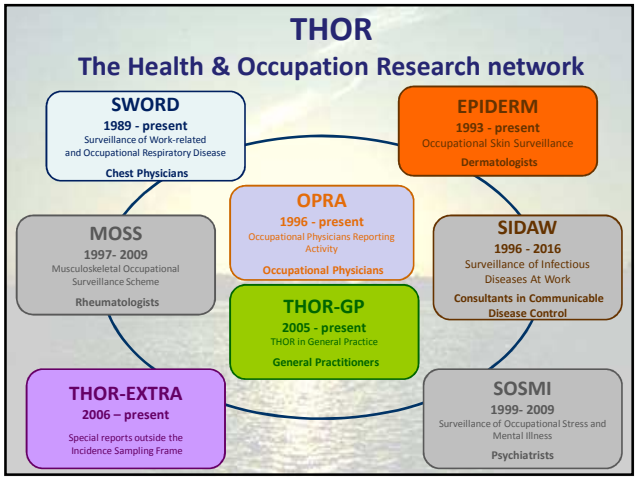
Workshop

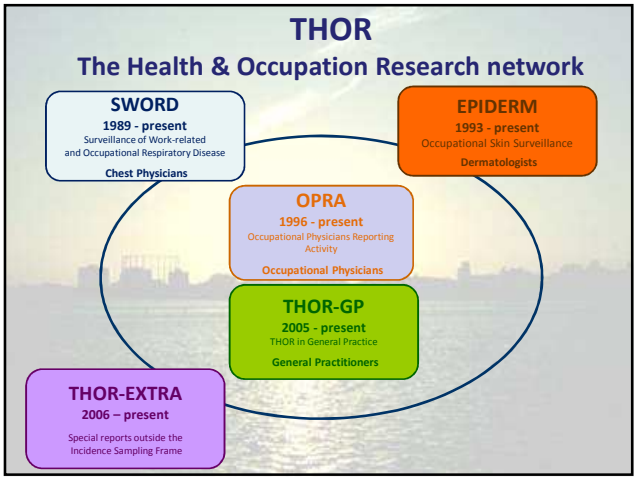
21st century occupational health reporting and surveillance

Martie van Tongeren
Professor of Occupational and Environmental Health
The University of Manchester

The Health and Occupation Research (THOR) Network

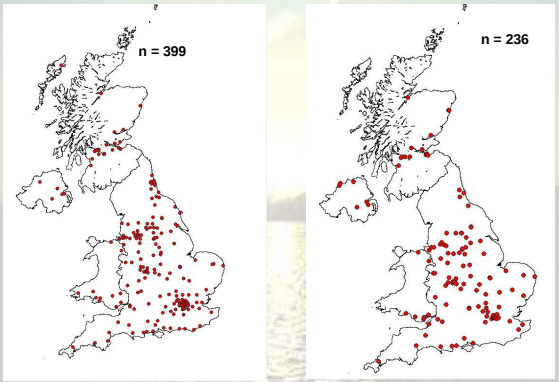
- A research and surveillance programme, fulfilling a medical observatory function, for occupational disease, work related ill health and sickness absence
- Started in UK with 1st scheme in 1989: SWORD
- >1000 doctors participate
- Reports from clinical 'system' specialists account for an estimated 11,000 new UK cases of work-related ill-health per annum.
- Reports from OPs and GPs account for a further estimated 12,000 UK cases per year
- THOR Ireland started in 2005





SWORD and EPIDERM reporters

Chest physicians (SWORD) **Dermatologists (EPIDERM)**



Impact

- First paper in 1992

292 British Journal of Industrial Medicine 1991;48:292–298

Occupational respiratory disease in the United Kingdom 1989: a report to the British Thoracic Society and the Society of Occupational Medicine by the SWORD project group

Prepared by S K Meredith, V M Taylor, J C McDonald

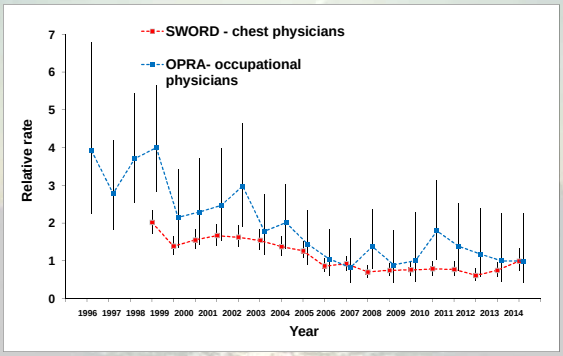
Table 2 Cases and crude annual rates by diagnostic category

Diagnostic category	No (%)	Rate/million/y*
Inhalation accidents	72 (3·4)	3
Acute pulmonary oedema	15	
Other	57	
Allergic alveolitis	133 (6·3)	5
Asthma	554 (26·4)	22
Building related illness	217 (10·3)	9
Byssinosis	23 (1·1)	1
Infectious diseases	100 (4·8)	4
Lung cancer (with pulmonary fibrosis)	51 (2·4)	2
Malignant mesothelioma	340 (16·2)	13
Pneumoconiosis	322 (15·3)	13
Benign pleural disease	221 (10·5)	9
Other diagnoses	68 (3·2)	3
Bronchitis/emphysema	25	
Lung cancer	12	
Other	26	
Unspecified	5	
Total	2101 (100%)	84

*Based on the 1988 Labour Force Survey estimate of the United Kingdom working population.

- > 75 peer-reviewed publications since 2002
- Data have been used to identify priority areas for interventions by HSE and to evaluate the impact of such interventions, eg
  - Asthma in motor vehicle repair workers
  - Dermatitis amongst hair dressers
- Raised awareness, eg
  - Hand washing and contact dermatitis
  - Stress in doctors
- Formed the basis of the EU collaboration Modernet

Trends in Occupational Asthma



Some problems THOR

- Voluntary reporting:
  - Participating physicians do not receive payment
  - Recruitment/retainment
  - Reporting fatigue
  - Limited amount of data requested
- Accuracy of incidence rates
  - Lack of denominator information
  - Not all relevant physicians (chest physicians, dermatologists, occupational physicians, GPs) participate, hence underestimating of cases

Aim of the Workshop

- To explore **opportunities for innovations** in the occupational health reporting schemes, including digital methods for data recording, use of social media, data mining, clinic practices
- To **prioritise** potential innovations
  - According to requirements of HSE and other stakeholders
  - To study temporal and other trends in incidence
  - To evaluate effectiveness of interventions
  - To identify new causes of occupational disease
- The outcomes of the workshop should provide a **platform to develop further proposals** to implement innovations (if appropriate)

	Programme
9.45-10.00	Welcome and introduction (Professor Martie Van Tongeren)
10.00-10.30	History of THOR (Dr Melanie Carder)
10.30-11.00	Novel methods for data collection (Prof Niels Peek)
11.00-11.15	Coffee break
11.15-11.45	Health and Safety Executive priorities and needs (Prof Andrew Curran)
11.45-12.15	Physician engagement (Dr Dil Sen and Dr Martin Seed)
12.15-13.15	Lunch
13.15-13.45	Electronic health records in the UK (Prof Evangelos Kontopantelis)
13.45-14.00	Introduction to breakout groups
14.00-15.00	Breakout group discussions Breakout group 1 Technological advances (led by TBC, rapporteur, Dr Annemarie Money) Breakout group 2 Data linkage and data mining (led by TBC, Dr Melanie Carder) Breakout group 3 Physician engagement (led by Dr Dil Sen, rapporteur Dr Martin Seed)
15.00-15.15	Coffee break
15.15-16.00	Report back from breakout groups and discussion
16.00-16.30	Conclusion and follow up plan

Overview of The Health and Occupation Research (THOR) surveillance scheme

21st century occupational health reporting and surveillance

Melanie Carder on behalf of the THOR team - The Centre for Occupational & Environmental Health, The University of Manchester

Structure of presentation

1. Background and overview of THOR
2. What gets reported
3. What the data are used for
4. The 'challenges'

Structure of presentation

1. **Background and overview of THOR**
2. What gets reported
3. What the data are used for
4. The 'challenges'

The need for data on incidence of occupational ill-health

- Occupational diseases (ODs) and work-related injuries (WRI) impose a heavy burden on both workers and employers and represent enormous economic costs.
- In general the information on incidence and prevalence of occupational diseases is rather poor and fragmented.
- Statutory provisions are poor sources of work related disease data e.g. UK HSE no longer publishes occupational disease data from the Reporting of Injuries Diseases and Dangerous Occurrences Regulations (RIDDOR) on its website.

Instead it relies on THOR

- The Republic of Ireland has also been collecting data through THOR
- Similar schemes exist elsewhere e.g. The Netherlands, France (RNV3P)

The Health and Occupation Research (THOR) Network

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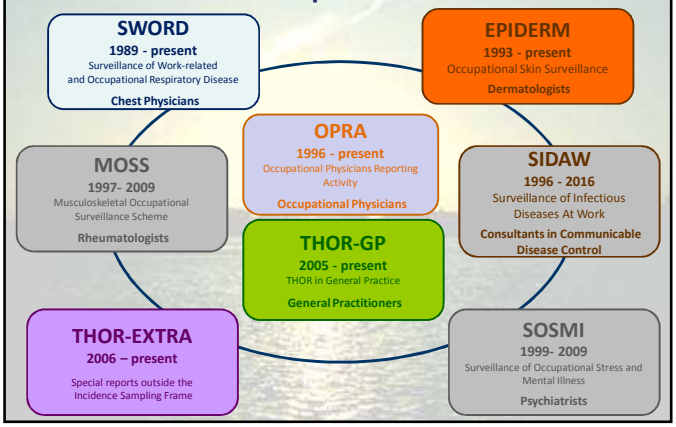
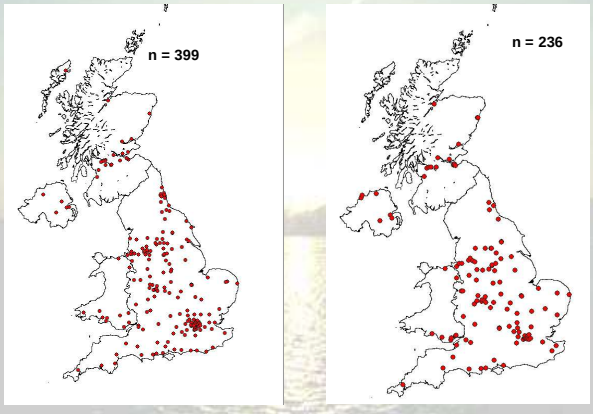
THOR

The Health & Occupation Research network



SWORD and EPIDERM reporters

Chest physicians (SWORD) **Dermatologists (EPIDERM)**



THOR reporting

- Physicians participate on either a monthly basis (core reporters) or for one randomly selected month per year (sample reporters)
- Report cases seen during their usual clinical practice that they believe to have been 'caused or aggravated by work'
- Reporting options – report card, web-form, 'group' reporting, delegating the task to another member of their clinical team (e.g. a specialist medical trainee or an OH nurse)
- Data collection includes
  - Demographic information
  - Employment - occupation & industry
  - Suspected causal agent/task/event
  - Sickness absence (GPs)
  - Patient referrals (GPs)

The report card

Front

OCCUPATIONAL SKIN SURVEILLANCE

A constituent scheme of The Health and Occupation Research network (THOR)

EPIDERM

Please record below the number of NEW cases first diagnosed by you during _____to be a disease or illness caused by work
PLEASE DO NOT INCLUDE ANY CASES FROM AN EARLIER DATE

A	CONTACT DERMATITIS		E	MECHANICAL - Traumatic	
	1 Allergic		F	NAIL 1 *Dystrophy*	
	2 Irritant			2 *Paronychia*	
	3 Allergic and Irritant		G	NEOPLASIA 1 *Keratosis*	
	4 Unclear			2 *Basal Cell*	
B	CONTACT URTICARIA			3 *Squamous Cell*	
C	FOLLICULITIS/ACNE			4 *Melanoma*	
D	INFECTIVE		H	OTHER DERMATOSES - (specify)	
	Tinea			1……	
	Warts			2……	
	Other namely……			3……	
	I have nothing to report			**Reporters Initials**	

Reason (optional)……
……

Please give the diagnosis and other brief details for each reported case overleaf

THOR, Centre for Occupational & Environmental Health, The University of Manchester, BLOCK C, 4th Floor, Ellen Wilkinson Building, Oxford Road, Manchester, M13 9PL.Tel: 0161 275 7103 www.medicine.manchester.ac.uk/oeh/research/thor

The report card

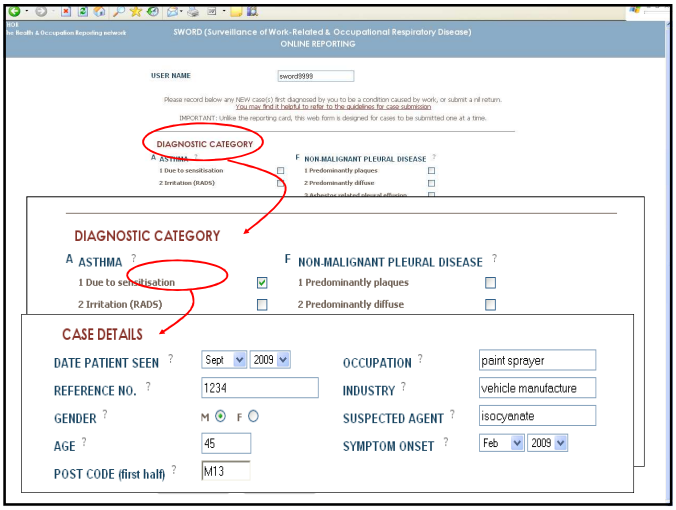
Back

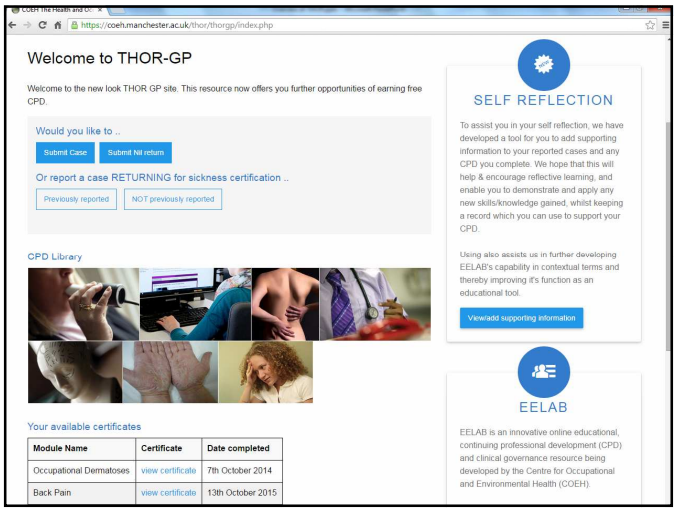
DETAILS OF ALL CASES. If one line per case is not sufficient, use the line below

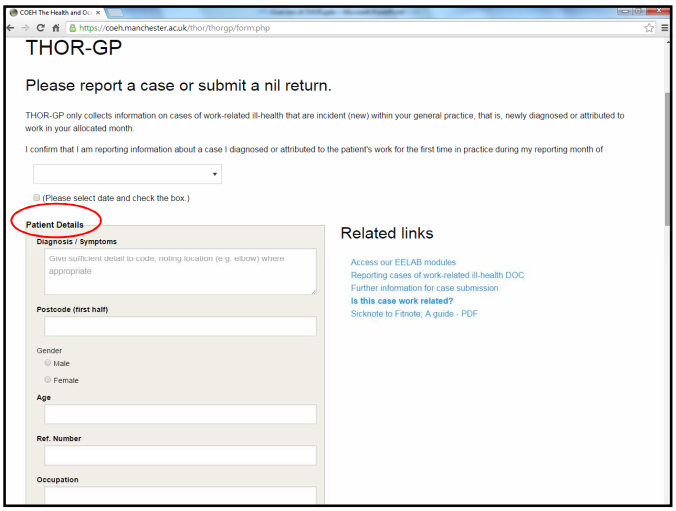
Group (A-H)	Reference Number	Gender	Age	* L/D	Postcode (first half) e.g. M13	Job	Industry	Suspected Agent(s)	Symptom onset date

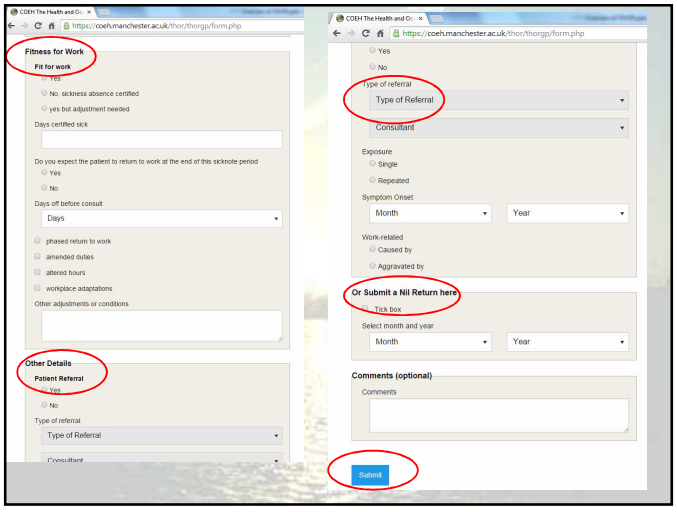
* Please mark L if seen only for medico-legal reasons, D if seen only for the DWP (formally DSS)

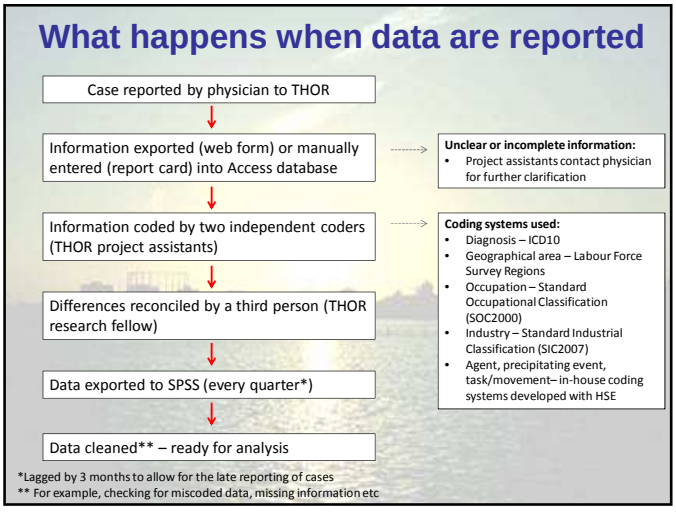
Online reporting - SWORD




Welcome to THOR-GP
Welcome to the new look THOR GP site. This resource now offers you further opportunities of earning free CPD.
Would you like to ..
Submit Case
Submit Nil return
Or report a case RETURNING for sickness certification ..
Previously reported
NOT previously reported
CPD Library
Your available certificates
Module Name
Certificate
Date completed
Occupational Dermatoses
view certificate
7th October 2014
Back Pain
view certificate
13th October 2015
SELF REFLECTION
To assist you in your self reflection, we have developed a tool for you to add supporting information to your reported cases and any CPD you complete. We hope that this will help & encourage reflective learning, and enable you to demonstrate and apply any new skills/knowledge gained, whilst keeping a record which you can use to support your CPD.
Using also assists us in further developing EELAB's capability in contextual terms and thereby improving it's function as an educational tool.
View/add supporting information
EELAB
EELAB is an innovative online educational, continuing professional development (CPD) and clinical governance resource being developed by the Centre for Occupational and Environmental Health (COEH).


THOR-GP
Please report a case or submit a nil return.
THOR-GP only collects information on cases of work-related ill-health that are incident (new) within your general practice, that is, newly diagnosed or attributed to work in your allocated month.
I confirm that I am reporting information about a case I diagnosed or attributed to the patient's work for the first time in practice during my reporting month of
(Please select date and check the box.)
Patient Details
Diagnosis / Symptoms
Give sufficient detail to code, noting location (e.g. elbow) where appropriate
Postcode (first half)
Gender
Male
Female
Age
Ref. Number
Occupation
Related links
Access our EELAB modules
Reporting cases of work-related ill-health DOC
Further information for case submission
Is this case work related?
Sicknote to Fitnote; A guide - PDF

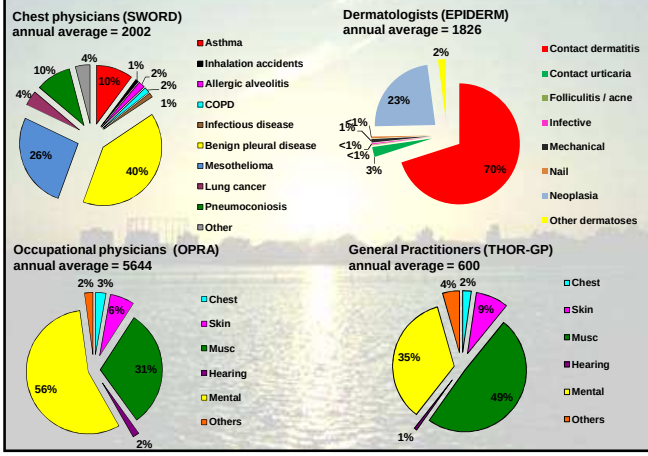

Fitness for Work
Fit for work
Yes
No, sickness absence certified
yes but adjustment needed
Days certified sick
Do you expect the patient to return to work at the end of this sicknote period
Yes
No
Days off before consult
Days
phased return to work
amended duties
altered hours
workplace adaptations
Other adjustments or conditions
Other Details
Patient Referral
Yes
No
Type of referral
Type of Referral
Consultant
Type of referral
Type of Referral
Consultant
Exposure
Single
Repeated
Symptom Onset
Month
Year
Work-related
Caused by
Aggravated by
Or Submit a Nil Return here
Tick box
Select month and year
Month
Year
Comments (optional)
Comments
Submit


What happens when data are reported
Case reported by physician to THOR
Information exported (web form) or manually entered (report card) into Access database
Unclear or incomplete information:
Project assistants contact physician for further clarification
Information coded by two independent coders (THOR project assistants)
Coding systems used:
Diagnosis – ICD10
Geographical area – Labour Force Survey Regions
Occupation – Standard Occupational Classification (SOC2000)
Industry – Standard Industrial Classification (SIC2007)
Agent, precipitating event, task/movement– in-house coding systems developed with HSE
Differences reconciled by a third person (THOR research fellow)
Data exported to SPSS (every quarter*)
Data cleaned** – ready for analysis
*Lagged by 3 months to allow for the late reporting of cases
** For example, checking for miscoded data, missing information etc

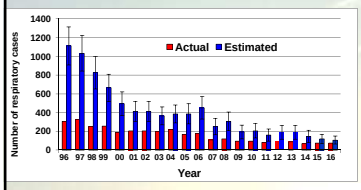
Structure of presentation

1. Background and overview of THOR
2. **What gets reported**
3. What the data are used for
4. The 'challenges'

Overview of what gets reported (2006-2016)

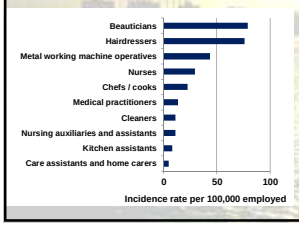


Examples of how we look at the data

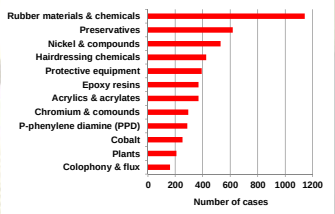


Over time....

By occupation....



By agent....



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Outputs from THOR

Annual statistical provision for the Health and Safety Annual Statistics

- SWORD (respiratory physicians), EPIDERM (dermatologists)
- Cross-tabulations by diagnosis, year, region, age, gender, occupation, industry and agent

Annual trends in incidence report

- Provide the change in incidence over specified periods for selected diagnosis including an overview of the statistical methodology.

Progress reports to HSE and the physicians

- Quarterly and annual reports to physicians and HSE (response rates, cases reported, features)
- Biannual progress reports to HSE –official THOR update to HSE; contractual milestones,

THOR data and HSE

- THOR is one of the main sources of information with which the HSE (and others) determine their priorities and work programmes on occupational health
- A search for THOR on the HSE's website will yield hundreds of documents which make substantial reference to THOR, and more than 50 tables of THOR data.
- THOR has been assessed by the UK Statistics Authority in order to meet the required standard to be classified as 'national statistics'
- THOR data are also used regularly by the HSE to check anecdotal suspicions against a wider range of evidence.
- This helps prioritise activity and provides an evidence base for the HSE's campaigns and interventions.

Examples of THOR data informing policy

- **The HSE pocket book Bakers! – Time to clear the air** was developed in response to THOR data identifying bakers and confectioners as a high-risk group.
- **The Asthma Workplace Charter**, which was developed by Asthma UK in consultation with the HSE, uses THOR data as the basis for its list of the main occupations at risk from developing occupational asthma.
- THOR data influenced the **choice of trades and case studies** highlighted on the **HSE's asthma website**.
- The **House of Lords Science and Technology Committee inquiry into allergy** cited THOR as a source for its statistics (RA expert witness)
- THOR data have helped **identify HSE priorities for intervention**, such as the **Bad Hand Day campaign** to raise awareness of, and prevent, work-related dermatitis in the hairdressing industry.
- The HSE '**Topic inspection pack on the Control of isocyanate exposure** in motor vehicle repair bodyshops cites Epiderm data that vehicle paint sprayers are one of the top-10 occupations suffering occupational contact dermatitis.

Outputs from THOR

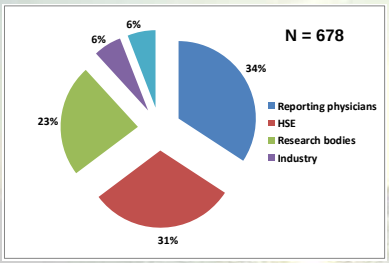
Other ad-hoc reports

- In addition to the key recurring outputs, THOR generates occasional 'ad-hoc' reports, either requested by HSE and/or arising from issues identified by COEH researchers. For example:
  - the impact of reporter 'fatigue' on WRIH trends estimates,
  - methodological issues associated with the calculation of THOR incidence rates).

Data enquiry service

- key strength of THOR is that its longevity has meant that, to date, in excess of 109,000 cases have been reported to the constituent schemes.
- Thus, a large database exists which can be interrogated to answer specific questions relating to WRIH and its determinants.

Sources of requests for THOR data (2002-2016)



Examples of recent HSE data requests

- Work-related ill-health (WRIH) in the rail industry
- WRIH in cleaners
- WRIH in the chemicals industry
- WRIH in the manufacture of non-metallic products
- Dermatitis in the rubber manufacturing sector
- Respiratory ill health attributed to milk powder / products, coffee, diacetyl
- Ill-health attributed to cotton / fibres / wool
- Asthma and dermatitis attributed to persulphates
- Dermatitis attributed to resins and acrylics

Money A, Carder M, Hussey L, Agius RM. (2015) The utility of information collected by occupational disease monitoring systems. Occup Med (Lond) 65 (8): 626-631

Structure of presentation

1. Background and overview of THOR
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4. **The 'challenges'**

Structure of presentation

1. Background and overview of THOR
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   - **Physician recruitment and retainment**

THOR recruitment - ongoing

- Identifying and approaching potential recruits (NHS choices, NHS Clinical excellence awards register, BMJ, specialist registrar)
- Publicising THOR-GP to COEH (GP) students undertaking postgraduate training to diploma level in occupational medicine (DOccMed)
- Ask physicians who decline to join/or withdraw for reason why (and whether replacement if latter) - advise of option for delegating and/or 'group' reporting
- Updating recruitment material
- Continue to assert our presence via the individual specialist societies e.g. recruitment material to new members
- Further presentations at relevant conferences/meetings
- preparation of articles publicising THOR for inclusion in relevant newsletters/journals

Physician retainment

Reporting made easy as possible

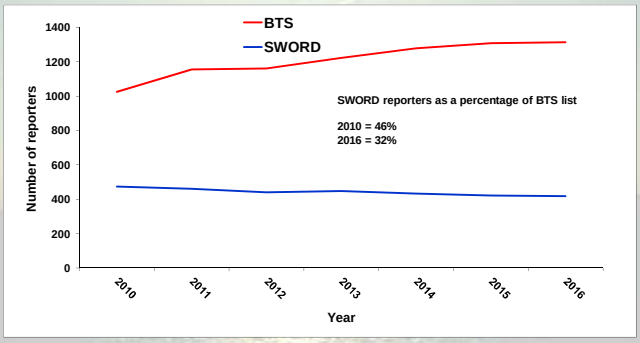
- Different methods (postal report card, web form)
- Developing new (more convenient) methods: exporting data from extant database, mobile phone app
- Reporting guidelines provided
- Reporting criteria not too stringent (inclusive)
- Group reporting
- Delegating the reporting task (e.g. to a clinical nurse specialist)
- Not asking for too much information/overburdening the physician

A survey of THOR participants in 2011 suggested that it took between two and five minutes to report a case to THOR, with a general consensus that the benefits obtained from participating in THOR far outweighed the time spent reporting.

Benefits of reporting to THOR

- Physicians provided with regular feedback about what they and others have reported
- Quarterly and annual reports (digest and interpretation of recent data, plans for future THOR activity, and occasional articles such as 'why I report to THOR')
- Ad-hoc enquiry service : typically cases of diagnosis 'x' in occupation 'y', attributed to agent 'z'.
- Over 600 enquiries (40% from THOR physicians)
- Annual advisory committee meetings and annual symposium: learn about recent research within their speciality, share ideas and inform and influence future plans for THOR
- Encouraged to actively collaborate with THOR researchers to publish work based on THOR data
- EELAB (Electronic, Experiential Learning, Audit and Benchmarking)

Number of SWORD reporters versus number of consultants on BTS* list



*Increase in consultant numbers from 2010 probably a result of improvement in data collection.

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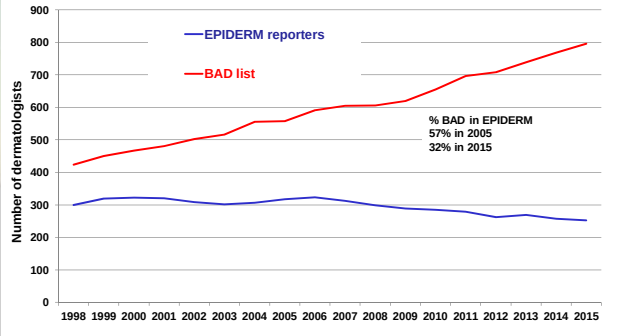
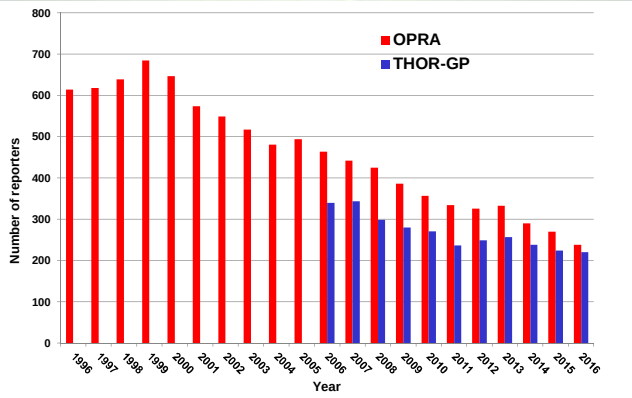
Number of dermatologists in EPIDERM compared to number of consultants on BAD list

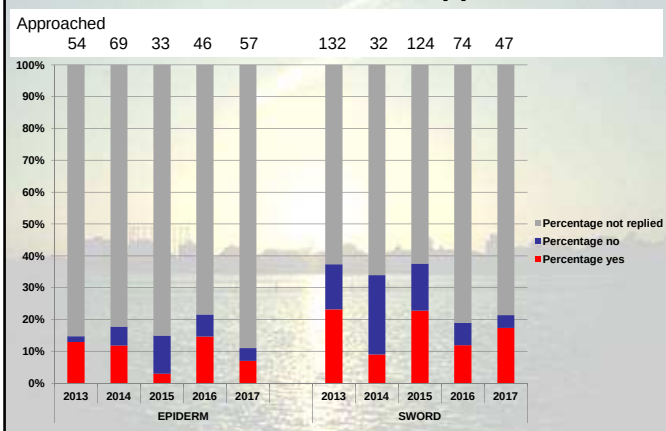


32

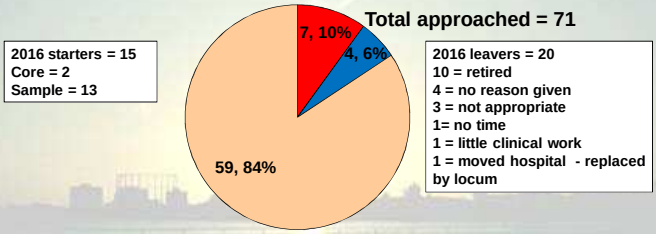
Number of OPRA and THOR-GP reporters



Outcome of recruitment approaches



Outcome of recruitment approaches in 2016, SWORD (chest physicians)



2016 starters = 15
Core = 2
Sample = 13

2016 leavers = 20
10 = retired
4 = no reason given
3 = not appropriate
1= no time
1 = little clinical work
1 = moved hospital - replaced by locum

6 recruited as sample
1 recruited as core
Recruitment source = specialist info

Reasons:
- No time
- Little clinical work
- Not appropriate
- No reason given

Structure of presentation

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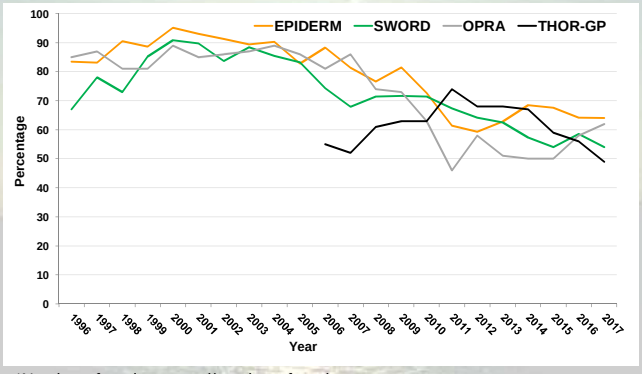
   - Physician recruitment and retainment
   - **Reporter 'fatigue'**

Response rates* by year



*Number of cards returned/number of cards sent out

Zero case reports: might some be false zeros?

Scenario where false zeros might arise:

Reporter too busy / too tired /on holiday…
….Receives a reminder that he/she has not responded.
…..Still busy…..decides to send back a 'zero case' report

Hypothesis:

This behavior :

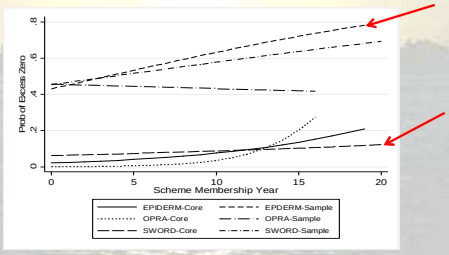
might **increase with membership time** ('reporting fatigue')***

might be **more common in holiday months** (August/December)

***If true, there would be a false trend towards lower incidence rates over time

Are Excess Zeros Present?

	EPIDERM 1996-2012		OPRA 1996-2012		SWORD 1999-2012	
	'core'	*'sample'*	*'core'*	*'sample'*	*'core'*	*'sample'*
Membership Yr OR (95% C.I)	1.14* (1.06,1.22)	1.09* (1.05,1.12)	1.48* (1.25,1.75)	0.99 (0.97,1.01)	1.04 (0.94,1.14)	1.05* (1.02, 1.08)
Peak Hol(Aug/Dec) OR (95% C.I)	1.13 (0.70, 1.83)	1.34 (0.94,1.90)	2.35* (1.27,4.37)	1.25* (1.04,1.51)	1.40 (0.79, 2.46)	1.19 (0.90, 1.58)



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   - Reporter 'fatigue'
   - **Data representativeness**

Some of the data issues..

- **Data not representative of the (working) population as a whole**
  - E.g. OPRA – occupational physician coverage in the UK biased towards public sector and larger industries.
  - Applying national population estimates to estimate incidence inappropriate (carried out specific denominator surveys)
- **Data incomplete**
  - E.g. SWORD and EPIDERM – cases under-reported because of physician non-participation, non-response, under-recognition,
  - Applying national population estimates to estimate incidence would lead to rates being underestimated (methods developed to adjust for some of these factors)
- The **influence of changes in referral patterns on trends**– THOR data may not be capturing certain diagnoses e.g. neoplasia, mesothelioma (cases increasingly seen by other specialists such as oncologists)

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   - Physician recruitment and retainment
   - Reporter 'fatigue'
   - Data representativeness
5. **The solutions – to discuss!**

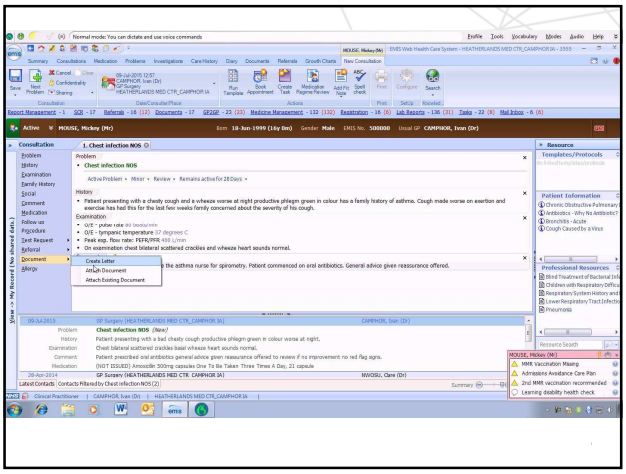
NHS National Institute for Health Research

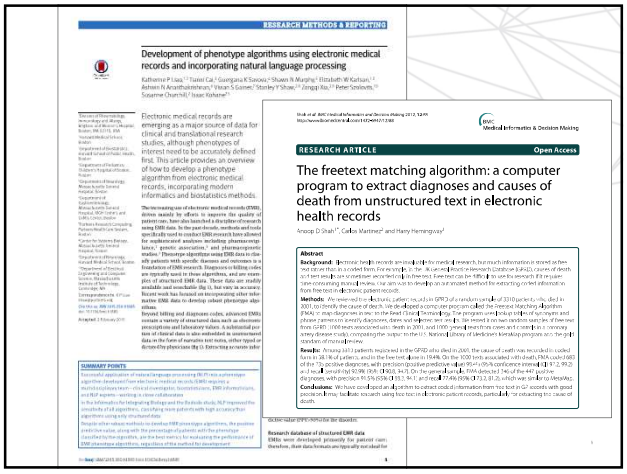
Manchester Biomedical Research Centre

Digital Data Collection

Professor Niels Peek
Health eResearch Centre
Connected Health Cities
The University of Manchester

21st century occupational health reporting and surveillance,
Thomas Ashton Institute, 29th Mar 2018



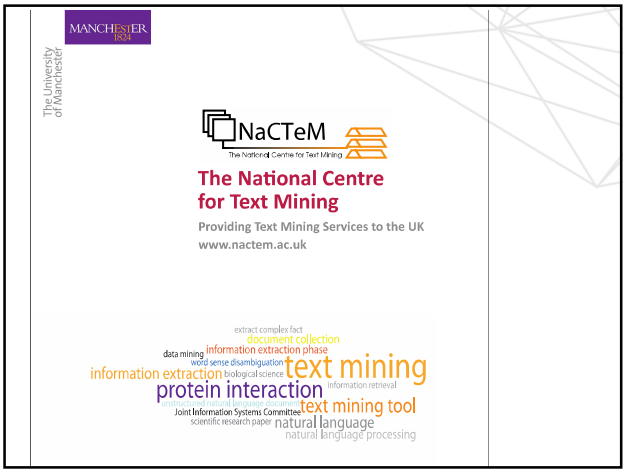


RESEARCH METHODS & REPORTING

Development of phenotype algorithms using electronic medical records and incorporating natural language processing

RESEARCH ARTICLE Open Access

The freetext matching algorithm: a computer program to extract diagnoses and causes of death from unstructured text in electronic health records



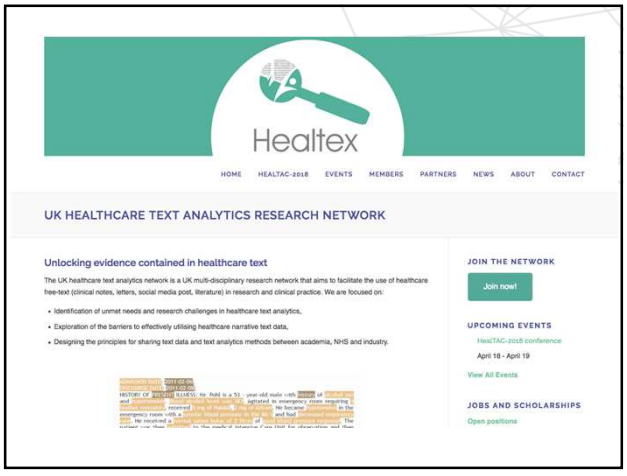
The University of Manchester

NaCTeM The National Centre for Text Mining

The National Centre for Text Mining

Providing Text Mining Services to the UK
www.nactem.ac.uk

extract complex fact, document collection, data mining, information extraction phase, word sense disambiguation, information extraction, biological science, text mining, protein interaction, information retrieval, Joint Information Systems Committee, text mining tool, scientific research paper, natural language, natural language processing



Healtex

HOME HEALTAC-2018 EVENTS MEMBERS PARTNERS NEWS ABOUT CONTACT

UK HEALTHCARE TEXT ANALYTICS RESEARCH NETWORK

Unlocking evidence contained in healthcare text

The UK healthcare text analytics network is a UK multi-disciplinary research network that aims to facilitate the use of healthcare free-text (clinical notes, letters, social media post, literature) in research and clinical practice. We are focused on:

- Identification of unmet needs and research challenges in healthcare text analytics,
- Exploration of the barriers to effectively utilising healthcare narrative text data,
- Designing the principles for sharing text data and text analytics methods between academia, NHS and industry.

JOIN THE NETWORK

Join now!

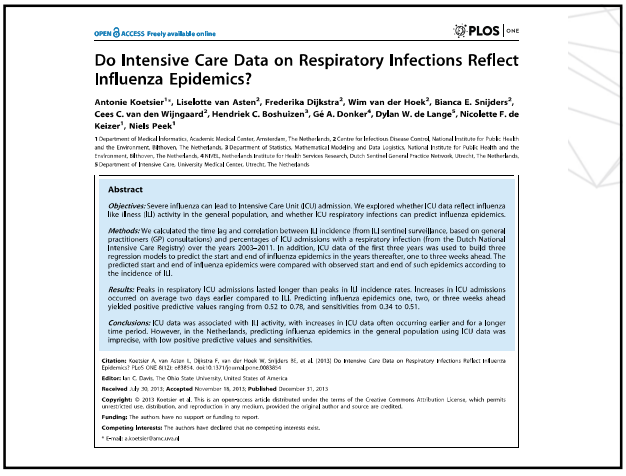
UPCOMING EVENTS

HealTAC-2018 conference
April 18 - April 19

View All Events

JOBS AND SCHOLARSHIPS

Open positions



OPEN ACCESS Freely available online PLOS ONE

Do Intensive Care Data on Respiratory Infections Reflect Influenza Epidemics?

Antonie Koetsier[1*], Liselotte van Asten[2], Frederika Dijkstra[3], Wim van der Hoek[2], Bianca E. Snijders[2], Cees C. van den Wijngaard[2], Hendriek C. Boshuizen[3], Gé A. Donker[4], Dylan W. de Lange[5], Nicolette F. de Keizer[1], Niels Peek[1]

1 Department of Medical Informatics, Academic Medical Center, Amsterdam, The Netherlands, 2 Centre for Infectious Disease Control, National Institute for Public Health and the Environment, Bilthoven, The Netherlands, 3 Department of Statistics, Mathematical Modelling and Data Logistics, National Institute for Public Health and the Environment, Bilthoven, The Netherlands, 4 NIVEL, Netherlands Institute for Health Services Research, Dutch Sentinel General Practice Network, Utrecht, The Netherlands, 5 Department of Intensive Care, University Medical Center, Utrecht, The Netherlands

Abstract

Objectives: Severe influenza can lead to Intensive Care Unit (ICU) admission. We explored whether ICU data reflect influenza like illness (ILI) activity in the general population, and whether ICU respiratory infections can predict influenza epidemics.

Methods: We calculated the time lag and correlation between ILI incidence (from ILI sentinel surveillance, based on general practitioners (GP) consultations) and percentages of ICU admissions with a respiratory infection (from the Dutch National Intensive Care Registry) over the seasons 2003–2011. In addition, ICU data of the first three years was used to build three regression models to predict the start and end of influenza epidemics in the years thereafter, one to three weeks ahead. The predicted start and end of influenza epidemics were compared with observed start and end of such epidemics according to the incidence of ILI.

Results: Peaks in respiratory ICU admissions lasted longer than peaks in ILI incidence rates. Increases in ICU admissions occurred on average two days earlier compared to ILI. Predicting influenza epidemics one, two, or three weeks ahead yielded positive predictive values ranging from 0.52 to 0.78, and sensitivities from 0.34 to 0.51.

Conclusions: ICU data was associated with ILI activity, with increases in ICU data often occurring earlier and for a longer time period. However, in the Netherlands, predicting influenza epidemics in the general population using ICU data was imprecise, with low positive predictive values and sensitivities.

Citation: Koetsier A, van Asten L, Dijkstra F, van der Hoek W, Snijders BE, et al. (2013) Do Intensive Care Data on Respiratory Infections Reflect Influenza Epidemics? PLoS ONE 8(12): e83854. doi:10.1371/journal.pone.0083854

Editor: Ian C. Davis, The Ohio State University, United States of America

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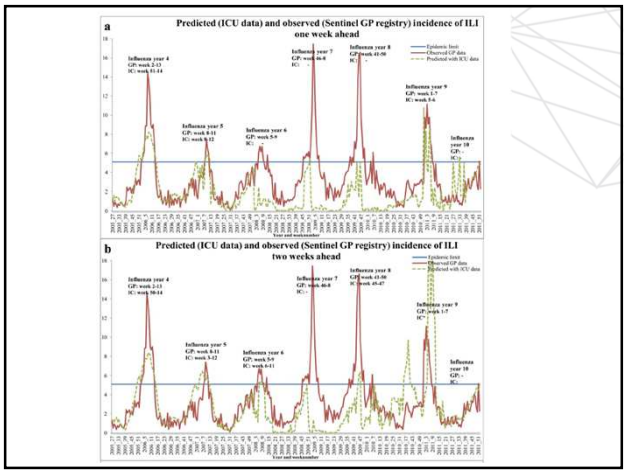
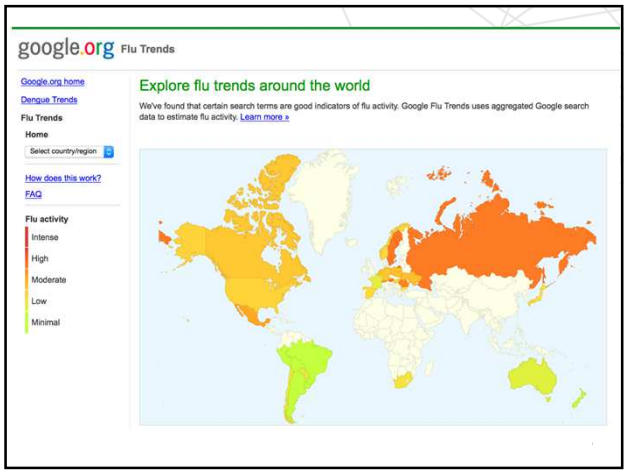
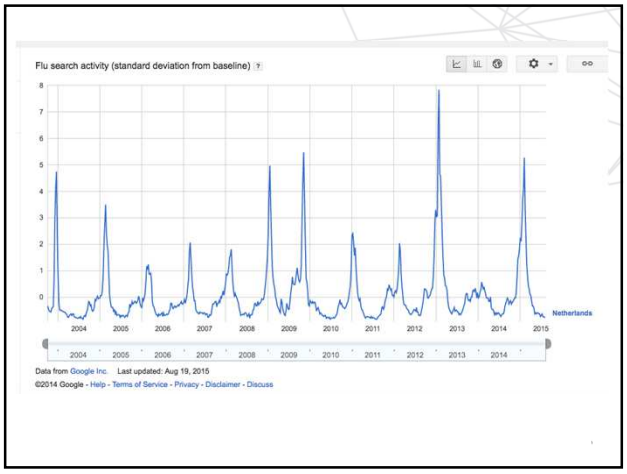
Competing Interests: The authors have declared that no competing interests exist.

* E-mail: a.koetsier@amc.uva.nl


a
Predicted (ICU data) and observed (Sentinel GP registry) incidence of ILI one week ahead
b
Predicted (ICU data) and observed (Sentinel GP registry) incidence of ILI two weeks ahead


google.org Flu Trends
Google.org home
Dengue Trends
Flu Trends
Home
Select country/region
How does this work?
FAQ
Flu activity
Intense
High
Moderate
Low
Minimal
Explore flu trends around the world
We've found that certain search terms are good indicators of flu activity. Google Flu Trends uses aggregated Google search data to estimate flu activity. Learn more »


Flu search activity (standard deviation from baseline)
Netherlands
Data from Google Inc. Last updated: Aug 19, 2015
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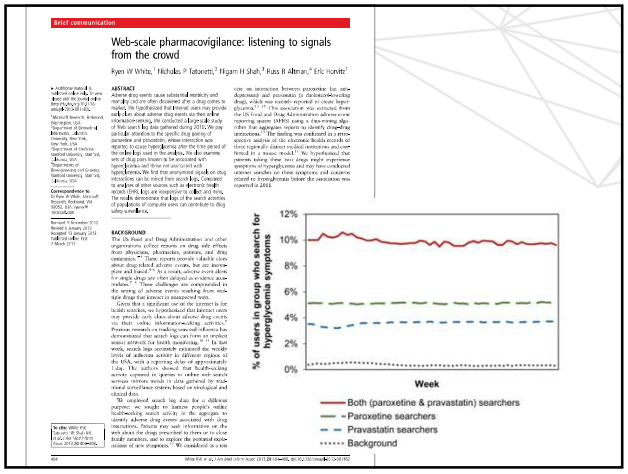
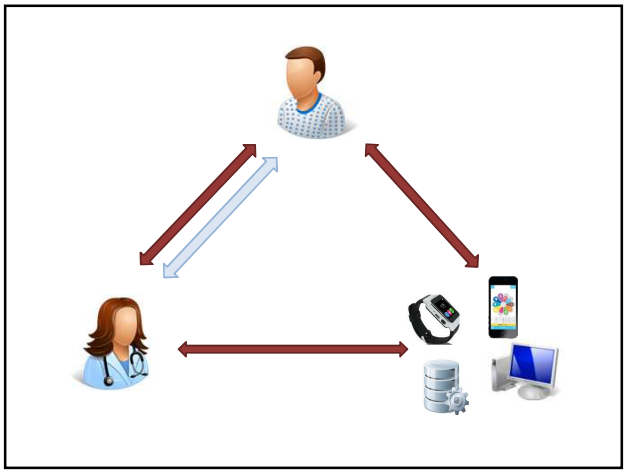
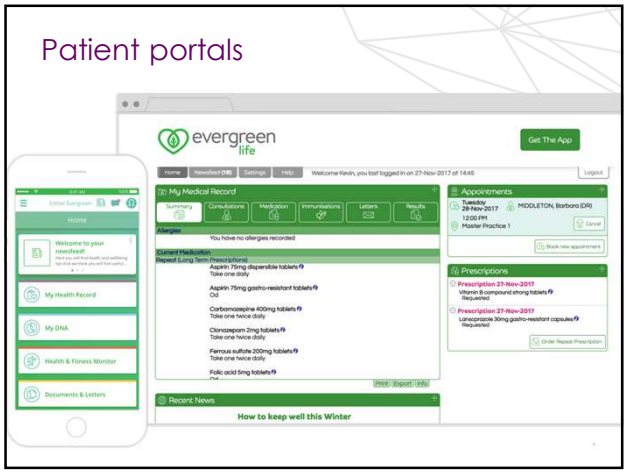

Brief communication
Web-scale pharmacovigilance: listening to signals from the crowd
% of users in group who search for hyperglycemia symptoms
Week
Both (paroxetine & pravastatin) searchers
Paroxetine searchers
Pravastatin searchers
Background

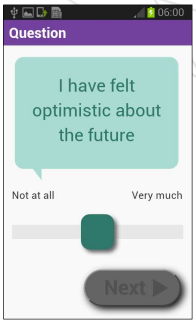



Patient portals
evergreen life
Get The App
My Medical Record
Appointments
Prescriptions
Recent News
How to keep well this Winter

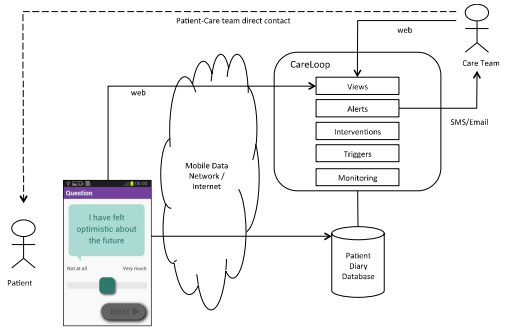
ClinTouch: experience sampling

- Experience sampling methodology
- User responds on a touch-screen mobile phone
- Validated against the Positive and Negative Syndrome Scale (PANSS) for measuring symptom severity in schizophrenia

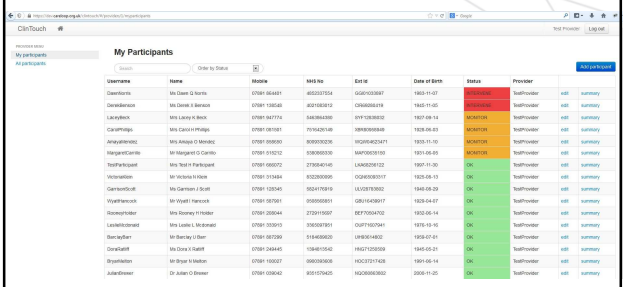
http://www.clintouch.com



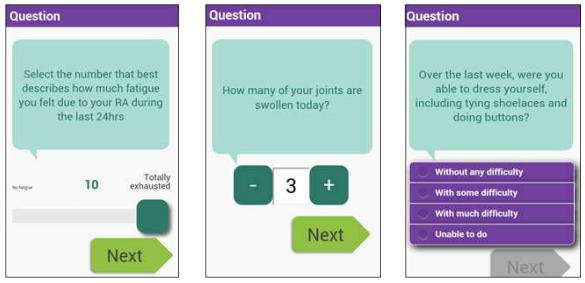
CareLoop



CareLoop clinician interface



Experience sampling



Daily Weekly Monthly

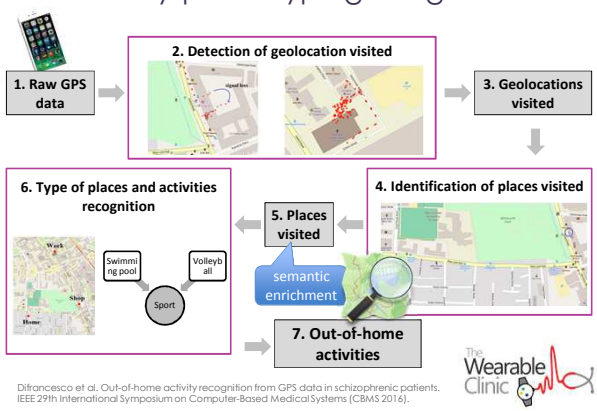
Knee Osteoarthritis: Linking Activity and Pain

KOALAP

Combining self-reported data with sensor data

Google

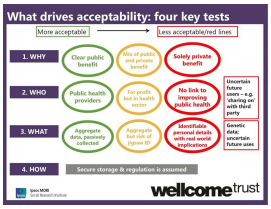
Activity phenotyping using GPS data



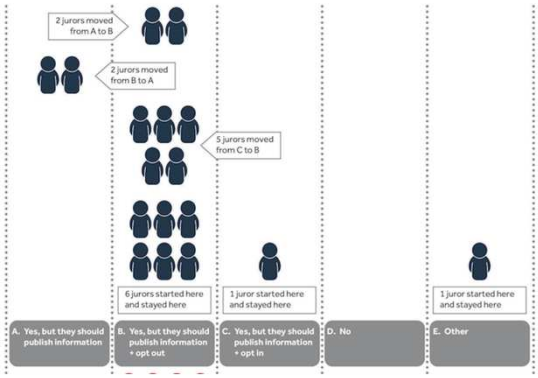
Difrancesco et al. Out-of-home activity recognition from GPS data in schizophrenic patients. IEEE 29th International Symposium on Computer-Based Medical Systems (CBMS 2016).

The Wearable Clinic

Information governance and trust



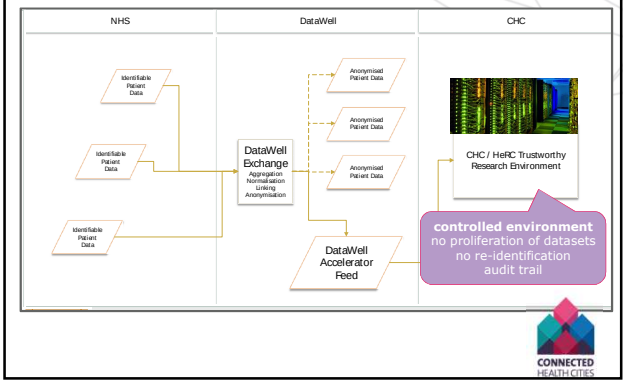
Citizens' Juries



HeRC Trusted Research Environment

- openStack private cloud build on 450 cores with 150Tb of storage (+ link to the N8 HPC)
- Direct connection to the NHS N3 network
- ISO 27001 certified Information Security Management System (ISMS)

DataWell - GMCHC infrastructure



Summary

- Active reporting of incident cases by GPs through the EHR
- Recognition of incident cases through Machine Learning and text mining
- Estimation of incidence through other routine data sources
- Active data collection by patients
- Passive data collection by patients

Health and Safety Executive

21st Century Occupational Health Reporting and Surveillance

Professor Andrew Curran
Chief Scientific Adviser,
Director of Research

Some history: the industrial revolution

1833 HM Factories Inspectorate formed

1843 Mines Inspectorate formed

1895 Quarry Inspectorate formed

1911 Health and Safety Research facility established

1959 Nuclear Inspectorate formed

More recent history: the risk revolution

1972 Robens Report

"The primary responsibility for doing something about the present levels of occupational accidents and disease lies with those who create the risks and those who work with them."

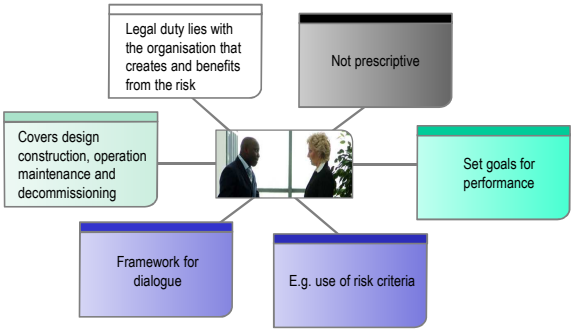
1974 Health and Safety at Work etc. Act

- Goal setting legislation
- Supported by guidance and codes of practice
- Encouraging a culture of continuous improvement

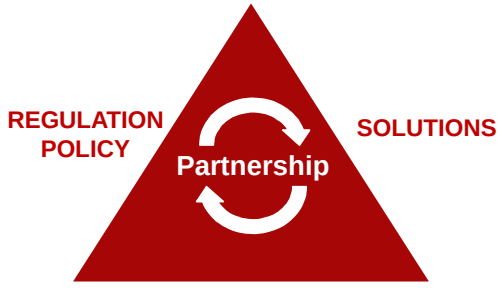
1975 Health and Safety Executive formed

A single body with responsibility to enforce health and safety legislation in all work places

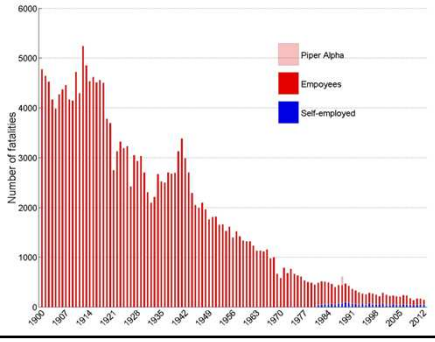
What is a Goal-Based System?



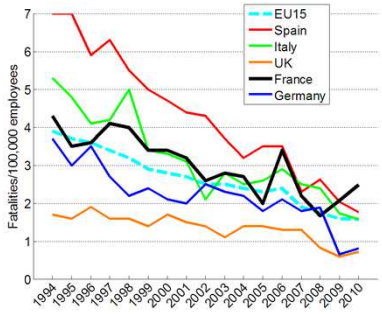
A System Underpinned by Evidence



UK Employee fatalities since 1900



EU Fatalities (rate since 1994)



WHAT ABOUT HEALTH?

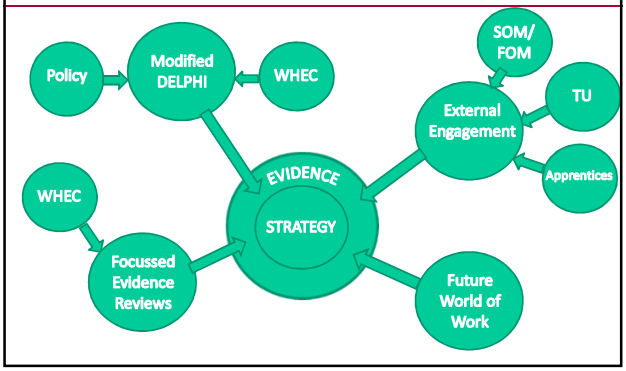
THE CONTEXT

HSE Strategy

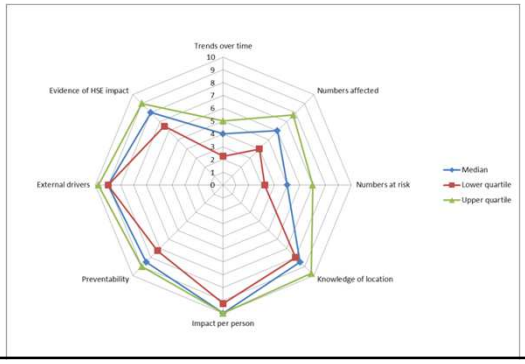
http://www.hse.gov.uk/strategy/strategy-document.htm

HSE Strategy

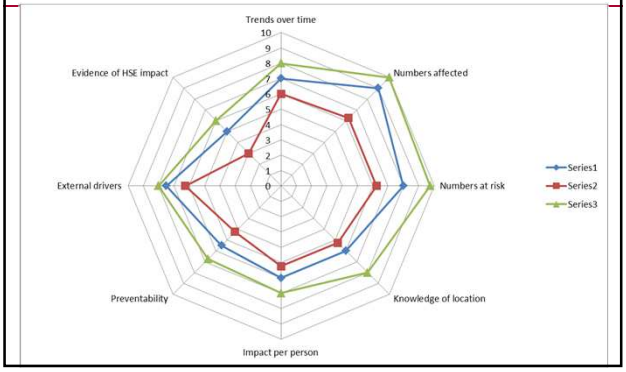
Approach



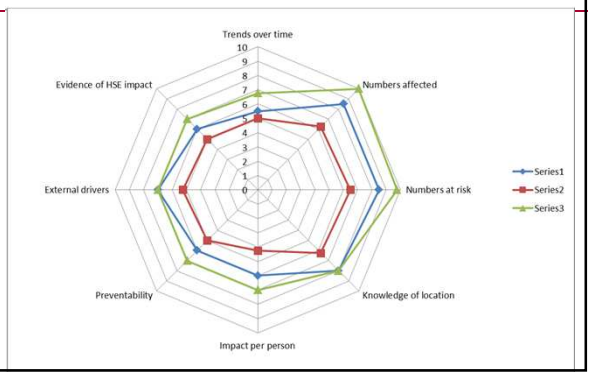
Prioritisation: Mesothelioma



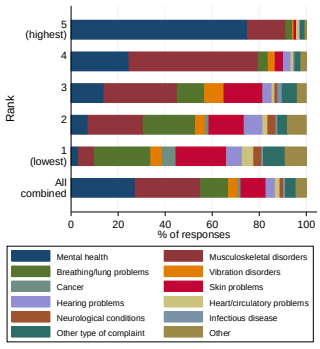
Prioritisation: Stress



Prioritisation: MSD



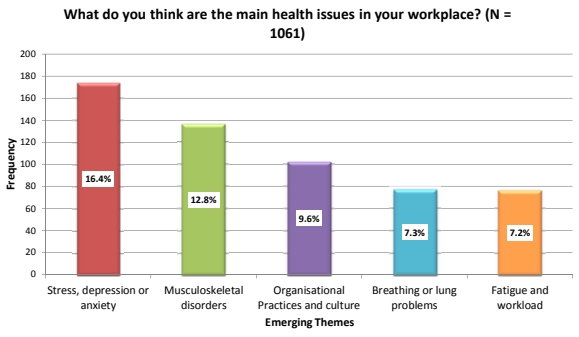
Occupational Health Providers



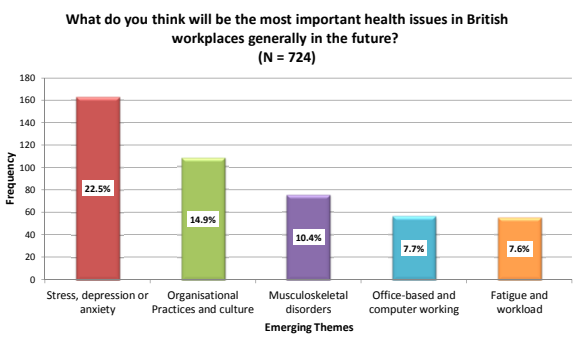
Top 5 health conditions caused/made worse by the workplace that **you see** in your practice

- Similar picture to the previous slide
- Highest rank dominated by mental health
- Musculoskeletal disorders dominated second highest rank
- As rank decreases, skin and hearing problems mentioned more but **not** vibration disorders
- Breathing/lung problems now mentioned more as rank decreases

Apprentices and Young Workers' survey - What do you think are the main health issues in your workplace?



Apprentices and Young Workers' survey



Apprentices and Young Workers' survey - What do you think are the main health issues in your workplace?

1. Stress

"The pressure some team members are under, it causes stress. I feel this is a factor that should be focused on."

2. Musculoskeletal disorders

Back ache, neck ache and any other manual handling or office based related illnesses"

3. Organisational practices and culture

"The attitudes of staff and management towards the health of their workforce's. While all workplaces may have written procedures, in my experience they are seldom put in to full practice."

4. Breathing or lung problems

"Dust and grit in the lungs"

5.Fatigue and workload

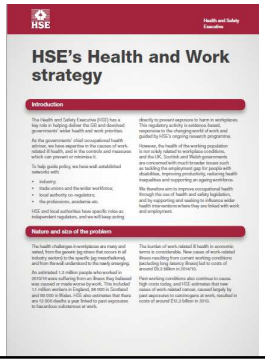
"Lack of breaks during long work days, or insufficient time clean/employ cross infection measures."

http://webcommunities.hse.gov.uk/connect.ti/WHEC/groupHome

EDITORIAL

Developing the evidence base for a new health and work strategy for Great Britain

HSE Strategy

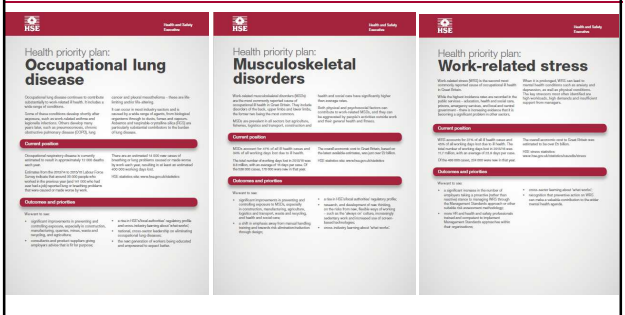


HSE's Health and Work strategy

Introduction

Nature and size of the problem

HSE Plans



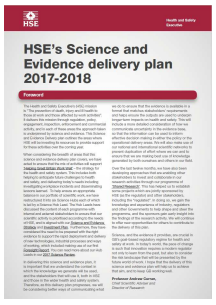
Health priority plan: **Occupational lung disease**

Health priority plan: **Musculoskeletal disorders**

Health priority plan: **Work-related stress**

Accountability

HSE's Science and Evidence investment plan

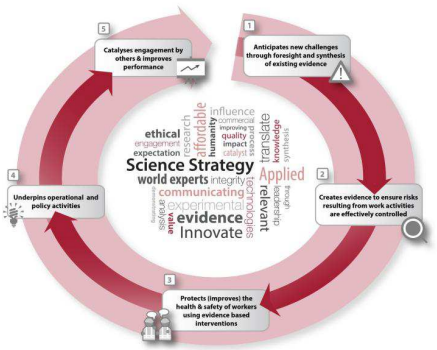


HSE's Science and Evidence delivery plan 2017-2018

http://webcommunities.hse.gov.uk/connect.ti/WHEC/groupHome

HSE'S SCIENCE

Science and Evidence Strategy

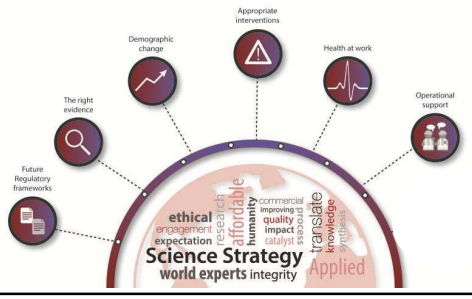


HSE Foresight Centre

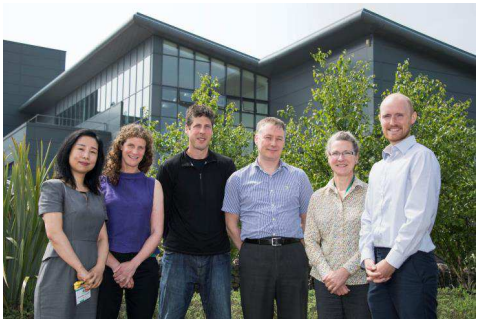
Areas of Interest includee…

- Everything Everywhere Connected – the Internet of Things
- Wearable Health and Safety
- Co-worker or Cobot?
- Advanced Manufacturing – Additive Manufacturing
- Advanced Materials - Composites
- Work Any Time, Any Place, Any Space
- What's Real and What's Not? – Immersive Technologies
- Backseat drivers
- Welcome to the Cognitive Era

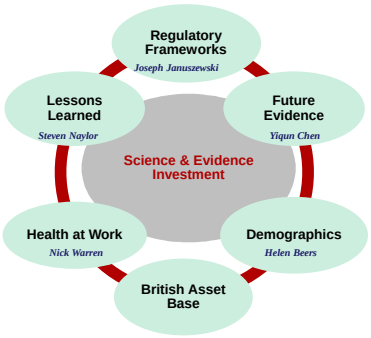
HSE's Science Hubs



Priority Research Hub Leads



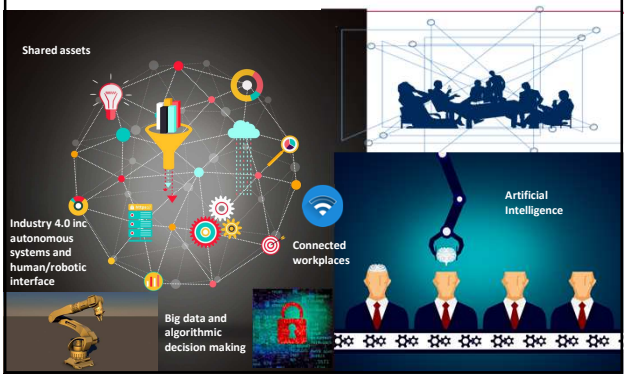
Overview of HSE Science Hubs



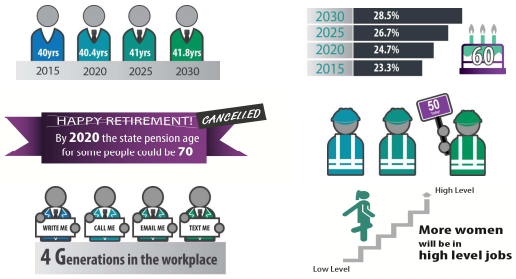
Roles and responsibilities - the HSE Science Hub leads

1. To provide technical leadership across HSE in the area identified
2. To identify research gaps and formulate research questions to address them
3. To ensure HSE priorities and regulatory context are reflected in the work of science hubs
4. To ensure our science and research meet the future challenges and opportunities
5. To identify commercial opportunities
6. To develop a programme of work and to evaluate the impact of the programme outcomes
7. To ensure the programme outcomes are communicated to HSE and the wider H&S system

Future Regulatory Frameworks - Who owns the risk in an increasingly complex workplace?



Demographic Change - What is the health and safety impact of demographic change and how do we manage it?



Appropriate Interventions - What should HSE be doing to achieve more effective intervention for the industrial asset base?

What will the future asset base look like

Health at Work - Understanding the interaction between work and non-work factors on health

To what extent does work contribute to ill-health conditions?
How does ill-health affect work?
What should HSE do? What works? Who else ought HSE be working with?
Are levels of work-related ill-health decreasing? To what extent has HSE contributed?

The right evidence for the Future

Vision:
To take a long term view in the development of the evidence base that can support HSE's long term strategic approach

Scope:

- Data collection systems
- Analytical techniques
- Measurement strategy
- Research

Supporting decisions on:

- Targeted intervention
- Prioritisation
- Tracking progress
- Evaluation of impact
- Identification of new/emerging risks

Evidence will be:

- Credible
- Fit for purpose

Development will be:

- Coherent
- Strategic / future proofed
- Focused on priority areas

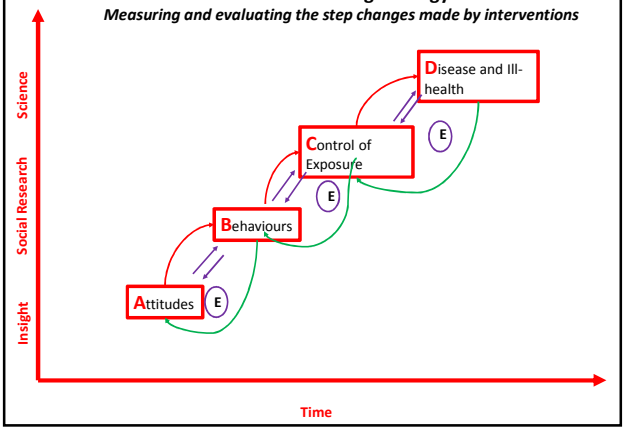
Developing the HSE measuring strategy -

Making best use of new data collection, modelling and analytical techniques to provide insight for our decisions on prioritization, targeted intervention, tracking progress and evaluation of impact

	Principles
1	To provide a framework for better use of measurements across HSE
2	To give a new focus on measuring behavioral changes, exposure reductions and disease
3	To ensure measurements are underpinned by scientific evidence
4	To link measurement priorities to HSE strategic and business plans
5	To allow the best possible longitudinal assessment of progress over time
6	To be able to estimate the potential national level impact and long term impact
7	To have a system in place to access, manage, link and utilize existing data
8	To generate real-time intelligence as far as practically possible
9	To enable effective communication for translation of evidence into actions

HSE Measuring Strategy

Measuring and evaluating the step changes made by interventions



Opportunity for a future occupational health reporting and surveillance approach?

Requirements

- Component vs system
- Manual vs automated
- Expert vs citizen
- Rapid alert vs national statistics
- National vs international
- Ouput vs outcome vs impact

How will we pay for it?

SHARED RESEARCH

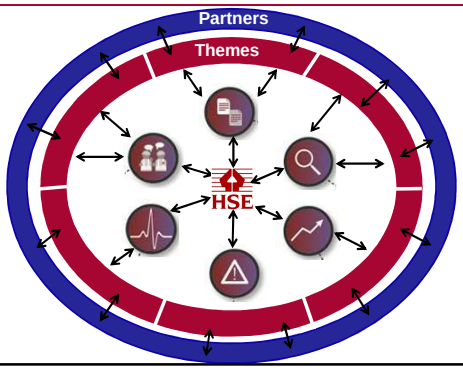
Shared Research

- Many problems to address
- Pace of change has increased
- HSE solutions vs system solutions
- Science hubs give focus: themes being developed

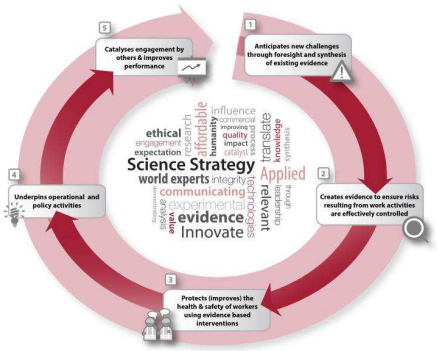
Shared Research

- Public: private partnership
- From shared problems to shared solutions
- Unique insights
- Develops practical, real-world, evidence based solutions

Shared Research Ecosystem



Science and Evidence Strategy



Why?

What is the impact of work on health (health on work?) and do HSE's interventions have a positive impact on prevention?

Conclusions

Conclusions

Health and Safety Executive

Thank you

MANCHESTER 1824

The University of Manchester

21st century occupational health reporting and surveillance

29th March 2018

Physician engagement

Dil Sen and Martin Seed

Clinical Senior Lecturers at the Centre for Occupational & Environmental Health

Presentation outline

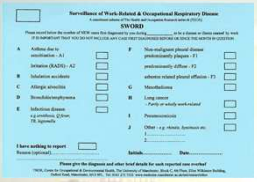
- Overview of current reporting processes
- Trends in reporter numbers and engagement
- Barriers to reporting
- Potential solutions for discussion

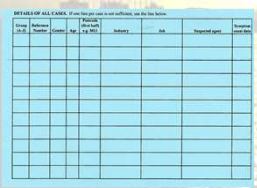
THOR – from the beginning….

1989 –	SWORD for respiratory and occupational physicians
1993 –	EPIDERM (skin)
1996 – 2015	SIDAW (infectious diseases)
1997 – 2006	OSSA (audiology)
1999 – 2009	MOSS (musculoskeletal), SOSMI (stress and mental illness)
1996 –	OPRA (occupational physicians)
2002 –	Collective scheme name changed from ODIN to THOR
2005 -	THOR-GP *electronic reporting only*
2006 -	THOR-Extra
2007 -	Web based reporting introduced as option for all schemes
2011 – 2012	Report card emailed (to print). Big fall in response so posting of cards resumed
2011	EELAB

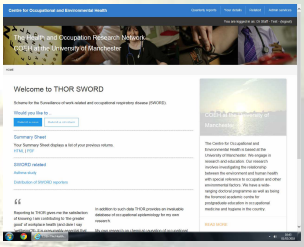
Reporting process & tools

Card vs Electronic





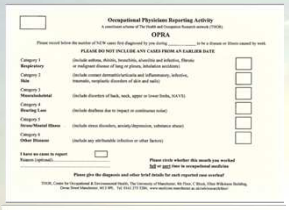
SWORD

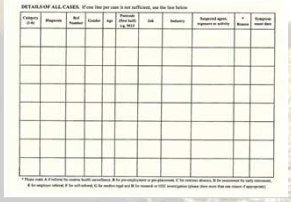


EPIDERM

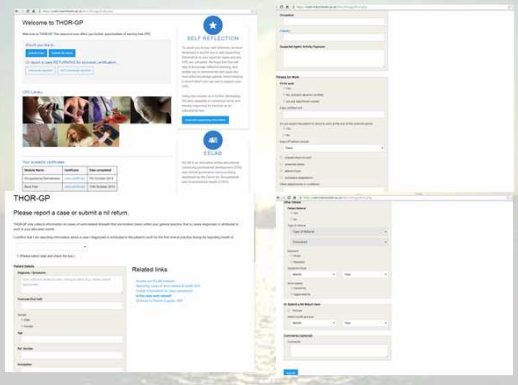
Electronic reporting also available

OPRA





THOR-GP – web reporting only



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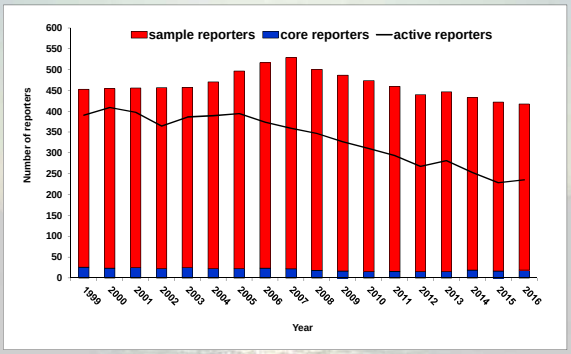
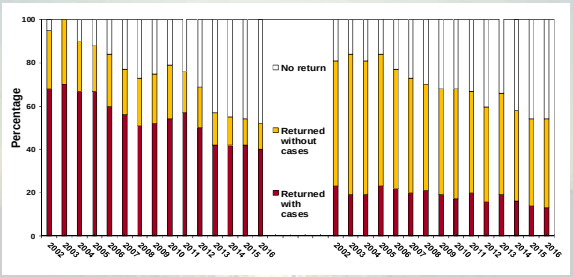
TRENDS
In reporting numbers etc.

Number of SWORD reporters 1999-2016



Responses from consultant chest physicians in SWORD (2002-2016)



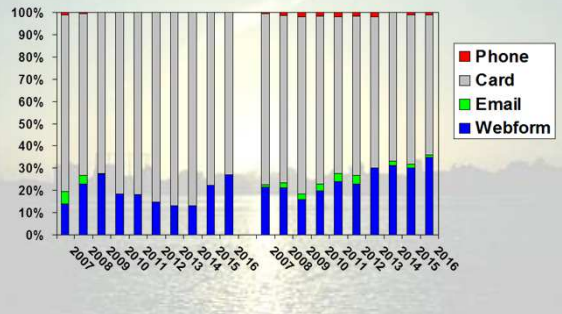
2016 response rates (CORE)

Core: 19
Average response rate = 52%
40% with cases
12% with no cases

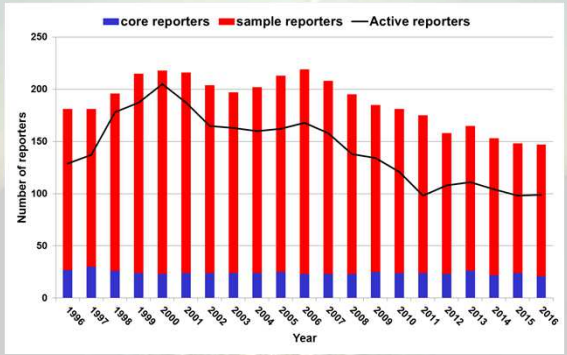
2016 response rates (SAMPLE)

Sample: 399
Average response rate = 54%
13% with cases
41% with no cases

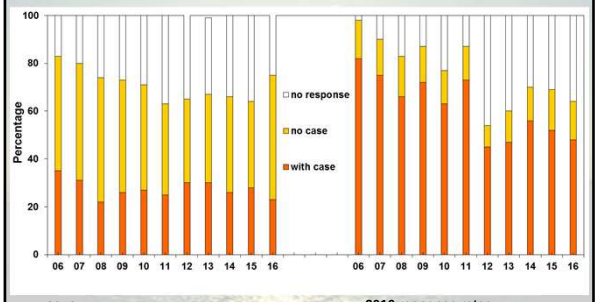
Percentage of returns by method of reporting - SWORD



Number of EPIDERM reporters 1996-2016



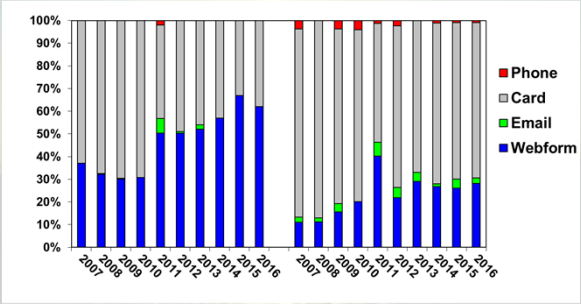
Responses from consultant dermatologists EPIDERM 2006-2016



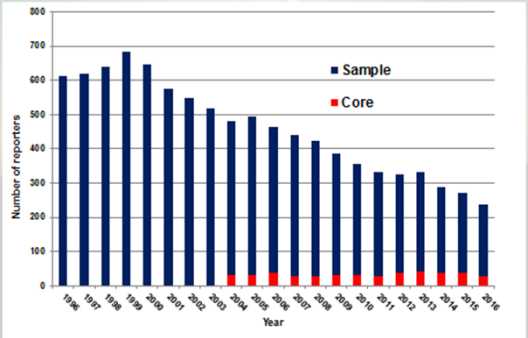
2016 response rates
Sample: 126
Average response rate = 64%
23% cards with cases
41% cards with no cases

2016 response rates
Core: 20
Average response rate = 64%
48% cards with cases
16% cards with no cases

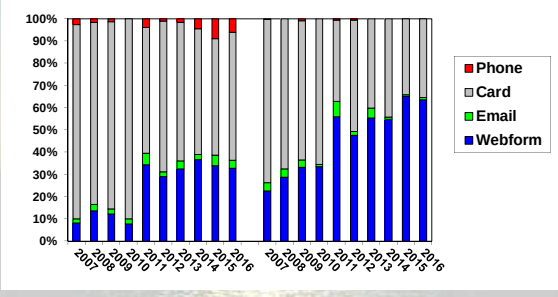
Percentage of returns by method of reporting – EPIDERM



Number of OPRA reporters, 1996-2016



Percentage of returns by method of reporting - OPRA



BARRIERS to reporting?

Potential barriers to recruitment

- Lack of publicity / awareness
- Possible lack of insight into occupational causation
- Yet another commitment for a new consultant take on
- What's in it for me?
- Does the scheme result in any benefit to worker health?
- Likely other unrecognised barriers……

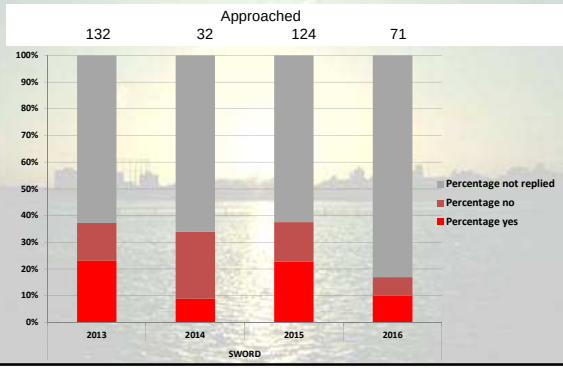
Potential barriers to full engagement by existing reporters

- Access to reporting tools
- Time commitment
- Indecision on whether the case should be reported
- Fall in motivation with time – 'reporter fatigue'
- Likely other factors……

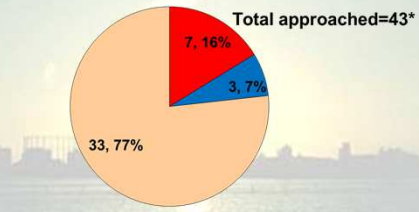
Recent efforts to improve reporter number & engagement

- Reporter recruitment approaches
- Development of interactive learning and CPD opportunities in the web platforms for OPRA and THOR-GP - EELAB

Outcome of recruitment approaches - SWORD



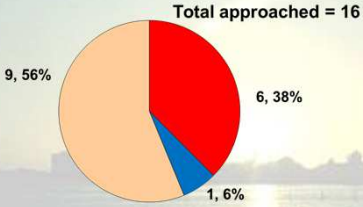
EPIDERM Outcome of recruitment approaches (January 2016 – December 2016)



*12 joined (5 recruited from previous year)
1 core (replacement)
11 sample (2 replacements / 9 from 'Specialist Info')

Reasons:
- Too busy = 2
- No reason = 1

OPRA Outcome of recruitment approaches (January 2016 – December 2016)



2016 leavers = 21

11 retired
10 withdrawn
- Little or no clinical work (1)
- Left post (2)
- No time (2)
- No reason (5)

Number replied yes
Number not replied
- 3 core
- 3 sample

Number replied no
- 1 retired

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POSSIBLE SOLUTIONS?
For discussion

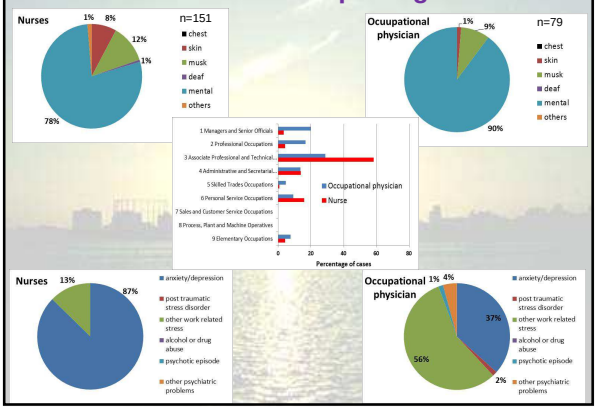
EELAB – usage by OPRA and THOR-GP

- Since Sept 2016, audit, benchmarking and module displays accessed by 14 reporters on 24 individual dates
- Since Jan 2017, 24 users accessed CPD modules (55 users in last 3 years): Back pain 5, Bullying 2, Depression 3, Occupational asthma 3, Occupational Dermatoses 7, WRULD 4

Other possibilities to improve physician engagement in reporting

- Encouragement of electronic vs card reporting:
  - '*How to* report to OPRA' article in preparation for Occupational Medicine
- If the majority continue to prefer card vs electronic should we develop adaptations to simple the paper based reporting?
- Survey reasons for 'zero returns'
- Given that most people carry a mobile phone these days is there scope for an 'app' to facilitate reporting and other web based interaction e.g. EELAB?
- Build on existing EELAB – possible application to SWORD and EPIDERM?
- ***Further ideas to be discussed at this workshop……***

OH NURSE Reporting?



Workshop discussion themes…….

- How to increase reporter numbers…using others eg. OHNs?
- How to improve engagement of existing reporters?
- How to increase transition from card to electronic reporting?
- Expanding on existing web features such as EELAB?
- Other technological innovations e.g mobile phone apps?

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Any questions?

Primary Care Databases

Analysing Electronic Health Records

Evan(gelos) Kontopantelis

Division of Informatics, Imaging and Data Sciences
Faculty of Biology, Medicine and Health
University of Manchester

Manchester, 29 Mar 2018

Outline

1. What is out there
2. PCD Structure
3. Examples
4. So, Electronic Health Records (EHRs) then?
5. Statistical analysis Methods
6. Tools
7. Summary

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Electronic Health Records

EHRs

- Have the potential to bring huge benefits to patients
  - can speed up clinical communication
  - reduce the number of errors
  - assist doctors in diagnosis and treatment
- Research quality augmented with added level of detail?
  - patient level factors can be taken into account
  - subgroup analyses are made easy
  - statistically, analyses can be more powerful
- But...
  - (even more) confidentiality issues arise
  - much work and advanced computer skills
  - usually no randomisation...

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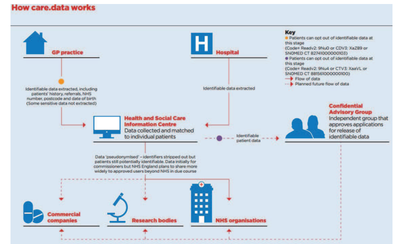
What was supposed to happen



What happened

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NHS delays plan to harvest your details: Victory for the Mail as database is shelved for six months

- NHS England announces hiatus over fears patients are in the dark
- Top clinical bodies have blasted the plans to share medical records
- NHS says it wants to improve 'understanding' of the scheme

By SOPHIE BORLAND

PUBLISHED: 18:36, 18 February 2014 | UPDATED: 01:25, 19 February 2014

The unique UK Primary Care Databases

...more relevant than ever?

- The Clinical Practice Research Datalink (CPRD)
- The Health Improvement Network (THIN)
- QResearch
- ResearchOne

The Clinical Practice Research Datalink
CPRD

- Established in 1987, with only a handful of practices
- Since 1994 owned by the Secretary of State for Health
- In July 2012:
  - 644 practices (Vision system only: in Eng mainly London, SE, SC, NW, WM; see /pubmed/23913774)
  - 13,772,992 patients (≈5m active)
  - covering ≈7.1% of the UK population
- Access to whole database costs ≈£130,000 pa
- Offers the ability to extract anything adequately recorded in primary care and construct a usable dataset

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  - 562 practices (Vision system, 50-60% overlap with CPRD)
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- Similar structure to CPRD and possibly more efficient patient matching for socio-demographic characteristics

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- Datasets limited to 100k patients for externals
- Publication list, 90-95%: Vinogradova, Coupland and/or Hippisley-Cox

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  - ??? practices (SystmOne: Yorkshire&H, East Mid, East Eng, NE)
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- New potentially important player
- Uniformity of SystmOne and central databases for TPP systems likely to provide better quality data at lower cost

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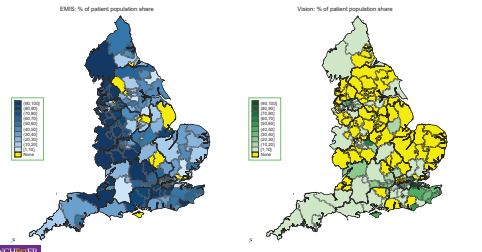
GP clinical systems

"Spatial distribution of clinical computer systems in primary care...", BMJ Open 2018



Export format

from SQL

- Broken down to numerous tables, due to data volume
- Text files need to be imported into powerful analysis/database management software
- Some of the reliable information available:
  - Birth year, sex, BMI
  - Clinical, referral, therapy, test and immunisation events
- All events are entered in codes (lookup tables available)
- Everything (likely to be recorded) can be identified, provided one knows which codes to look for and where
- BUT a manual search on all the codes is not possible

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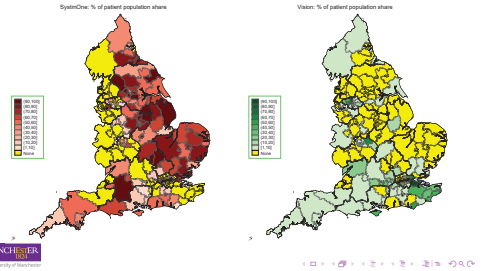

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Primary Care Databases structure
based on CPRD

- Event files
  - Clinical: all medical history data (symptoms, signs and diagnoses)
  - Referral: information on patient referrals to external care centres
  - Immunisation: data on immunisation records
  - Therapy: data relating to all prescriptions issued by a GP
  - Test: data on test records
- Look-up files
  - Medical codes: Read codes, ≈100k available
  - Product codes: ≈80k available
  - Test codes: ≈300 available

How to extract a cohort

- Size of the tables prohibits looking at codes one by one
- Instead we use search terms to identify potentially relevant codes in the look-up tables and create draft lists

Example (Search terms for diabetes)

- String search in Medical codes: 'diab' 'mell' 'iddm' 'niddm'
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Additional data
∗ =extra cost †=subset of ≈ 60% of practices that agreed to linkages

- Free-text∗
- Hospital Episode Statistics data†
  - Detailed admitted or outpatient data∗
  - General info on admission
- Office of National Statistics data†
  - Death (in addition to CPRD estimated death)
  - Patient LSOA deprivation (Townsend or IMD)
- Specific condition registries†
  - Cancer registry data (CPES, SACT)∗
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Occupational health
but some options exist

- Possible to issue a questionnaire to GPs and health workers
- Large cost; e.g. for the CPRD, per response:
  - Small questionnaire (1-4 questions) => £70
  - Medium questionnaire (5-9 questions) => £90
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Kontopantelis (FBMH) Primary Care Databases 29 Mar 2018 21 / 42

Outline

Occupational health
look away...

- Needlesticks/sharps injuries
- Manual handling
- Slips, trips and falls
- Stress at work
- Pre-appointment checks
- Rehabilitation
- Immunisation
- Health monitoring
- Health promotion, education and training
- Substance misuse

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- Large cost; e.g. for the CPRD, per response:
  - Small questionnaire (1-4 questions) => £70
  - Medium questionnaire (5-9 questions) => £90
  - Large questionnaire (10+ questions) => £120
- NIHR SPCR funded work on GP Burnout: drivers and variability
- Can calculate workload per practice or health worker and changes over time, as standard

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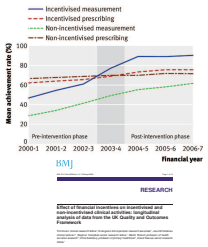
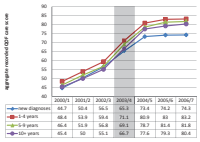
Non-incentivised aspects of care
Sample of 148 representative practices from the CPRD

- Achievement rates improved for most indicators in the pre-incentive period
- Significant initial gains in incentivised indicators but no gains in later years
- By 2006-7 achievement rates significantly below those predicted by pre- trends



Patient level diabetes care
Sample of 148 representative practices from the CPRD

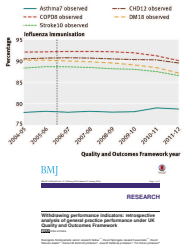
- In 2004-5 quality improved over-and-above this pre-incentive trend by 14.2%
- By 2006-7 improvement above trend smaller at 7.3%
- Levels of care varied significantly for sex, age, years of previous care, number of co-morbid conditions



	2003/1	2003/2	2003/3	2003/4	2004/5	2005/6	2006/7
new diagnoses	48.7	50.4	56.5	61.3	73.4	74.2	74.3
1-4 years	48.4	53.9	59.4	71.1	80.9	83	83.2
5-9 years	46.4	51.9	56.8	68.1	78.7	81.4	81.8
10+ years	45.4	50	55.3	66.7	77.6	79.3	80.4

Withdrawing incentives
644 CPRD practices, 2004-5 to 2011-12

- Financial incentives partially removed for aspects of care for patients with asthma, CHD, diabetes, stroke and psychosis
- Mean levels of performance generally stable after the removal of incentives
- Health benefits from incentive schemes may be increased by periodically replacing existing indicators with new ones



Outline

EHRs
disadvantages

- Usually no randomisation ⇒ unmeasured confounding
- Association rather than causation
- Usually self-selected units contributing data
- Often regional hence generalisability questionable
- Anonymised higher-level units ⇒ how control or match?
- Observation bias: reliance on codes being used as they should
- Data quality varies: dependent on external pressures or incentives
- Much work and skill-mix teams needed: complex analyses
- Record of engagement with health service, not always of health

EHRs
advantages

- Patient level data and subgroup analyses
- Able to extract data not available anywhere else
- Available now (with trustworthy data for a few years back)
- Real populations, not experimental settings (high external validity)
- Powered to detect almost anything
- Much cheaper than a trial
- Almost always possible and ethical
- Long-term effects and longitudinal analyses
- In future, integrated in clinical systems ⇒ care improvements

Outline

EHRs
seminal studies

- Tobacco smoking and lung cancer
  - Smoking and Carcinoma of the Lung, BMJ 1950 (Richard Doll and Bradford Hill)
  - Causal role of smoking now universally accepted, even though based exclusively on observational data
  - Sir Ronald A. Fischer most famous critic
- MMR vaccine controversy
  - Observational study on 12 children argued link between MMR vaccine and autism (Wakefield A. 1998, The Lancet)
  - Numerous large scale observational studies failed to replicate findings
  - Original paper retracted after fraud was identified

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Outline

Missing data
MCAR, MAR or MNAR

- Missingness levels may be higher than in RCTs
- May lead to biased estimates
- Always use a multiple imputation framework:
  - include all covariates even if levels of missingness are very high
  - include all outcomes
  - at least 5 datasets are recommended
- Do not use LOCF or complete case analyses

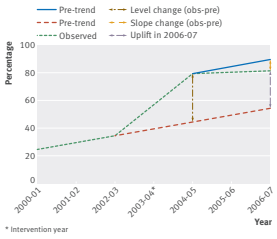
Mainstream inference
easy once we get this far

- Linear regression for continuous outcomes
- Logistic regression for binary outcomes
- Cox-proportional hazards regression for time-to-event binary outcomes
  - for short term outcomes small differences to logistic regression
- Assumptions need to be met in all methods
- Easy to implement within a multiple imputation framework

More advanced approaches for inference
generally in more advanced statistical packages

- Competing risks regression for time-to-event
- Spline regression to model non-linear components
- Interrupted time-series (ITS) analysis
- Logit transformation for performance indicators
- Effect heterogeneity
- Propensity score matching

ITS focus
to account for pre-intervention trends



Outline

EHRs tools
with a PCD focus

- Search commands
  - pcdsearch in Stata and Rpcdsearch in R
  - code list extraction algorithm
  - *Modelling conditions and health care processes in Electronic Health Records: an application to Severe Mental Illness with the Clinical Practice Research Datalink, PLOS ONE 2016*
- Representative sampling
  - repsample in Stata
  - Select a representative sample (e.g. of practices)
  - *A Greedy Algorithm for Representative Sampling: repsample in Stata, JSS 2013*
- Data extraction
  - rEHR (github.com)
  - R package for manipulating and analysing EHR data
  - *rEHR: An R package for manipulating and analysing Electronic Health Record data, to be submitted*

EHRs tools
with a PCD focus

- Power calculations
  - ipdpower in Stata
  - mixed-effects power calculation through simulations
  - *Simulation-Based Power Calculations for Mixed Effects Modelling: ipdpower in Stata, JSS in print*
- General Multiple imputation
  - twofold in Stata
  - Multiple imputation for longitudinal datasets
  - *Application of multiple imputation using the two-fold fully conditional specification algorithm in longitudinal clinical data, Stata Journal 2014*

EHRs tools
with a PCD focus

- Cleaning BMI
  - mibmi in Stata
  - Cleaning and multiple imputation for missing BMI data
  - *Longitudinal multiple imputation approaches for Body Mass Index: the mibmi command in Stata, under review*
- Code lists
  - clinicalcodes.org
  - Website with freely available developed code lists
  - *ClinicalCodes: An Online Clinical Codes Repository to Improve the Validity and Reproducibility of Research Using Electronic Medical Records, PLOS ONE 2014*

Reporting guidelines
RECORD statement

- REporting of studies Conducted using Observational Routinely-collected Data
  - Based on STROBE (STrengthening the Reporting of OBservational studies in Epidemiology)
  - Unique features compared to other epidemiological studies
  - Often very hard to fully describe in a way that they are replicable

Outline

What to take home

- Complexity: not like pressing a button
- Unmeasured confounding and other biases
- 80% of the work if not more is creating a dataset to analyse
- Analyses options have similarities but are always more challenging than in RCTs
- Confidentiality and data linkages
- Quality varies between and within databases
- P-values often irrelevant

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