Background Quality Report

Work-related ill health statistics based on reports by specialist physicians to THOR

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Introduction

This report assesses the quality of the annual statistics of newly diagnosed cases of work-related ill health in Great Britain (GB) that are based on cases reported by consultant physicians to THOR (The Health and Occupation Research network). Although THOR collects work-related ill health information for the UK, HSE only publish THOR statistical outputs for Great Britain (GB), as HSE is the Health and Safety regulator of GB. The aims of THOR are to estimate the incidence and incidence rate of work-related ill health seen by the specialist physicians in the network and to monitor trends over time. This information will contribute to the evidence base for developing strategy to prevent work-related ill health. The information can also help occupational health professionals to improve identification, diagnosis, and management of work-related ill health cases similar to those reported.

This quality assessment is conducted according to a common definition of quality in the European Statistical System, which includes relevance, accuracy, reliability, timeliness, punctuality, coherence, comparability, accessibility and clarity. To produce and update this quality report is to meet our obligation to comply with the UK Statistics Authority (UKSA) Code of Practice for Official Statistics (www.statisticauthority.gov.uk/assessment/code-of-practice/).

Principle 4, Practice 2, which states:

> "Ensure that official statistics are produced to a level of quality that meets users' needs, and that users are informed about the quality of statistical outputs, including estimates of the main sources of bias and other errors, and other aspects of the European Statistical System definition of quality."

Background of THOR

THOR is a national surveillance of work-related illness in clinical settings in the UK. (See: www.population-health.manchester.ac.uk/epidemiology/COEH/research/thor. It systematically collects a wide range of newly diagnosed cases of work-related ill health and the associated information from specialist physicians on a monthly basis. There are several constituent schemes for different clinical specialties within THOR and its predecessor, the Occupational Disease Intelligence Network (ODIN). Further information can be found in www.population-health.manchester.ac.uk/epidemiology/COEH/research/publications. A list of these schemes is provided as follows.

SWORD (1989-)
Surveillance of Work-related and Occupational Respiratory Disease
Cases reported by consultant chest physicians

EPIDERM (1993-)
The Occupational Skin Disease Surveillance
Cases reported by consultant dermatologists

SIDAW (1996-)
Surveillance of Infectious Diseases at Work
Cases reported by consultants in communicable disease control

OSSA (1997-2006)
Occupational Surveillance Scheme for Audiological physicians

MOSS (1997-2009)
Musculoskeletal Occupational Surveillance Scheme
Cases reported by rheumatologists

SOSMI (1999-2009)
Surveillance of Occupational Stress and Mental Illness
Cases reported by consultant psychiatrists

OPRA (1996-)
Occupational Physicians' Reporting Activity
Cases of all types of work-related illness reported by occupational physicians

This report will particularly assess the quality of the work-related ill health statistics based on the reports by consultant chest physicians to SWORD and the reports by dermatologist to EPIDERM.

SWORD was initiated at the National Heart and Lung Institute in London and has been collecting case reports since 1989 from a network of consultant chest physicians. EPIDERM was initiated at the Centre for Occupational and Environmental Health (COEH), the University of Manchester, and has been collecting cases from dermatologists' reports since 1993. Both SWORD and EPIDERM are constituent schemes of THOR and are both currently run from COEH, the University of Manchester.

A very similar method has been used across various clinic-based reporting schemes within THOR, building on and improving from the long standing clinical based reporting schemes such as SWORD and EPIDERM. Physicians are reporting voluntarily on a monthly basis new cases of ill health that they have seen in the course of their clinical practice and in their view are caused or made worse by patients' working condition. Participating physicians record details of the cases on a standard monthly summary card and send the card back to the THOR research team at the end of the reporting month. Recently, an option to report electronically through a "web form" has been available. For each case reported, the physician provides basic demographic details, such as age, gender, residence (first three digits postcode), occupation and industry, together with the diagnosis and the suspected causal agents. All information collected is anonymous. No identifiable information about a patient will be reported to THOR.

The main categories of the work-related respiratory diseases reported by consultant chest physicians to SWORD include:

- Allergic alveolitis
- Asthma
- Bronchitis / emphysema
- Infectious diseases
- Inhalation accidents
- Benign pleural disease
- Malignant Mesothelioma
- Lung cancer
- Pneumoconiosis
- Other respiratory illness

The main categories of the skin diseases reported by consultant dermatologists to EPIDERM include:

- Contact dermatitis
- Contact urticaria
- Folliculitis/acne
- Infective skin disease
- Mechanical skin disease
- Nail conditions
- Skin neoplasia
- Other dermatoses

Further analyses can be conducted according to the following data dimensions

- Patient characteristics (age, gender, broad region of residence, occupation)
- Workplace and job characteristics (occupation and industry)
- Suspected causal agents

Reported incidence

The annual incidence of work-related ill health reported in THOR is estimated based on cases reported by the participating physicians who either report cases every month (core reporting) or on one randomly assigned month per year (sample reporting). Cases reported by sample reporters are multiplied by 12 and added to the cases reported by core reporters to obtain an annual estimated total. In 2014, about 1,551 estimated new cases of respiratory diseases had been reported by consultant chest physicians to SWORD and about 1,320 estimated cases of skin diseases had reported by dermatologists to EPIDERM.

Rates of reported Incidence of occupational asthma and occupational contact dermatitis

The incidence rates are calculated for occupational asthma and occupational contact dermatitis using the number of the estimated new cases reported to THOR in a year (the numerator) divided by the number of employed in that year (the denominator) and multiplied by 100,000 to give incidence rates per 100,000 employed. The estimated number of cases reported by the participating physicians (numerator) has not been extrapolated to produce a national estimate. To extrapolate will need to make adjustments of participation rates and response rates of THOR, providing some of the key assumptions are deemed to be reasonable. These include, for example, the non-responding physicians are seeing and reporting the same number and type of ill health as those who responded; the participating physicians in THOR are representative of all consultant physicians of the particular specialties in GB; and the patients they see are representative of the patients clinically referred to the specialist physicians. There is an ongoing discussion on whether the extrapolation is valid.

On the other hand, for the denominator, the number of employed is the number of workers in employment including employees and self-employed. The estimated number of people employed in GB by year is available from the Office for National Statistics Annual Population Survey (APS) employment estimates (see: www.hse.gov.uk/statistics/sources.htm#employment). The THOR researchers from the University of Manchester provide the incidence estimates (numerator) and the statisticians in HSE calculate the incidence rates using the APS data as denominator. The average annual incidence rate for occupational asthma in the past 10 years (2004-2013) is 286 per 100,000 employed. The average annual incidence rate for occupational contact dermatitis over the same period is 1,395 per 100,000 employed.

Incidence trends

THOR data are used to estimate trends of reported incidence of work-related respiratory and skin diseases overall and for sub categories of the diseases, particularly for occupational asthma and occupational contact dermatitis. Multi-level models are used for the trend analyses, which can take into account the changes in the numbers and characteristics of the reporters, changes in the underlying working population in the UK each year, seasonal effects and other reporting behaviours that may affect the incidence trends. The latest trend analysis has covered the cases reported to SWORD and EPIDERM. The analyses showed an average around -7% annual decrease in incidence of occupational asthma over the past 15 years (1999-2014), and an average around -4% annual decrease in incidence of occupational contact dermatitis over the past 18 years (1996-2014). However, in general, the observation of the long-term trends showed the larger decrease occurred in the earlier part of the reporting period (1996-2005 for contact dermatitis and 1999-2006 for asthma) with a generally relatively flat trend thereafter.(See: www.hse.gov.uk/statistics/pdf/thortrends15.pdf)

Furthermore, the trends in incidence have been investigated not only for industry as a whole but also for specific industry sectors (i.e. healthcare) and for specific causal agents. The incidence trend analyses have also been used to investigate the potential effects of interventions to reduce work-related ill health in GB workplaces. Some relevant publications by the THOR team on the application of the trend analyses can be found in www.population-health.manchester.ac.uk/epidemiology/COEH/research/publications

More information on the standard outputs from THOR can be found (www.hse.gov.uk/statistics/tables/index.htm#thor)

THOR is one of the data sources of work-related ill health in Great Britain. Information on other data sources can be found in (www.hse.gov.uk/statistics/sources.htm)

Assessment of Statistics against quality dimensions and principles

Relevance

This dimension covers the degree to which the statistical product meets user need in both coverage and content.

In order to improve the completeness in the collection of potential work-related ill health cases that have been referred to the specialist physicians, the THOR research team aims to recruit all clinically active members of the relevant specialties identified from various information sources. Approximately 66% of the eligible chest physicians and 56% of the eligible dermatologists approached have agreed to participate in the reporting schemes and about 80% of the participating physicians have responded in their assigned reporting month.

There are about 471 chest physicians participating in SWORD per year in 1999-2014 and about 193 dermatologists taking part in EPIDERM reporting every year in 1996-2014. Only a small number of the participating physicians in both scheme, about 15-20, are reporting every month (core reporting), the remaining majority are reporting for a randomly assigned month per year (sample reporting). By design, THOR reporters are not a random sample of all consultant physicians and may not be a representative sample of all consultant physicians in GB but they are based in NHS clinics throughout GB.

For the annual statistics release, the estimated incidence rates per 100,000 for occupational asthma and occupational contact dermatitis are presented by occupation. Average annual incidence rates over 3-year and 9-year periods are provided to give stable estimates. www.hse.gov.uk/statistics/tables/index.htm#thor

THOR statistics are compared with relevant statistics produced from other data sources to give a more complete picture of particular types of work-related ill health or for specific industries. More information is available on how THOR statistics are used in the special analyses of work-related ill health.

- Use of THOR statistics in analyses of work related ill health by industry:
  www.hse.gov.uk/statistics/industry/construction/

  www.hse.gov.uk/statistics/industry/agriculture/

  www.hse.gov.uk/statistics/industry/healthservices/

  www.hse.gov.uk/statistics/industry/manufacturing/

- Use of THOR statistics in analyses of work related ill health by type of ill health: www.hse.gov.uk/statistics/causdis/respiratory-diseases.pdf

  www.hse.gov.uk/statistics/causdis/asthma/

  www.hse.gov.uk/statistics/causdis/dermatitis/

To ensure these statistics meet the needs of the users, their relevance are reviewed through different ways. The following are some of the approaches.

- There is a user engagement website where a feedback form is available for users to provide their views and suggestions on the range of statistical outputs provided. See: www.hse.gov.uk/statistics/about/engagement/
- Users' views on ways to improve data collection, analysis and information dissemination are sought when THOR information is provided in response to users ad hoc information requests
- There is a popular electronic email bulletin service (eBulletin service) which provides regular information to users, and reminding them of forthcoming releases and other relevant key events. Through this service, user views are sought periodically on specific issues or areas of development.

Accuracy and reliability

This dimension covers, with respect to the statistics, their proximity between an estimate and the unknown true value.

Assessment of work relatedness

There are uncertainties in deciding whether an ill health in an individual is work-related. The level of certainty on work attribution may vary widely across different types of ill health. The reporting in SWORD and EPIDERM has relied on physicians' judgement on work-relatedness of the ill health cases according to the balance of probability (whether the ill health is more likely than not caused by work activities). Nevertheless, consultant chest physicians and dermatologists can carry out special clinical investigations to make diagnoses and to identify causative work exposures.

Accuracy in data input, coding, analysis and result publication

Processes have been put in place to systematically check data accuracy in THOR. For example, input mask, validation rules and validation text are used to improve accuracy in the data input stage. Reporters are contacted in order to clarify the information provided by them if it is not clear or insufficient.

All data are coded by two trained staff and any differences reconciled by a third, more senior staff member. Raw data are coded according to standard coding scheme, such as Standard Occupational Classification (SOC), Standard Industrial Classification (SIC), and standard codes for Government Official Regions (GOR). Coding systems for classification of suspected causal agents have been developed and updated within THOR and HSE. Occasionally, there will be a need to dual code data for a specific period due to changes in the SIC and SOC classification system in order to address issues of continuity and to determine the impact of this change on the data quality. For example, change in the SIC coding system from SIC2000 to SIC2007.

Any unexpected increase or decrease of incidence observed in a certain occupation, industry or due to certain suspected agents are checked to ensure the changes are not artificially caused by coding errors or coding inconsistencies. Furthermore, the preparation of the annual submission of THOR statistics to HSE for the annual Health and Safety Statistics Release also include consistency check and making corrections to earlier years data arising from late reporting of cases or from on going data cleaning.

Timeliness and punctuality

Timeliness refers to the time gap between publication and the reference period. Punctuality refers to the gap between planned and actual publication dates.

Updated work-related ill health statistics based on data collected in THOR are published annually, in October each year, as part of Health and Safety Statistics release. The publication is about 10 months after the end of the data collection period. For example, all cases reported to THOR during the calendar year of 2014 are published in October 2015. The processes to produce the annual release of Health and Safety Statistics, including THOR statistics are well-established and therefore, have not resulted in a delay to release in recent years.

Accessibility and clarity

Accessibility is the ease with which users are able to access the data, also reflecting the format in which the data are available and the availability of supporting information. Clarity refers to the quality and sufficiency of the metadata, illustrations and accompanying advice.

Accessibility

The annual publication of the THOR statistics are presented in tables and are accessible via the HSE website. See: www.hse.gov.uk/statistics/tables/index.htm#thor

THOR statistics are used as a comparison of work-related ill health statistics produced from other data sources for special analyses for types of ill health (i.e. asthma and contact dermatitis) and for particular industry sectors. Results of these analyses and the associated commentaries are presented as summaries. These are accompanied with more detail PDF documents that are also accessible via the HSE website. These web pages of statistics will be updated at least annually. Please see the links provided under the section - “Relevance” on the use of THOR statistical outputs in analyses of specific types of ill health and industries.

THOR statistics are also accessible through ad hoc information requests. THOR team indicated that they have responded to over 500 ad hoc queries during the 8-year period, 2002-2010. A third of these requests were from HSE, a quarter from physicians and another quarter from researchers. The remaining requests were from industry and the public. The research team in the University of Manchester has also published many research papers using the THOR data in peer-reviewed scientific journals. A list of their publications can be found in www.population-health.manchester.ac.uk/epidemiology/COEH/research/publications

Clarity

Clear guidelines for reporting cases of work-related ill-health by specialist physicians are published on the THOR web page via the COEH, the University of Manchester. See: www.population-health.manchester.ac.uk/epidemiology/COEH/research/thor/

Patient Information Sheet about THOR has been developed and for participating GPs to use to explain to patients’. The Patient Information Sheet is also published on the THOR web page (www.population-health.manchester.ac.uk/epidemiology/COEH/research/thor/)

Confidentiality, transparency and security

THOR is run from COEH, the University of Manchester. Statistical outputs from THOR contribute to National Official Statistics and are published through HSE. There are procedures and policies in place to ensure sound confidentiality, security and transparent practices in the

publication of the statistics. A Confidentiality Policy (which also covers data security) is available on the HSE website: www.hse.gov.uk/statistics/about/confidentiality.htm

To ensure transparency of data release, any revisions to our publications are handled in accordance with the Department's revisions policy, which is published on the statistics section of the HSE web site. This gives details on the circumstances of when a revision might take place, as well as a log of past revisions. See: www.hse.gov.uk/statistics/about/revisions/
These statistics also comply with the UK Statistics Authority Code of Practice on release protocols. In particular, pre-release access to the data is strictly controlled. The Policy can be viewed at www.hse.gov.uk/statistics/about/.

To avoid the possible risk of disclosing personal information through statistical outputs, disclosure control, often using the method of aggregation than suppression, is implemented where deemed necessary, especially where small counts are involved (e.g. <5 actual cases).

Coherence and comparability

Coherence is the degree to which data which have been derived from different sources or methods but refer to the same topic are similar. Comparability is the degree to which data can be compared over time and domain.

Coherence

THOR schemes are long-standing clinical based reporting schemes that date back more than 20 years. The methods for data collection, analysis and dissemination are well developed and are continuously improved. Data collected from THOR forms an important part of the overall picture of work-related ill health in Great Britain. In most cases, THOR data are complementary rather than directly comparable with other relevant data sources.

Internal comparisons have been made between THOR and THOR-GP (a similar reporting network for general practitioners, see: www.hse.gov.uk/Statistics/pdf/throgp-background-quality-report.pdf), where similar methods of data collection and trend analysis have been used. However, we need to interpret the findings with caution, particularly because the fact that there are major changes in reporting in THOR-GP between 2007 and 2011 and the issue of reporter fatigue has not yet resolved. (See: www.hse.gov.uk/statistics/pdf/thortrends15.pdf)

Comparability across domain

Statistical outputs from THOR are presented side by side with statistics produced from other data sources, such as the self-reported ill health data collected from the Labour Force Survey to give a more complete picture of the occurrence of particular types of ill health in Great Britain. Suitable commentaries are provided to assist the interpretation.

(See: www.hse.gov.uk/statistics/causdis/asthma/ ; www.hse.gov.uk/statistics/causdis/dermatitis/)

Comparability over time

Many external and internal factors can influence the year on year comparability of the statistical outputs from THOR. Some of the external factors may include the increase in awareness of the work-related ill health of both patients and physicians and the changes in clinical referrals. On the other hand, some of the internal factors may include the changes in data collection methods, reporting frequency (reporting every months verse reporting for one randomly allocated month per year), coding practices of the raw data and reporting behaviours of the participating physicians (i.e. the possible reporter fatigue over time and harvesting cases at the start of reporting).

Incidence trends based on the cases reported to THOR are very sensitive to changes in data collection methods. For example, there was an apparent fall in response rate and the number of skin diseases reported in EPIDERM in 2011, which subsequently returned to the pre-2011 level in 2012. This was thought to be caused by the change from paper based reporting using postal report cards to electronic reporting in 2011. Post-card based reporting was reinstated in 2012.

Furthermore, extensive work has been carried out by the Manchester research team to investigate impact of reporter fatigue, which manifested by, for example, the increase of blank returns in association with the length of the participation time. Although this year's trend analyses have not formally adjusted for the effects of reporter fatigue, a summary of the body of work to investigate this has been provided in addition to guidance as to the possible impact of fatigue on the trend estimates. For EPIDERM and SWORD, some of the observed decrease in disease incidence over time might have been due to reporter 'fatigue' rather than a 'true trend'. For example, for EPIDERM, adjusting for 'fatigue' would give an estimate of -3.4% annual reductions in the incidence of all skin conditions compared to -3.8% if no adjustment on fatigue was made. For SWORD the equivalent change would be from -2.7% with adjustment to -3.2% without adjustment for all respiratory conditions.

Since April 2010, the Standard Industrial Classification system SIC 2007 to group industry data has replaced the previous SIC 2003. While the majority of the changes can be done by simple electronic conversion from one code to another, the conversion of others are less straightforward. However, the impact of this change on the statistical outputs is minor. Further information about the industry coding and the implications of the coding changes is available from the webpage: www.hse.gov.uk/statistics/industry/sic2007.htm.

Summary of strengths and weaknesses

Strengths

- All consultant physicians within the particular specialties are invited to take part in the reporting, and the participation rate and response rate have been high
- Reported cases are clinically assessed by consultant physicians
- They collect not only the information on diagnosis and the associated job and industry, but also the information on suspected causal agents to allow further investigations of work-related causes of the ill health and for identification of novel work-related health risk
- They allow the assessments of the reported incidence, incidence rates and the monitoring of trends over time.
- They are long-standing clinically based reporting schemes that date back more than 20 years. The quality of the data collected are continuously assessed and improved
- They are complimentary to other sources of data of work-related ill health and probably provide the best available data on the causal agents for occupational asthma and occupational contact dermatitis in GB.
- All information collected is anonymous. No identifiable information about a patient is collected

Weaknesses

- Majority of the reporters are reporting for one randomly allocated month in each year with a small group of about 20 reporters in SWORD and in EPIDERM are reporting every month. With approximately 60% participation rate and 80% response rate, the estimated incidence cases and incidence rates are subject to sampling errors and response bias.
- They can only capture more serious cases of ill health that have been clinically referred to specialist physicians and will underestimate the total burden of work-related ill health
- The estimated incidence rates and trends are influenced by patients' healthcare seeking behaviours, clinical referral patterns and reporting behaviours of the participating physicians and therefore are sensitive to methodology changes
- The estimated incidence rates and trends are based on many assumptions and subject to uncertainties which prevent drawing firm conclusions

National Statistics

National Statistics are produced to high professional standards set out in the National Statistics Code of Practice. They undergo regular quality assurance reviews to ensure that they meet customer needs. They are produced free from any political interference.

An account of how the figures are used for statistical purposes can be found at www.hse.gov.uk/statistics/sources.htm .

For information regarding the quality guidelines used for statistics within HSE see www.hse.gov.uk/statistics/about/quality-guidelines.htm

A revisions policy and log can be seen at www.hse.gov.uk/statistics/about/revisions/

Additional data tables can be found at www.hse.gov.uk/statistics/tables/.

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