

The Health and Occupation Research Network THOR (UK & Republic of Ireland)

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Methodologies to identify work-related diseases:
Review of sentinel and alert approaches

The European Agency for Safety and Health at Work
(EU-OSHA) Workshop – Brussels

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v3

Objectives and structure of the presentation

To outline and discuss, with reference to THOR:

- The drivers for sentinel approaches / monitoring systems
- An outline description of relevant THOR schemes and methods, with illustrations (limited to chemicals in this presentation) of:
 - sentinel monitoring
 - alert function
- Consideration of strengths / weaknesses, obstacles, challenges, and potential solutions
- The link with prevention
- Open debate

Drivers for THOR sentinel approaches/monitoring systems and alerts for new work-related diseases (WRDs)

- Original drive was to estimate incidence (and trends in incidence) of WRDs (funded by the UK Health and Safety Executive.)

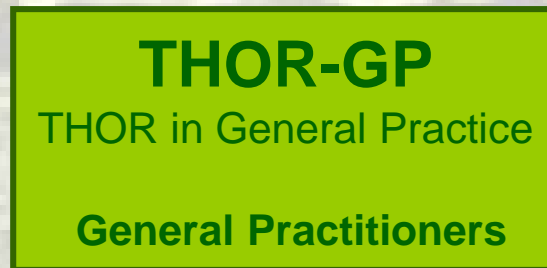
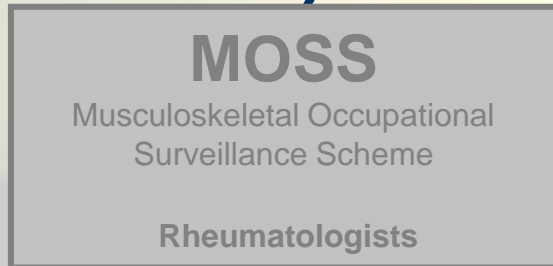
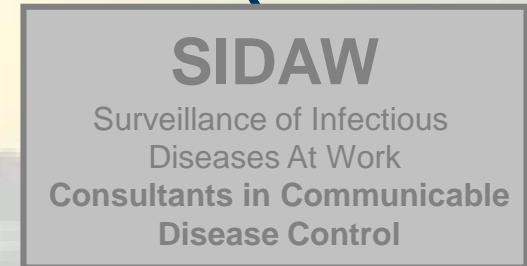
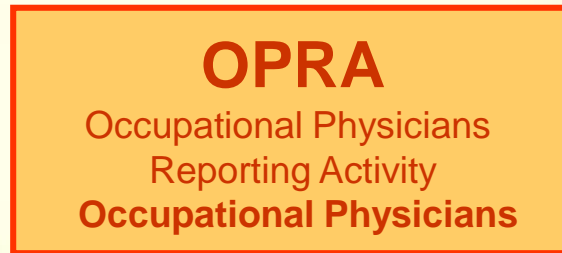
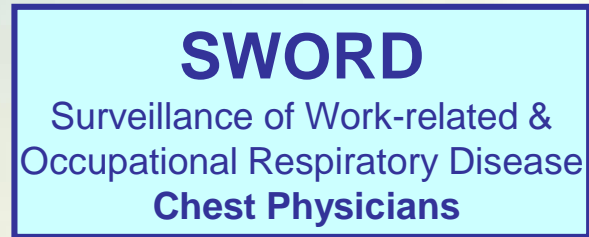
However this evolved to incorporate sentinel approaches to detect new causes of WRDs, with a view to generating alerts, further investigation and prevention.

- Need to keep up with the EU (e.g. for the Republic of Ireland's Health and Safety Authority)
- Physicians' motivation and perceived needs are crucial to THOR's success:
 - especially occupational physicians, respiratory physicians and dermatologists

The Health and Occupation Research Network (THOR)

- Research & surveillance 'medical observatory' - originally for measuring the incidence and determinants of occupational disease / WRDs (but later extended e.g. sentinel reporting, sickness absence burden)
- Started in UK with 1st scheme in 1989: SWORD
- Currently >1000 doctors participate in UK & ROI reporting incident cases (either every month or as a sample for 1 random month p.a.)
 - > Hence estimate of annual cases
- Reports from clinical 'system' specialists account for an estimated 5,000 new UK cases of work-related ill-health per annum.
- Reports from OPs and GPs account for a further estimated 10,000 UK cases per year

The Health and Occupation Reporting (THOR) network



Surveillance networks

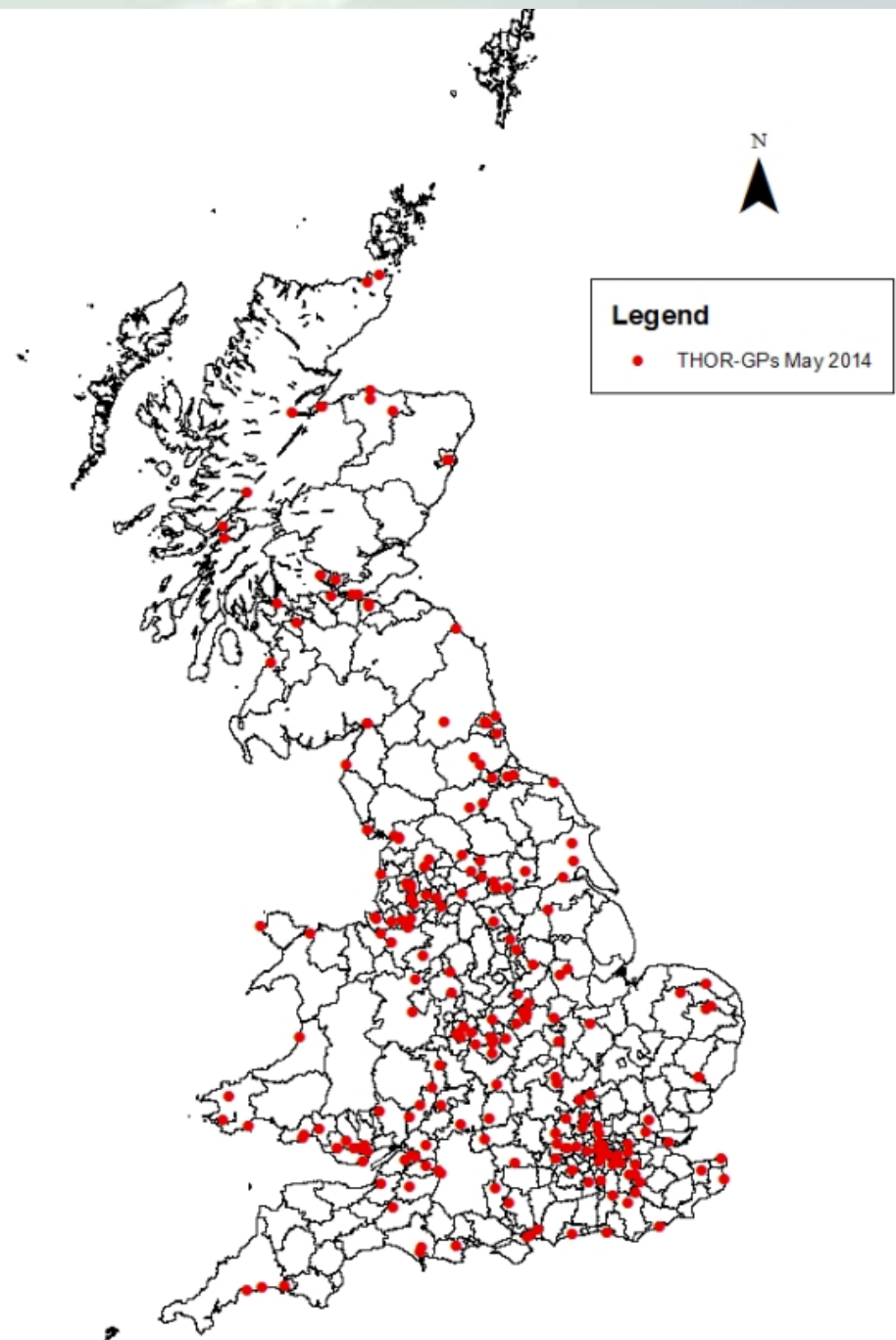
Example

General Practitioners

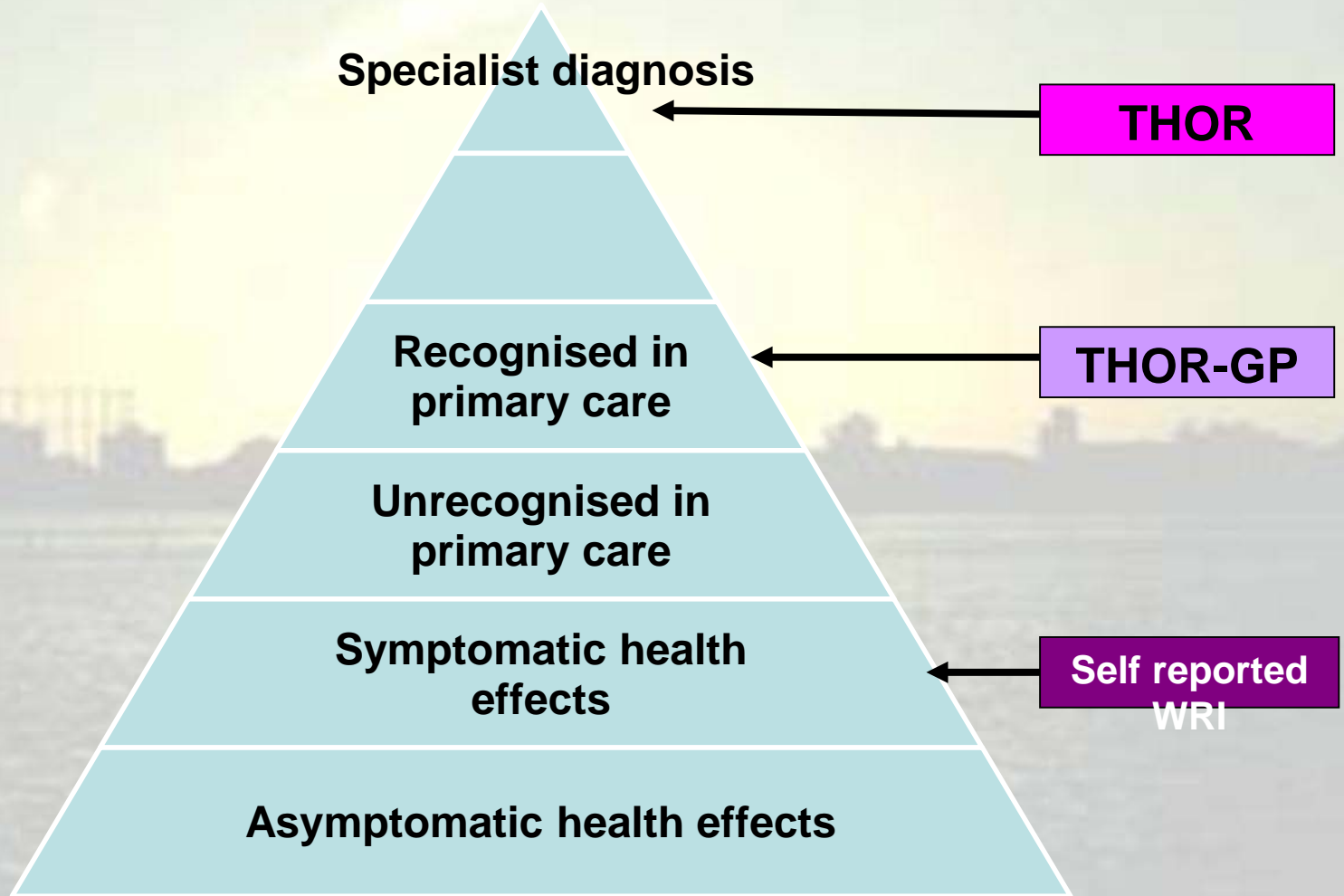
The Health and Occupation
Research Network in
General Practice

THOR-GP

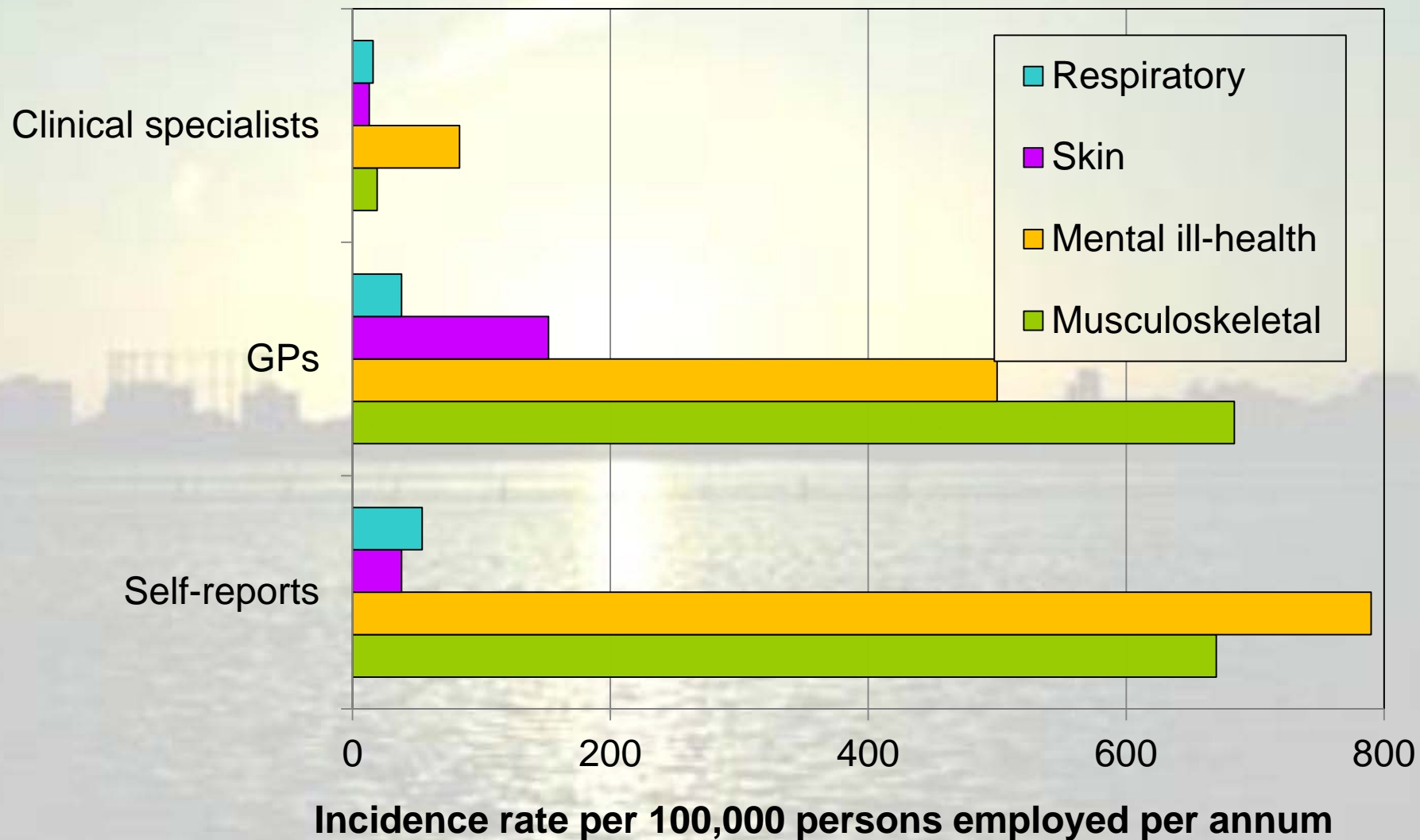
(Map shows GB only
But reporters also in Ireland)



The work-related ill health Sentinel surveillance pyramid



Incidence rate per 100,000 persons employed for work-related musculoskeletal, mental, skin and respiratory ill-health (2006 to 2009) as reported by clinical specialists, GPs & self-reports



Specific features of THOR that make it work with regard to the identification of new WRDs

- Generally highly motivated participating physicians nurtured by:
 - Generic feedback (quarterly report)
 - Specific feedback (answers to queries)
 - Consultation (advisory meetings etc)
 - Continuing Professional Development esp. EELAB
(Electronic, Experiential Learning, Audit and Benchmarking)
- Particularly good for respiratory and skin disease
 - System specialists
 - Occupational Physicians
 - (GPs)

THOR-extra

Same doctors in THOR schemes which measure incidence but for:

- Reporting sentinel cases outside the usual incidence sampling period
- Detailed exposure and other data collection (e.g. non-occupational)

The screenshot shows a web browser window with the address bar displaying 'THOR EXTRA Online Case Submission'. The page header includes the THOR logo and the text 'The Health & Occupation Reporting network'. The main content area is titled 'THOR EXTRA Online Case Submission' and contains the following sections:

Please record below any case which you believe is attributed to a novel or interesting cause.
You may find it helpful to refer to the [guidelines for case submission](#)

REPORTER DETAILS

Centre Number
Email Address Scheme

PATIENT INFORMATION

Diagnosis
Reference number
Gender M F
Age
Post code (First half)
Occupation
Industry
Suspected agent
Symptom onset
Date patient seen
Have you reported this case to Thor?

COMMENTS

Please give reasons for reporting this case, and why you believe this is a novel or interesting cause

FEEDBACK

Please provide us with comments & suggestions on the Thor Extra reporting method or on any other aspect of the scheme

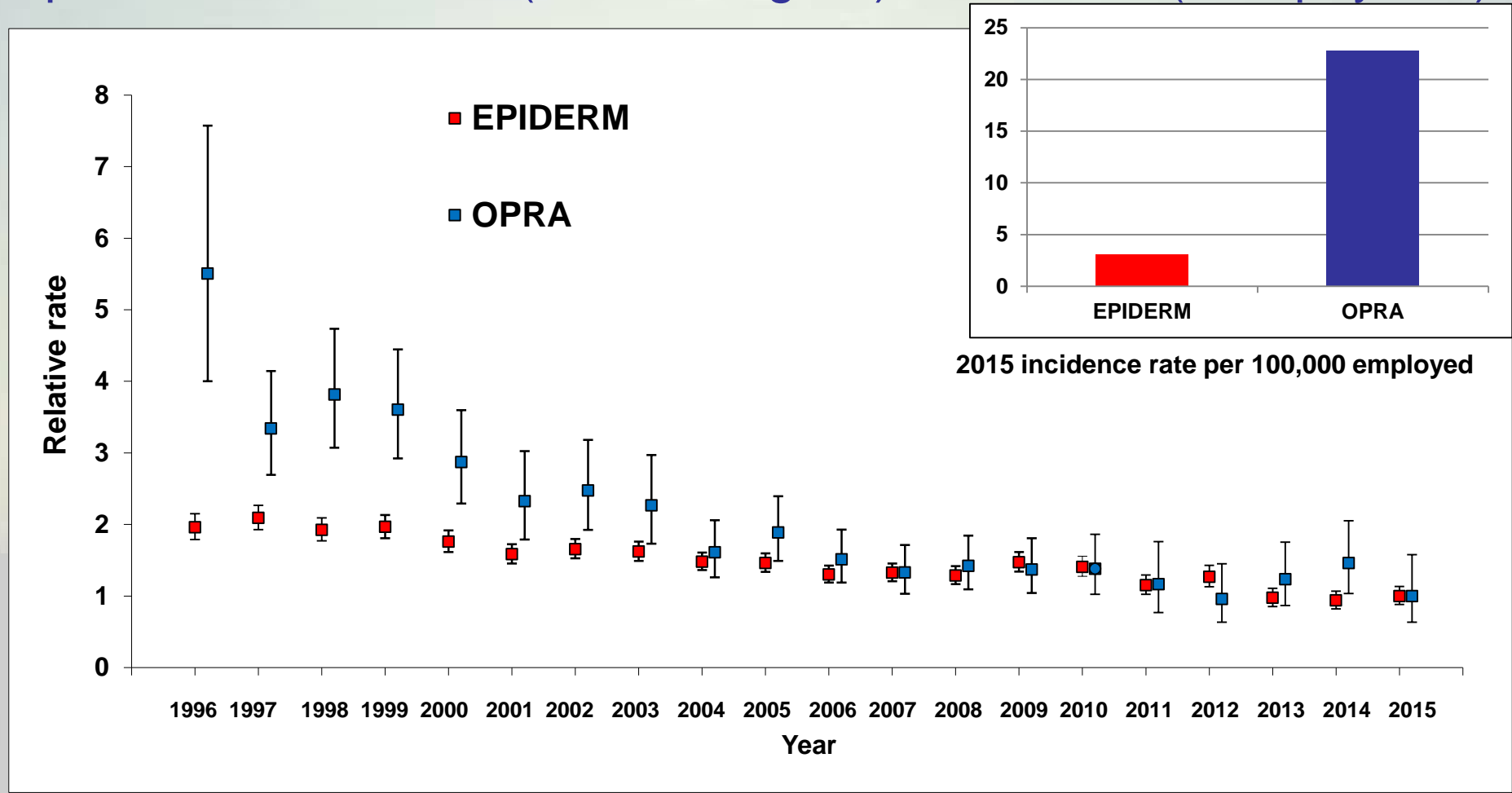
Dermatitis – from trends in incidence to finding new causes

Incidence trends overall

- > Trends with specific work practices, or
- > Trends for specific classes of agents
- > New causes



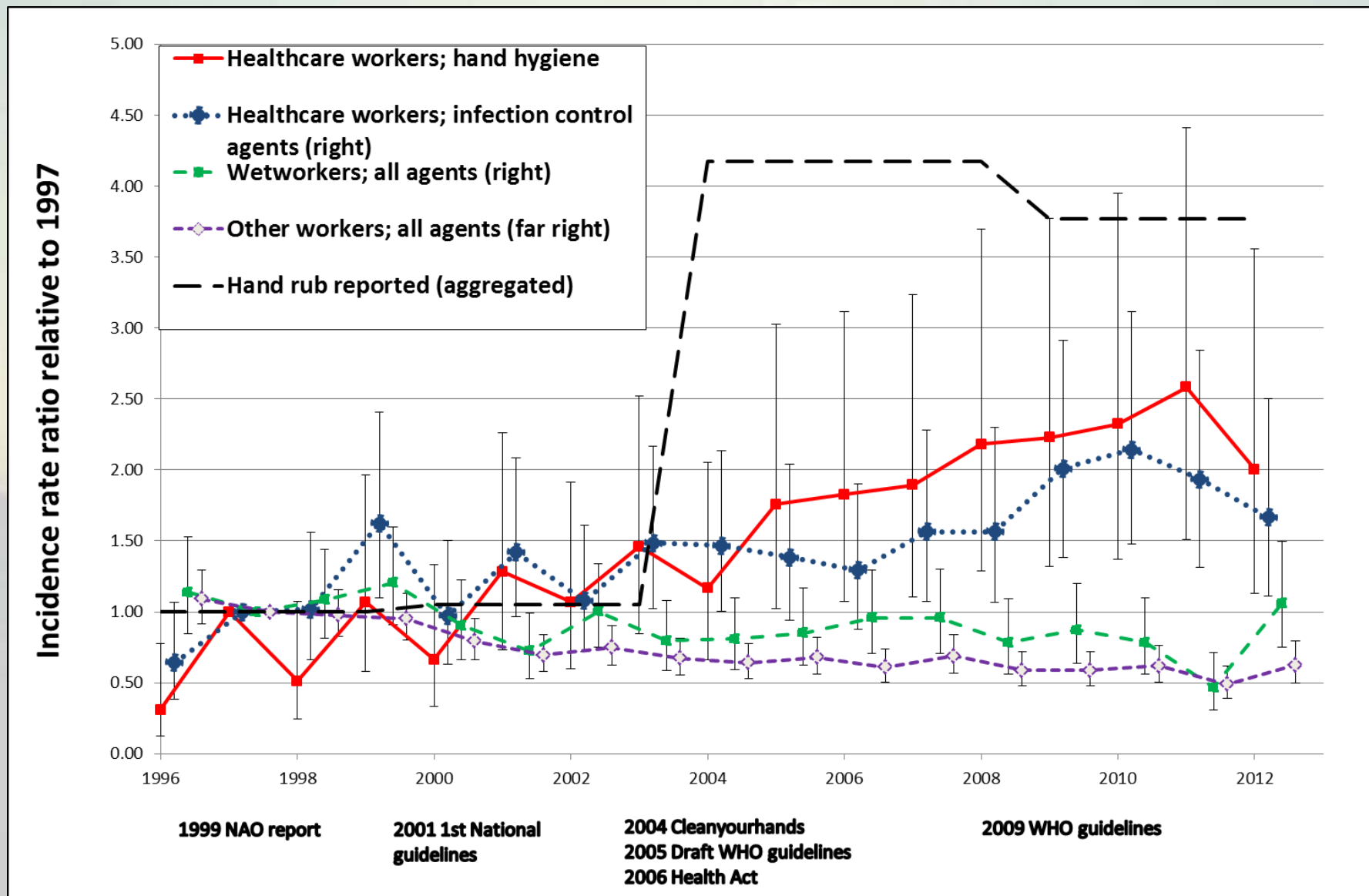
Relative risk by year (2015=1) (95% CI) of contact dermatitis as reported to EPIDERM (dermatologists) and OPRA (occ. physns.)



Estimated annual change (1996-2015)
EPIDERM: -3.8% (95% CI: -4.3%, -3.3%)
OPRA: -7.4% (95% CI: -8.8%, -6.0%)

Estimated annual change (2006-2015)
EPIDERM: -3.9% (95% CIs: -5.3%, -2.4%)
OPRA: -2.9% (95% CI: -6.5%, +0.8%)

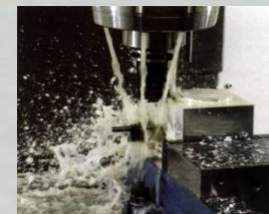
Trends in Irritant Contact Dermatitis attributed to hand hygiene in healthcare workers



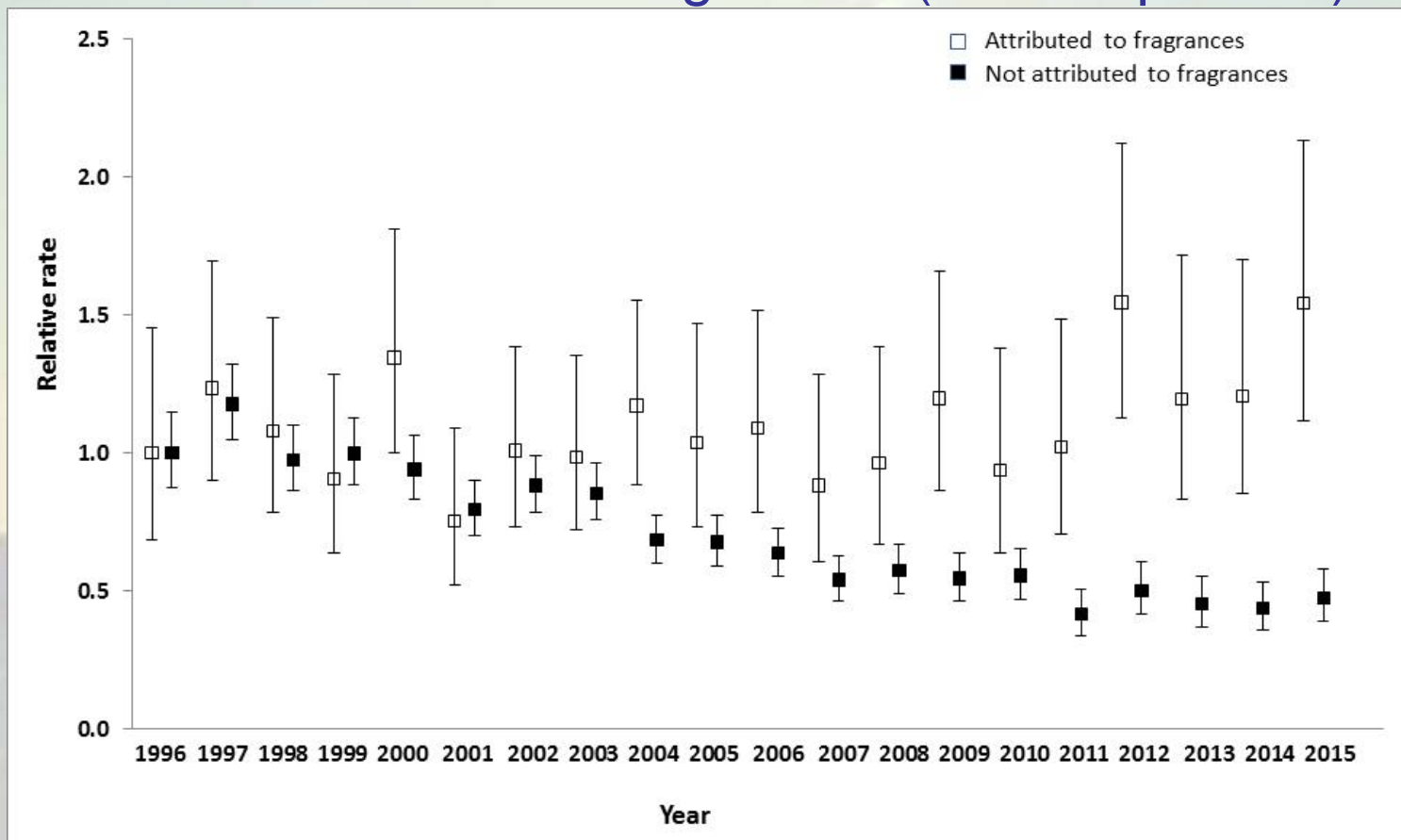
Work and Methyl(chloro)isothiazolinones

Average annual percentage change in reported incidence in work-related contact dermatitis attributed to MCI/MI and or MI, 1996-2012

Group	Total number actual cases	Average annual percentage change and 95% confidence intervals
Personal care exposures	136	+3.8% (-0.3 to 8.0)
Healthcare workers	63	8.1 % (2.1 to 14.4)
Beauty workers (including nail technicians)	25	6.6% (-2.2 to 16.2)
Hairdressers	48	1.5% (-4.7 to 8.1)
Detergent exposures	10	
Cleaners	10	Insufficient numbers for analysis
Industrial exposures	133	
Painters (or paint mentioned as a causal agent)	15	Insufficient numbers for analysis
Manufacturing	118	6.3% (1.8 to 10.9)
Other (range of occupations)	79	Insufficient numbers for analysis
Total	358	4.1% (1.4 to 6.9)



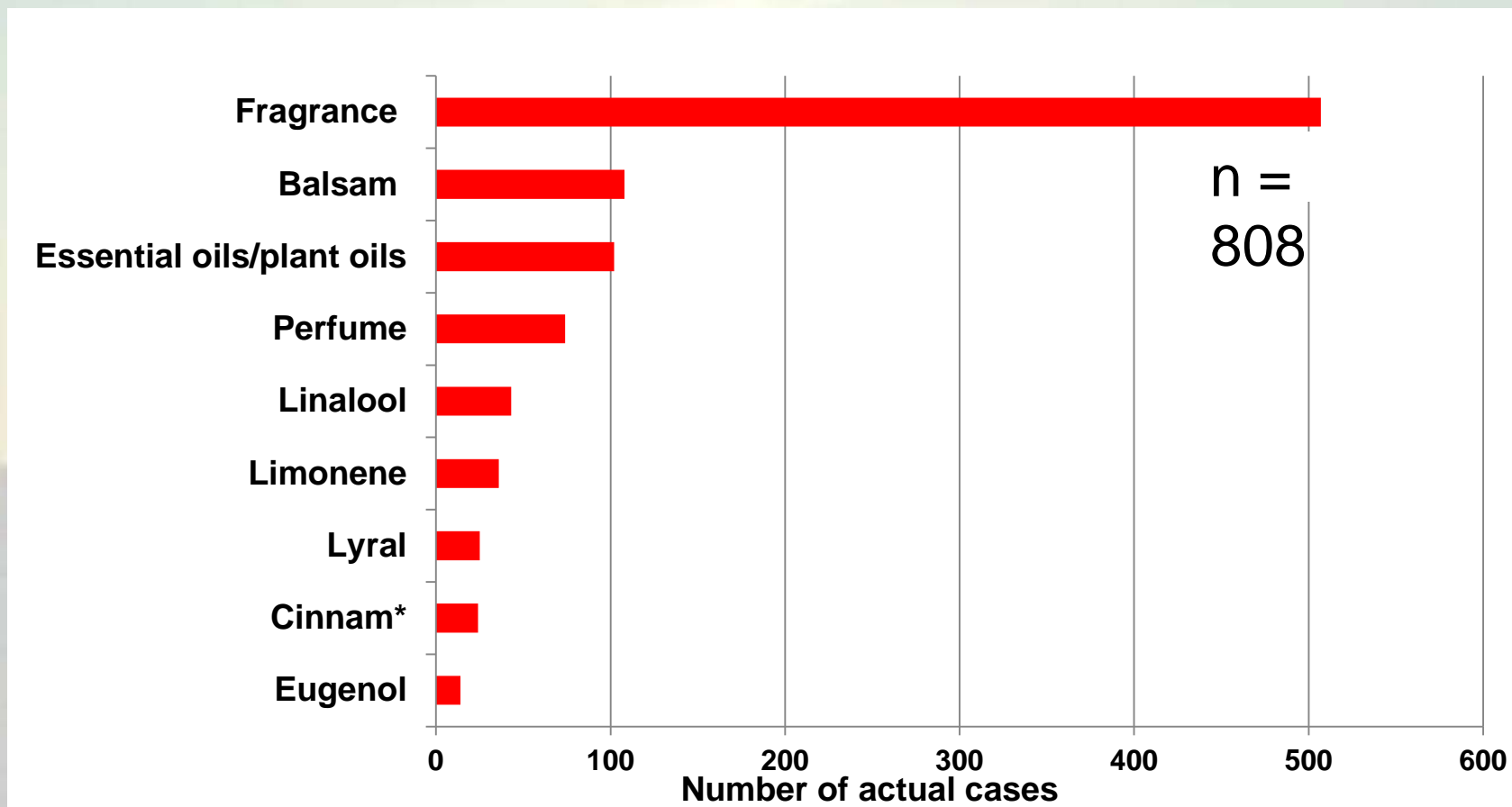
Relative rates by year (95% CI) of Allergic Contact Dermatitis reported by dermatologists attributed to fragrance versus not attributed to fragrances (all occupations)



Group	Average annual percentage change and 95% confidence intervals		p*
	Attributed to fragrances	Not attributed to fragrances	
Health and social care	0.4 (-2.6, 3.6)	-8.3 (-9.9, -6.7)	<0.001
Beauty	3.1 (-0.2, 6.5)	1.4 (-0.5, 3.2)	0.193
Food	1.3 (-3.1, 5.9)	-3.7 (-6.1, -1.3)	<0.05
All industry	1.1 (-0.8, 3.0)	-5.5 (-6.2, -4.7)	<0.001

* Test to see if trends (fragrance v not fragrance) are statistically, significantly different

Preliminary analysis of number of actual cases of Allergic Contact Dermatitis by fragrance 'type', reported by dermatologists to EPIDERM, 1996-2015

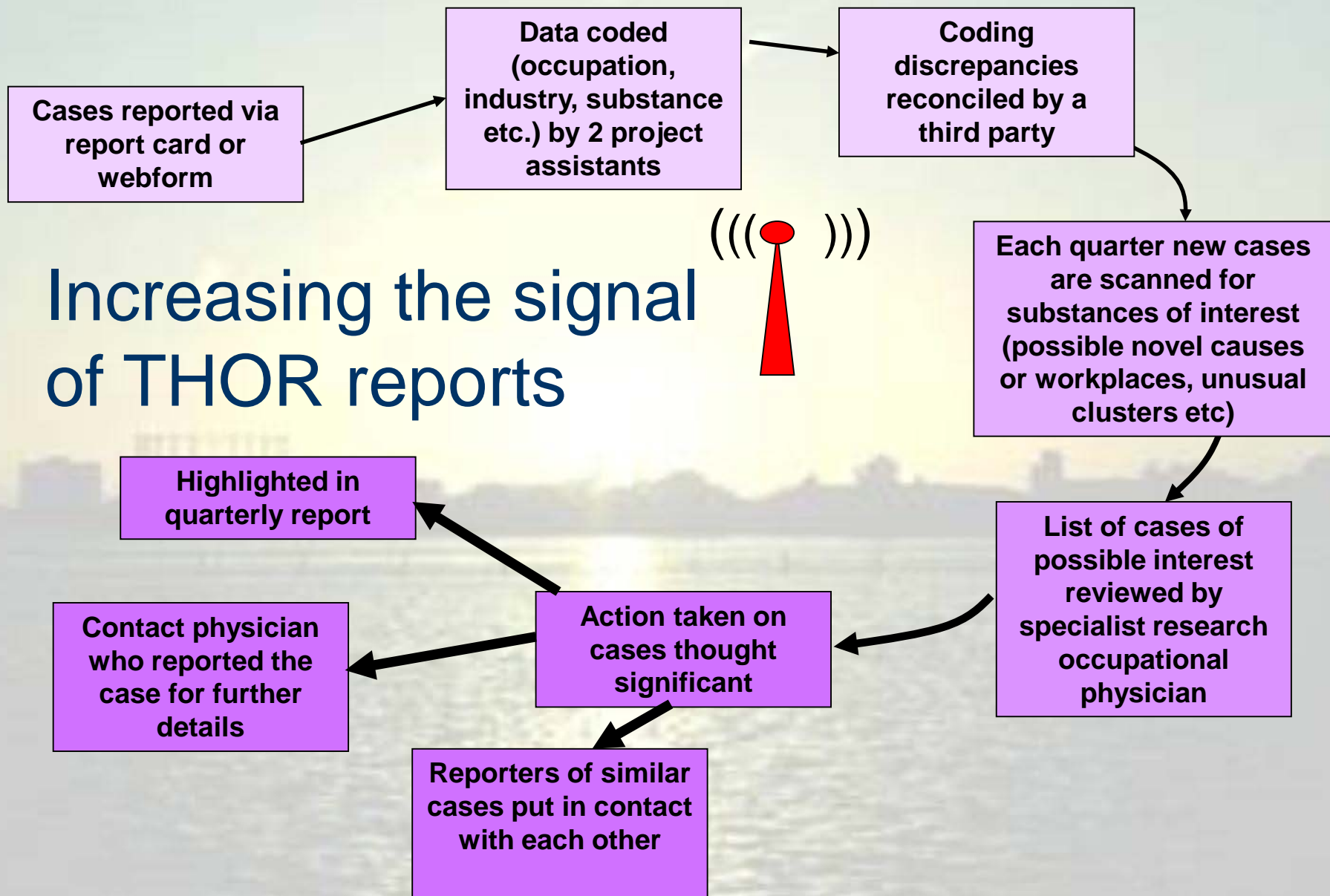


Each case may be attributed to more than one agent

*e.g. cinnamyl alcohol, cinnamaldehyde

Lyrar is Hydroxymethylpentylcyclohexenecarboxaldehyde

Increasing the signal of THOR reports



Examples of 'new' WRD identified in THOR - 1

'New' = new causal agents + rare + new{agent+job/task+agent}

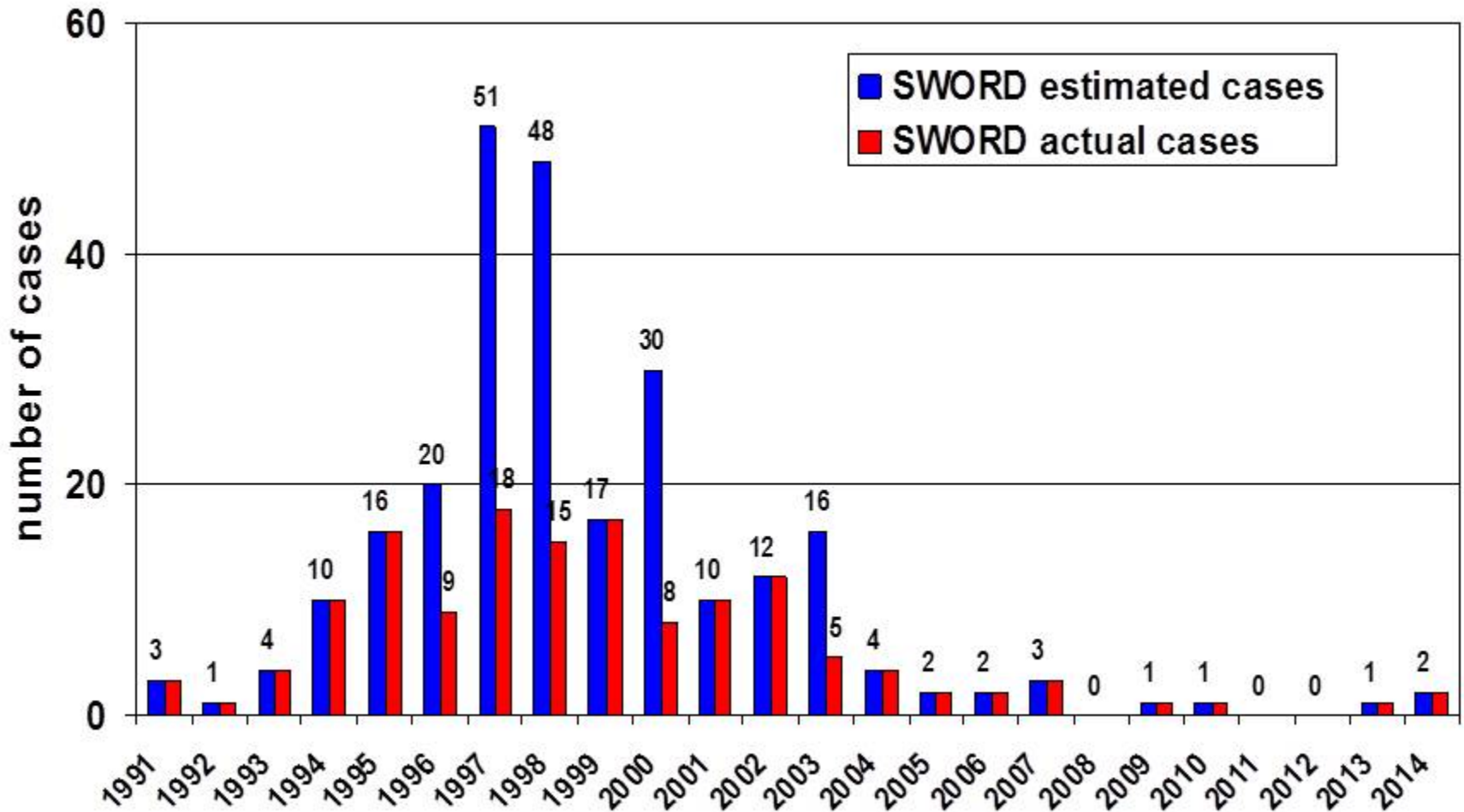
Skin:

- Allergic contact dermatitis in veterinary laboratory worker using limonene for histopathology
- Dermatitis caused by isocyanate exposure in vehicle paint sprayers
- Contact urticaria from cannabis exposure in a forensic scientist

Systemic / skin:

- Scleroderma caused by perchlorethylene in a factory worker in the manufacture of chemical and chemical products

Cases of occupational *asthma* attributed to latex exposure reported to SWORD (1991-2014)



Extracts of example of hierarchy of searching

DISEASE > Agent > Job / task

ASTHMA

Diisocyanates

Car spray painter

*Glueing ****

Flour

Baking

Denatonium***

PNEUMOCONIOSIS

Silica

Stone mason

*Chemical engineer****

BRONCHIOLITIS ***

*** = Special focus ? new disease or ? new cause

Examples of 'new' WRD identified in THOR - 2

'New' = new causal agents + rare + new{agent+job/task+agent}

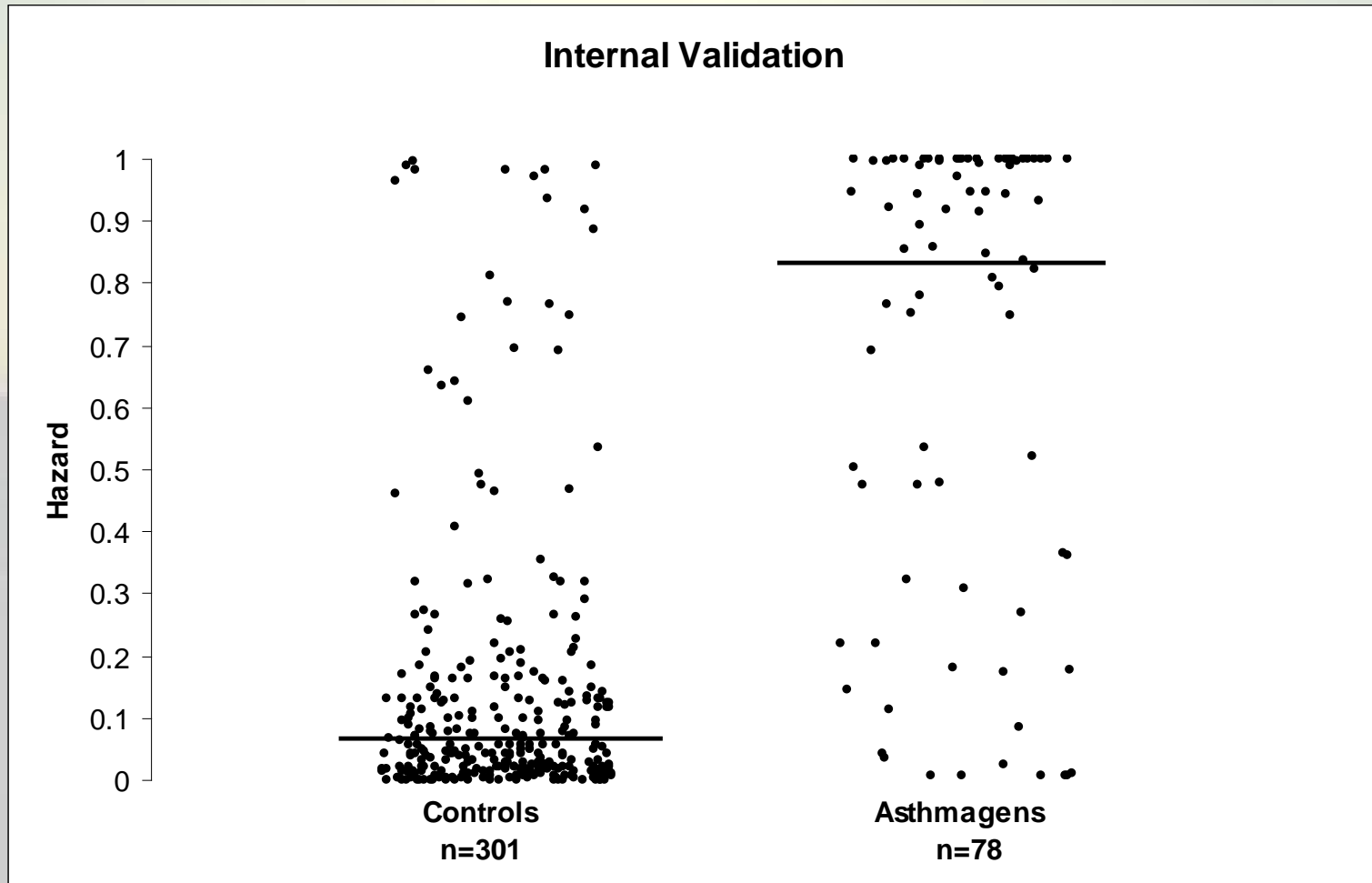
Lung:

- Chemical **pneumonitis** caused by silicone waterproofing spray in boat repair
- **Alveolitis** from spraying fabric protector (? silicone) in furniture manufacturer
- **Lipoid pneumonia** from spray mount glue in a graphic designer
- Non-malignant **pleural disease** in process operator exposed to marinite (? cryptic asbestos)
- **Bronchiolitis** (? ketone peroxides) in boat laminator
- **Asthma** caused by heated triglycidyl isocyanurate (TGIC), a hardening agent used in powder paints.
- Asthma / Type 1 allergy due to denatonium benzoate in a nurse testing PPE for bio-protection
- Asthma from cyanoacrylates in forensic fingerprint specialists*
- Asthma from isocyanates in funeral wreath manufacturers*
(* disproportionality analysis by Prof Bonneterre)

Example of corroborating evidence:

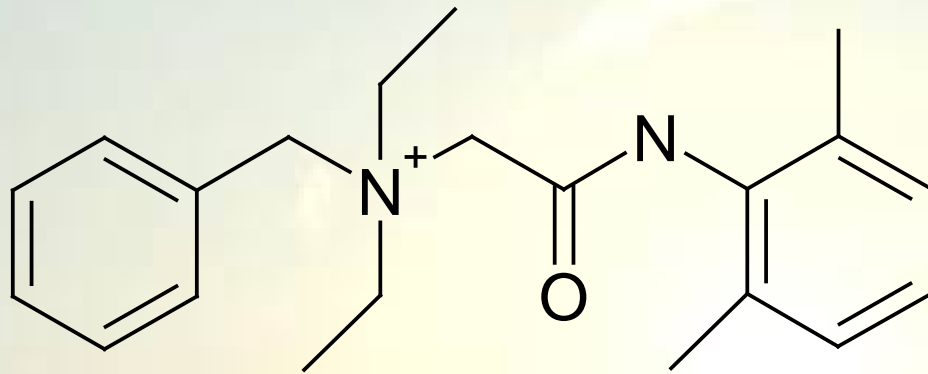
Quantitative Structure Activity Relationships (QSARs)

QSAR = a statistical analysis of chemical substructures associated with biological activity.



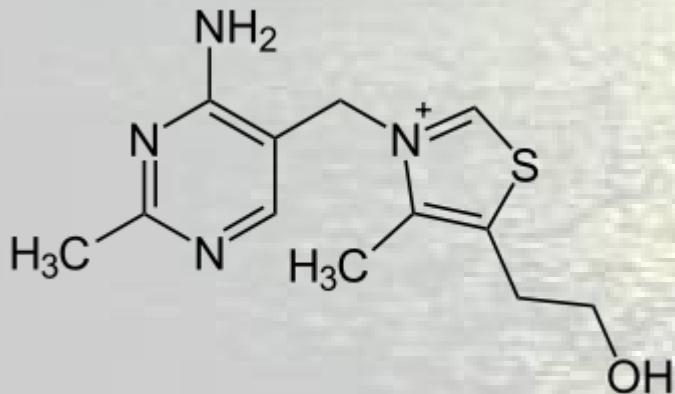
Corroboration by QSAR of THOR reports of occupational asthma due to novel agents

Denatonium (benzoate) (CAS 86398-53-0)



Hazard Index = 0.92

Thiamine (CAS no.59-43-8)



Hazard Index = 0.95

Alert function of the THOR schemes/ systems

THOR information given to HSE e.g. on specific hazards in:

- hairdressing,
- car manufacture / repair,
- metal working fluids,
- silica in new contexts

But: debate about the requisite level of proof and legal aspects
(we cannot disclose information which could identify the reporting physician, patient or workplace)

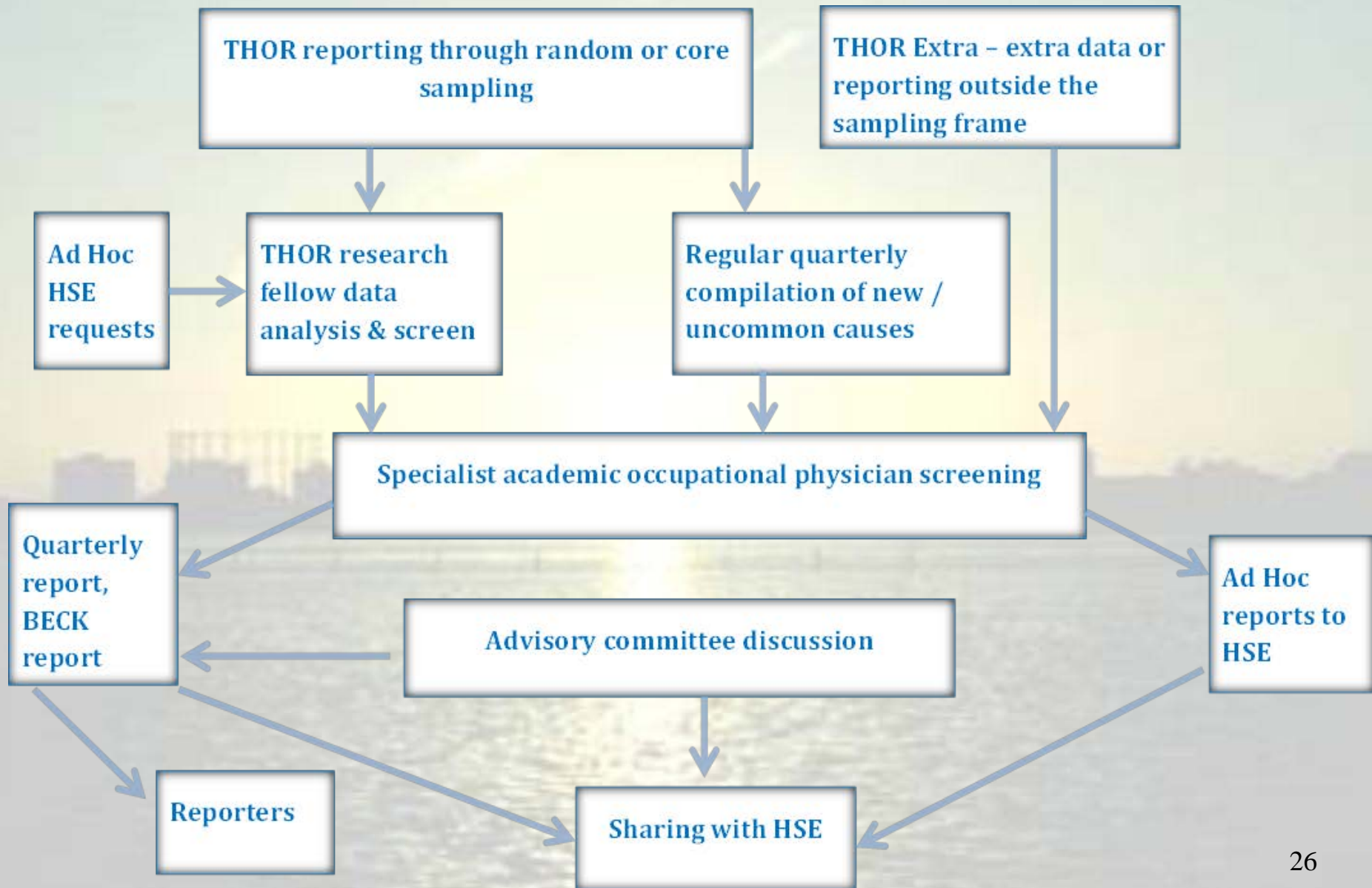
Improvements could be achieved by:

- Pooling with other systems (EU wide)
- Regular use of disproportionality metrics (as per RNV3P)
- Assumption by another body e.g. HSE (UK), or EU-OSHA of the final alert action and any associated legal responsibility

The link with prevention

- Need to validate / corroborate novel causes:
 - expert review,
 - collation of cases / case finding , (national / international)
 - other approaches e.g. Other data mining, QSARs
- Alerting HSE and other stakeholders – promoting vigilance
- But legal considerations - cautious and slow approach
- Preventive campaigns for employers and employees
e.g. In hairdressers (skin), vehicle manufacture / repair (lung)
- Possible recommendation of less risky options e.g. substitutes

Summary: From sentinel surveillance to dissemination of 'alert'



Obstacles facing alert and sentinel approaches/monitoring systems for the identification of new WRDs

- Reporting fatigue, time pressure on physicians – need to maintain motivation
 - Balance against -
- Limits to data collection e.g. detail on exposure, case management
- Works well for respiratory and skin disorders, but not so well for other organ systems / diseases
- Need to undertake further evaluations
- Funding challenges
- Pooling of data and expertise needed
 - work for more international collaboration (e.g. Modernet),
 - with systematically applied methods

Acknowledgements

- All participating physicians
- Funding bodies: UK HSE, ROI HSA, EU-COST etc

- Thank you for your attention

www.coeh.man.ac.uk/thor

www.agius.com/raymond