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## E-cigarettes – good or bad for your health?

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IFoA e-cigarettes working party

23<sup>rd</sup> November 2017

### Agenda

- Working party members
- Working party brief
- The different streams of work
- Key aims of the WP
- Work to date
- Next steps
- What we want from you ...



## Working Party Members

- Niel Daniels (chair) SCOR Life
- Christina Cosma (vice chair) Pacific Life Re
- Joel Copeland Lloyds Banking Group
- Elena Dzarlijeva Deloitte
- Ricki Nabeshima SCOR Life
- Carl Padget Pacific Life Re
- Mark Paulson Barnett Waddingham
- Nicola Shaw Aviva
- Cillian Tierney Partner Re
- Andrew Wibberley Alea
- Dr Derek Yach Foundation for a Smoke Free World



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## Working Party Brief

- Initiated by the IFoA H&C Research Committee in July 2016 after feedback from members
- High level Terms of Reference
  - The impact of e-cigarettes on the insurance industry (with a focus on Life / CI / impaired annuity products). Will consider data (pricing), underwriting, claims issues
- An informative submission to the Life conference
  - E-cigarette usage has dramatically increased in recent years (2.9 million UK – ASH estimate, 2017). The overall impact on health is uncertain: the relative impact of these products compared to cigarettes seems to be at least 95% less in terms of disease; unknown impact around behavioural changes made by smokers; and public perception is confused! There is an ongoing debate on the health impact for individuals which could potentially lead to a major contribution towards preventing premature death, disease and social inequalities in health that smoking currently causes in the UK.
  - An IFoA working party has been set up consisting of a multi-disciplined team of insurance professionals including actuaries; underwriters; and medical practitioners, to consider the impact on the insurance industry.



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## Working Party Brief

For the purposes of our group, we are focussing on e-cigarettes

- But have come across a variety of info on wider "Reduced Risk Products" so will continue to look at that also

### **We are not the only people looking into this topic...**

The IAA are looking into this topic and we have agreed to cooperate with them

The government's Science and Technology Committee have also opened an inquiry into e-cigarettes with the aims of:

- Examining the impact on human health (including their effectiveness as a stop-smoking tool)
- Suitability of regulations
- Financial implications of a growing market on both business and the NHS

## Key aims of the working party

- Ultimately, trying to assess the impact of e-cigarettes on mortality / morbidity / longevity in an insurance context
- Which will be made up of, amongst other things,
  - Usage of e-cigarettes
  - Impact on quit rates / prevalence rates of conventional cigarettes
  - Relative risk of usage
- Aim is to work towards a paper that is of use to actuaries

## The various streams of work

### We have 4 streams of work:

- Medical/Research/Underwriting/Categorisation
  - Research into the impacts of e-cig usage on smoking quit rates
  - Research into the relative risk of e-cigarettes
- Social Demographics/International
  - Find data on usage amongst different groups (socio-economic, international, etc)
- Legislation/Regulation/Pubic Health/Public Bodies
  - How legislation may impact on impact / usage / etc
  - Consider public policy (eg of employers)
- Modelling
  - Modelling the impacts of e-cigarettes on smoking prevalence
  - Modelling the impact of e-cigarette usage on mortality / morbidity



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## Current impact of e-cigarettes on insurance

- Very differing approaches with regard to how e-cig smokers are rated
  - See survey results
- Lack of tests that can distinguish between use of conventional cigarettes & e-cigarettes
  - But this is changing rapidly
- No clarity on the relative risk of e-cigarette smokers
  - Public Health England quoted them as "95% safer than tobacco"
  - Actively promoted as tool for quitting for first time for 'Stop'tober
  - But limited studies to back this up & all are very short term
- No clarity on the impact of them on quit rates
  - Although public surveys suggest widely used as a quit aid so we would expect quit rates to rise ()
- Fears amongst public over their safety might be hampering take up (& hence aid to quitting)
  - Recent ASH survey suggests only 13% of adults realise e-cigarettes less harmful than smoking
  - This % has been falling in recent years
- Possibility of e-cigarettes being a gateway to smoking



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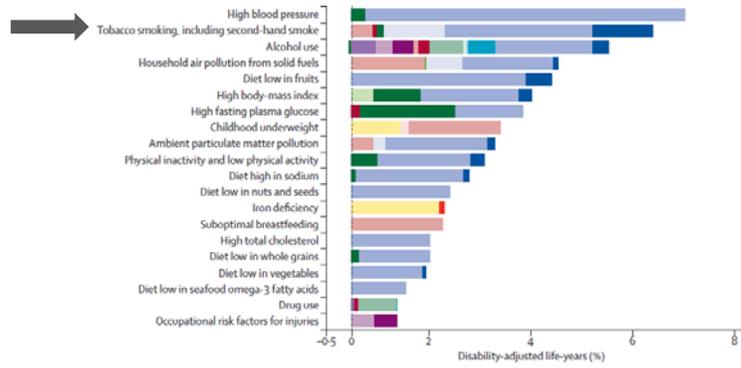
## Our work to date

- General background
- Industry underwriter surveys
- Modelling thoughts
- Contents of an e-cigarette
- Public messages
- Review of medical studies

## General background

- Smoking is a key cause of death & disease
- General consensus is that e-cigarettes are much safer
  - Public Health England 2015 statement anchored this
  - US health authorities far more negative
- Greater range of e-cigarettes in last 12 months
  - Nicotine vs non-nicotine
  - Heat not burn products
- Significant tobacco firm investment in e-cigs
- Significant opportunity to reduce claims from smokers

## Smoking is a leading (preventable) cause of death & disease



**BURDEN OF DISEASE ATTRIBUTABLE TO 20 LEADING RISK FACTORS IN 2010, EXPRESSED AS A PERCENTAGE OF GLOBAL DISABILITY-ADJUSTED LIFE-YEARS**

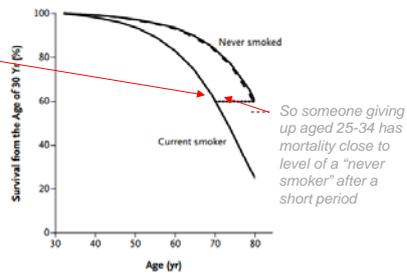
Source: Lim et al. A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990-2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet*. 2012 Dec 15;380(9859):2224-60.



## Quitting smoking increases life expectancy

LIFE EXPECTANCY INCREASES AMONG SMOKERS WHO QUIT DEPENDING ON AGE

- 25-34: GAIN 10 YEARS
- 35-44: GAIN 9 YEARS
- 45-54: GAIN 6 YEARS
- 55-64: GAIN 4 YEARS



**It's in a (protection) insurers' interests to see people quit !**

\* Reduced-risk products may have equivalent impacts

Sources: Jha et al. 21st-Century Hazards of Smoking and Benefits of Cessation in the United States. *NEJM* 2013.  
Halpern et al. Impact of smoking status on workplace absenteeism and productivity. *Tobacco Control* 2001.



## Lots of uncertainty around the effects...

### The negative view

- E-Cigs are unsafe and contain harmful ingredients
- E-Cigs are a gateway to tobacco & other drugs
- E-Cigs cannot support tobacco cessation & only encourage tobacco use
- E-Cigs are associated with tobacco companies with questionable objectives

### The positive view

- Toxin concentrations are almost all well below 1/20th that of cigarette smoke (Public Health England, 2015)
- Rise of E-Cigs use has not been accompanied by an increase in cigarette smoking rates (Cancer Research)
- Proportion of those aged 18-24 who smoke continues to fall over the period when E-Cigs use increased (ONS "Adult smoking habits in the UK: 2015")

*Scenario testing the different views will give us an understanding of the uncertainty but we are reliant on medical opinion given the lack of historical data*



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## Life insurers need to distinguish between smokers, ex-smokers and e-cig smokers

- Currently:
  - Cotinine test can not determine if a positive is for conventional or e-cig
  - No ability to accurately distinguish between nicotine and non-nicotine e-cigs
- Alternatives:
  - Anabasine (urine) or Caboxyheamoglobin (blood) can confirm no tobacco use + e-cigs
  - Newer saliva tests are coming



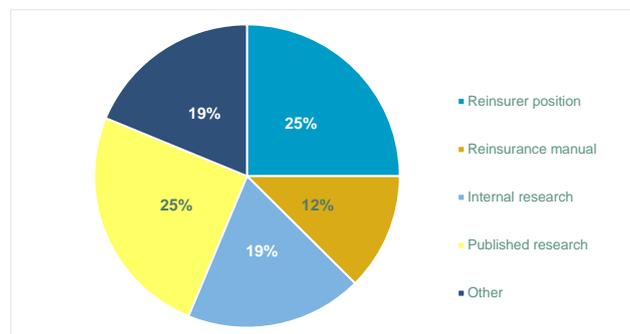
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## Industry underwriter surveys

- Over the past year two surveys have been sent to all the senior UK & Ireland underwriters that we knew
  - 1<sup>st</sup> Survey: 19 replies
  - 2<sup>nd</sup> Survey: 34 replies
- All respondents have an official company position of e-cigarettes
- Underwriting philosophies – consider e-cigarette smokers as:
  - Smokers: 68%
  - Non-smokers with a rating: 9%
  - Non-smokers without a rating: 9%
  - Other: 15%

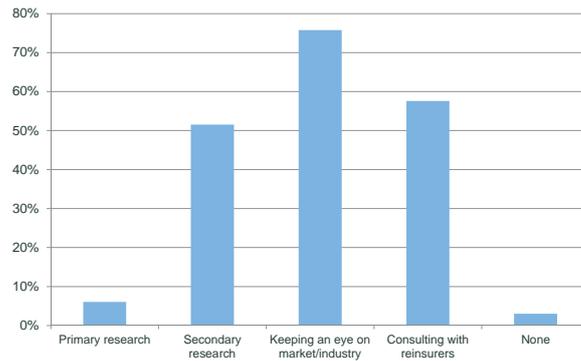
## Industry underwriter survey

- Main influence of company position on e-cigarettes



## Industry underwriter survey

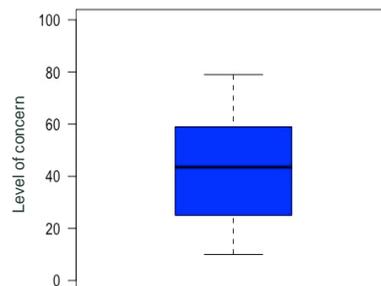
- Level of work companies are undertaking around e-cigarettes



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## Industry underwriter survey

- Survey 1 identified the areas of most concern around e-cigarettes:
  - unknown long-term health effects
  - potential to relapse back to smoking (if using as a cessation aid)
- Survey 2 asked respondents to rank their current level of concern around e-cigarettes:



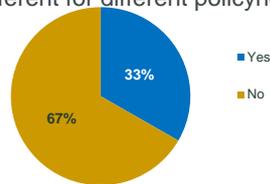
0 = no concern  
100 = the most concerned



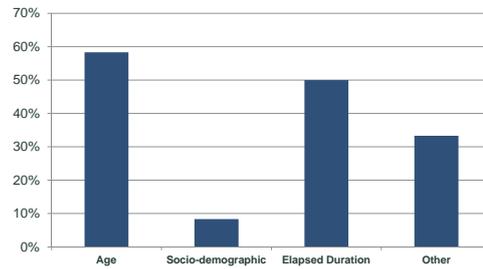
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## Industry underwriter survey

- Level of concern is different for different policyholders

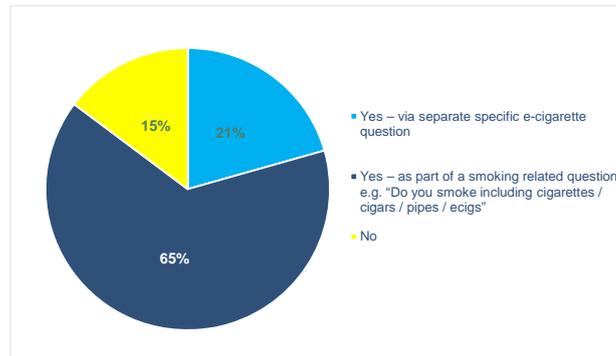


- Factors that influence the level of impact of e-cigarettes



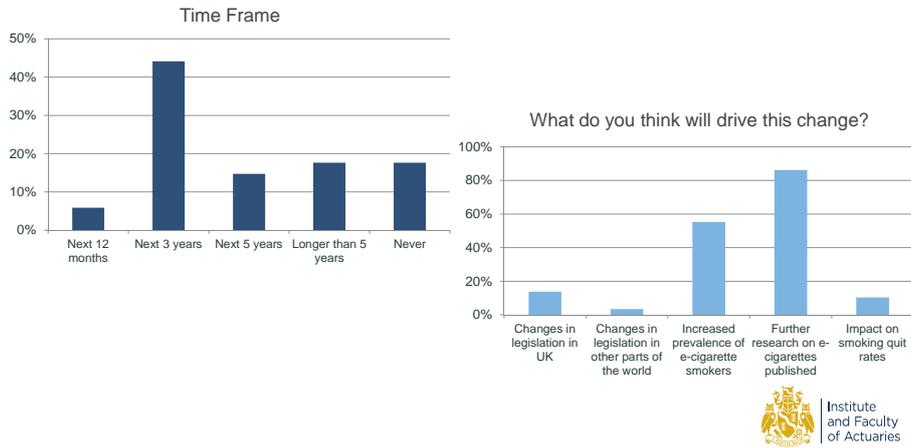
## Industry underwriter survey

- Collection of info at application stage on e-cigarettes



## Industry underwriter survey

- Expectation of a change in attitudes towards e-cigarettes



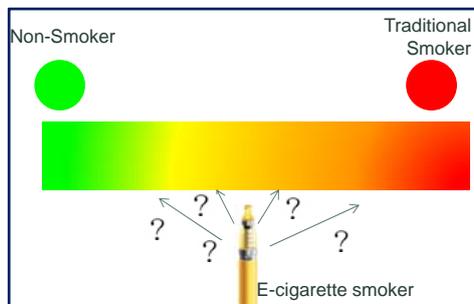
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## Industry underwriter survey

- Smoking is no longer binary

*"...a new rate will be agreed which is midway between smoker/non smoker rate for vapers and nicotine replacement users or the non-smoker rate will be extended to two years cessation before applying n/s rate."*

*"Suspect a relaxation in stance on e-cigarettes to allow lower price than traditional tobacco smokers. However don't expect them to be as good a risk as someone who has never smoked tobacco."*



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## Industry underwriter survey

- Comments received:

*"...Whilst lower risks of lung cancer from e-cigarettes, not clear studies on nicotine risks yet"*

*"It took many years to establish that actual cigarette smoking had harmful affects."*

*"...the only way we could see changing our position is that evidence clearly and demonstrably showed that e-cig users had same mortality as non or never smokers."*

*"Biggest issue is the population that use both tobacco and e-cigs."*

*"If there is any research articles or material you could share that would be really helpful"*



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## Modelling – aims and approach

- Impact on mortality rates of increased e-cigarette usage (and corresponding reduction in tobacco smoking)
- Resulting impact on protection products' pricing/reserving
  - Current portfolios and future portfolios
- Limited data makes stochastic modelling spurious
- We are using scenario-based deterministic modelling
- Exploring two main routes:
  - Cause of death based model
  - Multi-state model

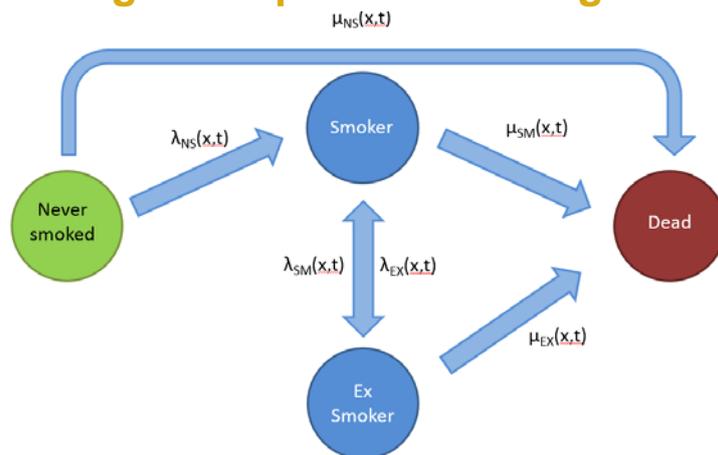


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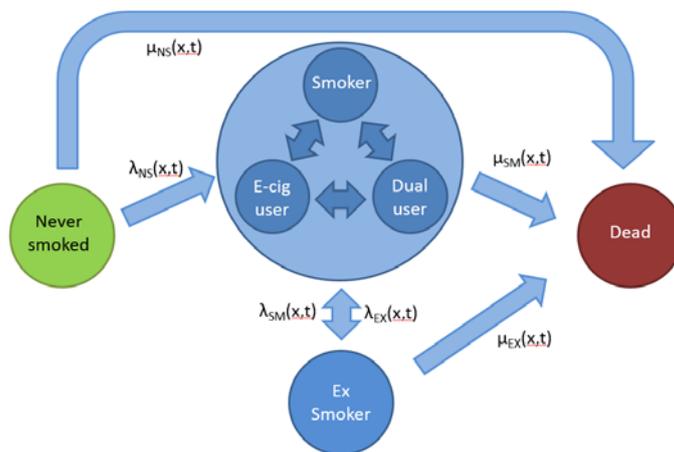
## Modelling the impact of smoking

- Combine population data from three sources to split effect of (tobacco) smoking by cause:
  - Deaths by cause
  - Smoking prevalence
  - Relative risk of death by cause group and type of smoker
- Adjust relative risks for e-cigarette users to derive mortality rates
- Problems
  - Lack of data on effect of e-cigarette usage by disease
  - Allowing for scale of smoking (duration, packets per day, dual users)

## Modelling the impact of smoking



## Modelling the impact of e-cigarettes



## Modelling – research

- Key research questions

| E-Cigarette Research Questions   | Traditional Smoker Research Questions   |
|--|---|
| Prevalence of e-cigarettes   | Profile of smokers/ex-smokers/non-smokers – age/sex/region/socio-economic             |
| E-cigarette uptake trends  | Factors that impact quit rates  |
| Prevalence of dual usage   | Relationship between smoking intensity and smoker mortality                           |
| Impact of e-cigarettes on smoking intensity among dual users               | Relationship between quit duration and ex-smoker mortality                            |
| Impact of e-cigarettes on smoking quit rates                               | Incidence rates of cancer, COPD, MI, death ... etc. in smokers/ex-smokers/non-smokers |
| Uptake of e-cigarettes by non-smokers                                      |   |
| Uptake of e-cigarettes by former smokers                                   |   |
| Relapse rates of e-cigarette smokers back to traditional smoking           |   |
| Incidence rates of cancer, COPD, MI, death ... etc. in e-cigarette smokers |   |

## Stakeholder messages

Multiple contradictory positions from different institutions:

- **Public Health England consensus statement (2017)**
  - No evidence that “vaping” acts as a gateway to the more harmful habit.
  - E-cigarettes are less harmful than smoking, recommended for use (in cessation of smoking)
- **National Institute for Health and Care Excellence (2017)**
  - Little evidence on the long term benefits or harms of e-cigarettes
- **WHO (2016)**
  - Urgent need to assess risks
- **International Union on TB & lung disease (2016)**
  - Safety not demonstrated; undermines WHO attempt at regulation
- **National Center for Biotechnology Information (2016)**
  - Studies have “failed to raise health concerns”
- **Royal College of Physicians (2016)**
  - Nicotine is not a highly hazardous drug



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## Media messages

- BBC programme 2016: E-cigarettes: Miracle or Menace?
  - Cited US studies of flavourings and toxicity. Survival rate of human blood cells in throat to:
    - Tobacco smoke: 6%
    - Menthol flavour vapour: 25%
    - Pina colada flavour vapour: 53%
- Is this a fair comparison?
  - It is arguable that this (and similar) test artificially overuse the liquid flavourings to create formaldehyde



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## What is in an e-cigarette?

- Nicotine
- Humectants (dissolving solution)
  - Vegetable Glycerin or Propylene Glycol
- Flavourings



## What is in an e-cigarette? – dissolving solutions

- These form 95% of the liquid
- Dosage c. 30-90ml per month
- Vegetable Glycerin and Propylene Glycol
  - Both acknowledged as safe food additives in solid or liquid form by US authorities
  - Vegetable Glycerin :
    - Organic by-product of natural oil production processes
    - Widely used solvent
    - Minor medical applications – pills taken orally
  - Propylene Glycol :
    - Produced from cracking process for oil and natural gas

## What is in an e-cigarette? – dissolving solutions

- The consumer's choice: Vegetable Glycerin or Propylene Glycol ?
  - Vegetable Glycerin
    - distinctly sweet, masking other flavours
  - Propylene Glycol
    - thinner consistency, better for e-cigarette mechanics
    - almost tasteless
    - more similar throat "hit" like a regular cigarette
    - some medical side effects including allergic reactions

## What is in an e-cigarette? – flavourings

- 500+ liquids available
- Manufacturing largely unregulated and untested
- Diacetyl and Acetylpropionyl – known irritants – found in majority of standard liquids
  - Levels slightly less than US govt occupational hazard levels
  - But far less than traditional cigarettes
  - “Presence in e-cigarette liquids represents an avoidable risk...measures should be taken to eliminate these hazards from products” (Farsalinos et. al 2014, Oxford University Press)

## Medical studies

- UK Electronic Cigarette Research Forum studies – UCL study funded by Cancer Research UK
  - Cross sectional study with 181 participants
  - Swapped traditional cigarettes for e-cigarettes or NRT
  - Average usage of e-cigs/NRT of 17 months
  - Analysed saliva and urine to compare body-level exposure to key chemicals
  - E-cig/NRT users found to have significantly lower levels of toxic chemicals/carcinogen
  - Dual users did not show same marked differences

## Medical studies

- US National Institute of Environmental Health Sciences (2015)
  - Studied 51 e-cigarette flavour liquids (out of c. 7000 available)
  - Following media stories of diacetyl & contribution to “Popcorn lung”, investigating prevalence of diacetyl and similar chemicals
  - 47 liquids tested included at least one of the at-risk chemicals
  - Diacetyl found in 39 of these
  - Note - diacetyl is in cigarettes in significant quantities higher than e-cigarettes

## Medical studies

- Italian Public Health with Universities of Torino & Rome (2014)
  - Study of studies: 480 studies compiled, 27 potential for inclusion, 12 selected for final review (6 cohort, 6 experimental studies)
  - All short term (max 1 year)
  - Impact on smoking cessation and health side effects of e-cigarettes compared to other methods
  - Main conclusions:
    - Similar efficacy of e-cigarettes
    - No major side effects
    - Specific side effects but diminished quickly over time – Mouth/throat irritation, nausea, headache, dry cough

## Medical studies

- Dr Lundback presented at European Respiratory Society International Congress 2017 (2017)
  - 15 healthy seldom-smokers recruited
  - Used e-cigs with nicotine one day and without nicotine the other
  - BP, heart rate and arterial stiffness measured at 0, 2 and 4 hours post-use
  - In the period immediately after using e-cigs 'there was a significant increase in blood pressure, heart rate and arterial stiffness' only after using e-cigs with nicotine.
  - Temporary increase (same temporary increase seen in similar studies using normal cigarettes)
  - Authors speculate that chronic exposure to e-cigarettes can cause permanent arterial stiffness, just like 'normal' smoking.

## Medical studies – just not long enough !

There are **NO** long-term studies into the health effects of e-cigarettes

- Manzoli et al (2016) continuous study up to 24 months for cohorts of tobacco smokers, e-cigarette smokers and dual users
  - Conclusions limited, but dual users showed a lower level of abstinence when using e-cigarettes
  - Moderate number of smoking-related side effects observed
  - Check-in every 12 months

## Next steps

- Much background info collected
- But limited data to either support or challenge the “95% safer” view
- But this view has been widely perpetuated and has become pseudo fact
- Important and needs challenge
- So this is a key next step
  
- Use of available data to derive input parameters for modelling
  - on relative risk
  - on take up rates / quitting rates
- Develop models
- Present findings at future conference and via a paper

## What we want from you .....

- Volunteers !
  - Actuaries
  - Researchers
  - Underwriters / CMOs
  - To join the working group or to support us
  
- Feedback on where this should all be heading
  - This is only our second communication to outside of the working group
  - It's vital we get feedback on what we are doing, where we are headed

***Offers of support / views / challenge can be sent to [ndaniels@scor.com](mailto:ndaniels@scor.com)***



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# Questions

# Comments

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