

Episode 5: Swedish poisonings and sauna deaths

This transcript was created by AI from audio and lightly edited for readability. Treat it with caution, and assume occasional transcription errors may remain.

TRANSCRIPT

Hi everyone, welcome back to The Tox Lab. I'm Rebecca.

I'm Rob. This week we're going to look at a possible link between Swedish poisoning deaths and saunas.

Interesting.

Very interesting.

So first of all, Rebecca, why don't we look at this paper on Swedish poisoning deaths?

This paper is titled A nationwide Swedish retrospective study on poisoning deaths between the years 2000 and 2022.

In it, the authors looked at the Swedish Cause of Death Register, which records causes of death and demographic data using ICD-10 codes.

For anyone who doesn't know, ICD-10 codes are the International Classification of Diseases codes, a standardised system used to classify diseases and causes of death.

In Sweden this registry is mandatory and covers all deaths in the country. It has been running in some form for decades, which makes it a very useful national dataset.

The authors looked at deaths recorded between 1 January 2000 and 31 December 2022 and identified poisoning deaths using the relevant ICD-10 codes.

Can we get into some stats?

Please do.

This is a fairly stats-heavy paper, just as a warning.

From the dataset, around 70 percent of people dying from poisoning were men. The median age at death was 53, and private homes were the most common location of death.

Quite interestingly, around 1 percent of all deaths in Sweden during the study period were due to poisoning.

That does sound high, although I am not sure exactly how that compares with the UK.

Using the ICD-10 codes, they could break the poisonings down by type. About 46 percent were due to drugs, 33 percent to alcohol, around 4 percent to smoke or carbon monoxide, a very small fraction to solvents, pesticides, and similar substances, and about 16 percent were unspecified poisonings.

That unspecified group is interesting. It means the death was coded as a poisoning, but the specific agent was not clearly identified.

The age and location pattern is also interesting. We are talking largely about men in their 50s, often dying at home.

When the authors looked at the subset of cases with toxicology available, which was about 83 percent of the overall study population, they found 396 unique substances across 100,984 positive tests. The median number of substances detected per case was four.

Only about 16 percent were single-substance poisonings.

And around 75 percent were positive for ethanol as well.

So already we are seeing a strong polydrug picture, with ethanol heavily represented.

The most commonly detected substances were ethanol, zopiclone, and nordiazepam.

So lots of alcohol, lots of sedatives, lots of mixed-drug use.

Exactly.

The number of substances detected per case increased over the study period. The paper notes that analytical methods changed around 2011, which may explain some of that increase, because they may simply have become better at detecting more compounds.

So one question is whether people were actually taking more substances over time, or whether the lab just got better at finding them.

Very fair question.

There were also some visible spikes in opioid-related deaths during the study period, including one around 2009 and another rise in the mid-2010s.

I believe there was a fentanyl analogue issue in Sweden around 2009, which might explain part of that earlier spike.

That would make sense.

One thing that really struck me about this paper is just how good Sweden's data infrastructure is. We do not really have a perfectly comparable single national post-mortem toxicology system in the UK.

In Sweden, most of the forensic toxicology is centralised, which means the methods are far more consistent than in many countries, aside from the methodological change they discuss.

That does give the dataset a lot of strength.

One thing they also mentioned was that from around 2016 onwards there had been more poisoning deaths without autopsy.

Which is interesting, because of course if you do fewer autopsies you potentially lose information.

Exactly. You can sometimes think something looks like a straightforward drug death and then the post-mortem reveals another important pathology, or vice versa.

Looking at the substances detected, there were a few things that stood out as slightly unfamiliar from a UK perspective.

Yes. Ethylmorphine, for example, appears quite prominently. That is a codeine-like compound historically used as a cough suppressant. There was also alimemazine, an antihistamine we do not tend to talk about much in the UK.

It shows that although the broad poisoning patterns are recognisable, some of the actual drugs in circulation differ between countries.

One small statistic I found unexpectedly interesting was that there were 26 deaths classed as toxic effects from animals or food, 25 of which involved arthropods.

When I first saw that I briefly wondered whether we were talking about bizarre shellfish poisoning, which of course makes no sense because shellfish are not arthropods in the way I was imagining.

So probably things like insect stings?

Yes, most likely things like bee or wasp stings.

The thing that really made me pause, though, was the proportion of poisonings related to smoke and carbon monoxide.

So 4 percent of all poisoning deaths were related to smoke or carbon monoxide, and about 3.5 percent specifically to carbon monoxide.

That does feel quite high.

We looked up a rough UK comparison and, although the categorisation is not identical, the UK figure appears somewhat lower.

So I started wondering: why might Sweden have relatively more carbon monoxide deaths?

It is colder, for a start. More heating, more enclosed spaces, more combustion.

Yes. But I also had a slightly more left-field thought: could some of it be related to saunas?

Okay, now that is interesting.

Traditional Scandinavian saunas can involve enclosed wooden spaces, heat, sometimes wood-burning systems, and potentially poor ventilation. So the hypothesis was: could sauna use be contributing to some carbon monoxide deaths?

To explore that, we found another paper looking specifically at sauna deaths in Sweden between 1992 and 2003.

This study used a similar national deaths-register approach. So Rebecca, why don't you talk us through what they found?

They initially identified 96 possible sauna-associated deaths through ICD coding and free-text mention of saunas. Nineteen were excluded because there was no real connection to sauna use, and four were suicides involving saunas, leaving 77 cases.

The authors make an important point straight away: in many of these cases it is difficult to determine the exact cause of death because of post-mortem changes, time delays before discovery, and multiple possible contributing factors.

So we should not over-interpret.

About 82 percent of the sauna deaths were men, most were middle-aged, and many were found dead in the morning after apparently being missing the night before.

About half occurred on a Friday or Saturday.

So either you are more likely to die in a sauna on a Friday and Saturday, or more likely to use a sauna on a Friday and Saturday.

Probably the latter.

The cases were divided into those with a clear cause of death, those with identifiable disease, those classed as heat-related deaths without other explanatory disease, and those that were too uncertain because of decomposition or limited information.

Among the cases with a definite cause of death, there were drownings, carbon monoxide poisonings linked to accidental fires, and deaths from oxygen depletion in poorly ventilated saunas.

Only two cases were actual carbon monoxide poisonings.

So that means my sauna-carbon-monoxide hypothesis is probably not the main explanation for the Swedish national carbon monoxide poisoning figures.

Probably not, although the sauna paper covers 1992 to 2003, whereas the national poisoning paper ran to 2022, so it is not a perfect overlap.

Still, it does not strongly support the idea that saunas are a major carbon monoxide problem.

Most of the 77 sauna deaths actually involved either identifiable disease or strong evidence of alcohol use.

Thirty of the cases involved chronic alcoholism. There were cases with coronary atherosclerosis, acute myocardial infarction, previous cardiac disease, and several individuals with very high ethanol concentrations.

Forty-nine of the 77 cases were positive for ethanol, and the mean concentration was around 160 milligrams per 100 millilitres, with many cases above 200 milligrams per 100 millilitres.

So a lot of these people were very intoxicated.

Yes. Now, heat can contribute to post-mortem ethanol production, so it is not always straightforward, but those concentrations are high enough that genuine heavy alcohol use seems very likely in many of the cases.

This does make me think that the combination of intoxication, heat, being alone, and possibly underlying disease is probably much more important than some uniquely lethal effect of saunas themselves.

I agree. Another interesting point is that the prevalence of identifiable heart disease in the sauna-death cases did not seem wildly out of line with the broader Swedish background mortality profile.

So it is not as though the paper clearly shows saunas are specifically killing people with heart disease at rates far beyond expectation.

There were also a handful of illicit drug detections, including amphetamines in a few cases, but alcohol was by far the dominant pattern.

So what is the practical takeaway?

Possibly: do not combine significant alcohol intoxication with going alone into a hot sauna.

That seems very fair.

There was also a small number of cases involving poor ventilation or oxygen depletion, so maintaining sauna safety and ventilation obviously matters too.

One thing that stood out to me is that many of these people were alone.

So "sauna with a friend" may actually be reasonable advice.

Unless you think there is carbon monoxide in the sauna, in which case please do not both stay there.

Very true.

So I think what we have really learned from these two papers is that the Swedish poisoning data are impressive and show a strong pattern of male, home-based, often polydrug poisoning deaths, with alcohol heavily represented.

And the sauna data do not really suggest that saunas themselves are some special, hidden poison risk. They seem much more tied up with alcohol, vulnerability, being alone, and pre-existing disease.

Exactly.

I think we are going to wrap it up there. Thank you all very much for listening.

Do give us a like and a follow, and please do leave us some comments or feedback. We really do appreciate it.

You can find us on Instagram at [@the_tox_lab](#), so feel free to comment on any of the posts relating to our episodes or send us a message.

And if you have paper recommendations or topics you want us to talk about, we are always happy to hear them.

Have a good week, everyone. Bye.