

The drugs don't work

Fake medicines are on the rise because of people self-diagnosing and buying online.

By **Susanne Lundin** and **Rui Liu**

Fake medicines, mimicking everything from lifestyle products to life-saving drugs, have been a problem in the developing world for some time. It is dangerous enough if they are ineffective and don't provide the expected relief, but they can also be extremely toxic – and now these products are on the rise in the West.

According to a 2017 World Health Organisation report, between 1 and 10 per cent of all medicines in low and middle-income countries are estimated to be counterfeit. A study in Africa showed that up to 70 per cent of medicines to treat infection in the region were fake.

In February WHO issued a global alert about a fake cancer drug in Europe and the Americas which was packaged to look like the medicine Iclusig but which contained only paracetamol.

A falsified cancer drug, Avastin, was recently discovered by a wholesaler in the Netherlands. And in Germany, both falsified cancer and HIV medicines have ended up in the legitimate supply chain.

Our recent survey showed that 36.5 per cent of doctors in Sweden had met patients who they suspected had taken fake medications. The numbers may be similar in other European countries.

Michael Deats, a WHO group leader on substandard and falsified medical products, said earlier this year: "We see breast cancer, prostate cancer, leukaemia products being reported with some regularity, unfortunately, from all regions."

But exactly how prevalent the phenomenon is becoming is difficult

to quantify. Although regulation of the pharmaceutical market in many European countries is effective, illicit products are increasingly finding their way into the legal market.

This is evident from an Interpol operation carried out in 123 countries. During one week in 2018, the international police organisation confiscated over 10 million fake medications via the postal system, with a value of \$14m (£11m). As a result of the intervention, 3,671 illegal websites selling such drugs were shut down.

But because sham medicines are made in several different places, it is hard to trace their production. What's more, such pharmaceuticals are usually so well faked – they may look, taste and even smell exactly like the original drug – that only lab tests can determine their true content. So how do we tackle this problem?

While researchers from medicine,

as prescribed antibiotics, as well as buying drugs online.

Others may take the opportunity of buying cheap medicines while on holiday abroad. Some said they would even consider planning medical trips away "if I had a sickness and for some reason could not get drugs for it in Sweden". The same factors are likely to be at play in many other Western countries.

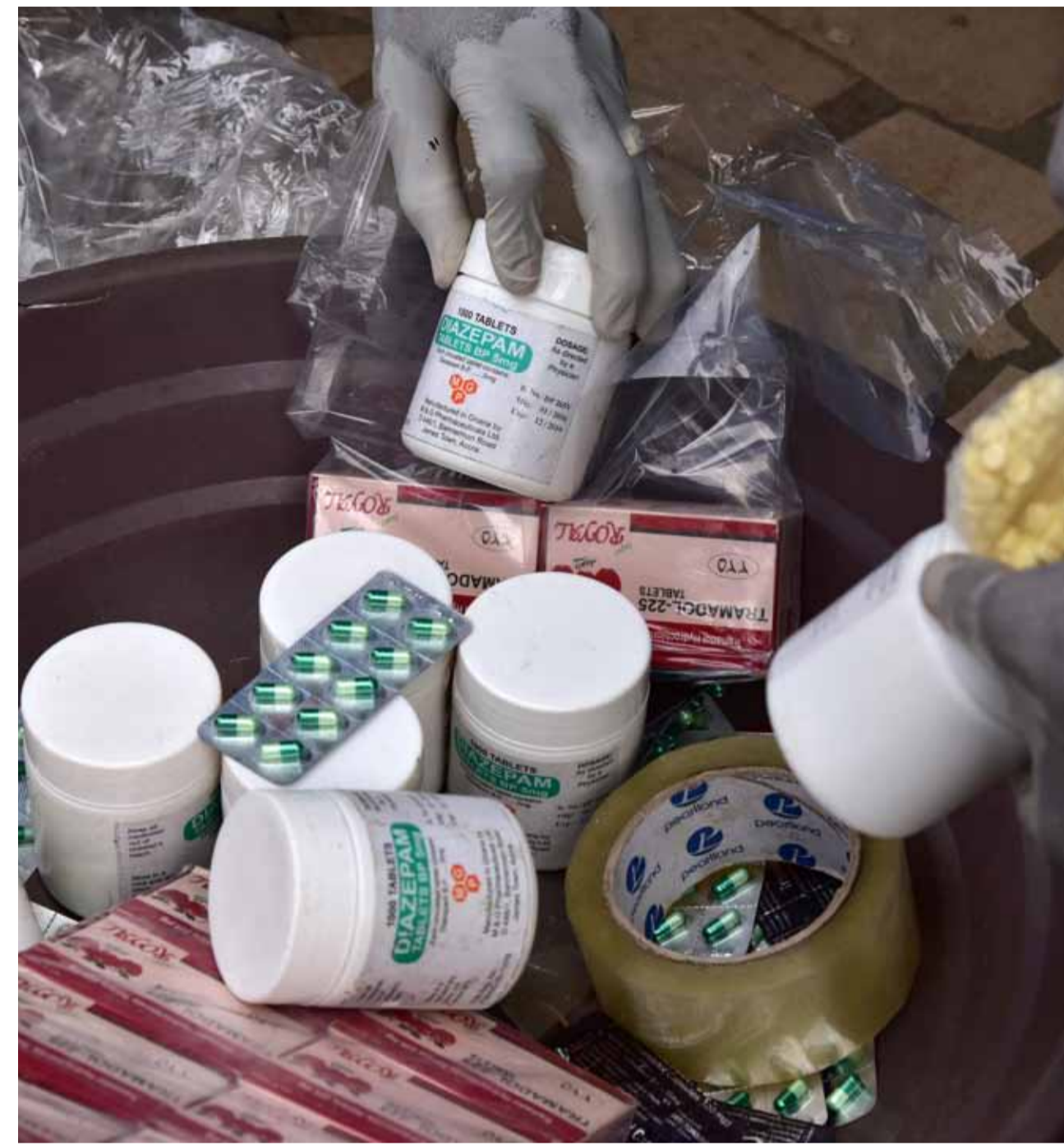
The convenience of online medicine sales means they are becoming a common alternative to a prescription from the doctor – but we discovered that the awareness of risk appears to be low.

The majority of people we asked did not know that the EU requires all legally authorised internet pharmacies to display a common logo certifying the legal status of stores for the sale of prescription medicines. Instead some people who buy drugs online get them from the first seemingly trustworthy website they find without doing much research into it.

Understanding the behaviours of consumers and what drives their demand is crucial. Why does, as a British study reported, a young man prefer buying potency medicines such as Viagra at an obviously illegal internet pharmacy instead of going to a high street pharmacy? And what leads a young woman to act in a similar way to get slimming pills rather than go to a doctor?

Clearly, this could be down to people feeling ashamed to openly admit sexual dysfunction or problems with losing weight. But there is more to take into account.

We are seeing a shift of identity from care-seeking patients to care-



There is little awareness of the risks of fake medicines which are often bought online. AP/GETTY

competent consumers. Many people read up on what drugs they want before they go to a doctor and ask for it. And if the doctor does not oblige, the patient may end up buying it from an illicit source.

The EU put in place new regulations to prevent falsified medicines

from entering the pharmaceutical distribution chain in February. The Falsified Medicines Directive requires, among other things, that each package must have a unique barcode which can be used to trace the products and check what they are made up of.

But the global spread of fake medicinal products does not happen in a vacuum. We think it coincides with our changing views of healthcare and

what we expect from medical professionals. It is this shift that has eroded trust in the system and led to a rise of self-diagnosis and self-prescription – boosting the market for unregulated websites that have access to fake medical products.

Susanne Lundin is a professor of ethnology and Rui Liu is a PhD candidate – both at Lund University in Sweden

Deadly outbreaks of listeria should become a thing of the past with genome tests

The bacteria that causes infections is notoriously hard to destroy but new technology can help identify contaminations. By **Alva Smith**



The bacteria 'Listeria monocytogenes' lives in soil, water courses and plants so it is difficult to prevent vegetables from being contaminated. GETTY

The listeria outbreak that has killed five people and infected four others who ate sandwiches and salads in British hospitals supplied by The Good Food Chain is the third significant outbreak around the world in recent years.

South Africa experienced the largest-ever incidence in 2017-18, when more than 200 people died after eating a contaminated ready-to-eat sausage called polony.

Between 2015 and 2018, an outbreak in Europe killed 10 people and infected more than 50. That was caused by a vegetable processing facility in Hungary that contaminated frozen products that were being shipped to numerous countries, including the UK, Finland and Austria. The bacteria persisted despite the manufacturers following all the regulations on sanitation.

The bacteria that is to blame, *Listeria monocytogenes*, lives in soil, water courses and plants as an organism known as a saprophyte, which lives off dead and decaying matter. It also exists in the gut of animals – including humans – often causing no symptoms and then being passed out in faeces.

Because fresh vegetables are grown in tightly packed, open spaces, it is difficult to prevent them from being contaminated from these sources, due to soil splash and interactions with wild animals in the field.

However, to become a problem for the food industry, there usually needs to be a contaminated "pinch point" in the manufacturing process. In the Hungarian outbreak, for

instance, bacteria were traced to the floor drain of the processing factory and to spinach from a vegetable grinder.

People who contract listeria risk developing an infection called listeriosis, which can be dangerous to the likes of pregnant women, immunocompromised people and the elderly. The riskiest foods include soft cheeses, unpasteurised milk, salads and certain types of processed meat.

One reason why listeria bacteria are so good at surviving in the food supply chain is because they form resilient biofilms, in which the microorganisms stick together in substances that they secrete from their bodies.

Recent evidence also suggests that *L. monocytogenes* enter a protective state under stress, such as when a different detergent is used against them, and they are able to tolerate fridge temperatures.

In all, they are much harder survivors than other bacteria such as *E. coli* or *Salmonella* and demand greater cleaning and sanitation in food factories to keep them at bay.

By law, food manufacturers in the UK and many other countries have to send food and environmental samples for microbial analysis. But these standard tests are of limited value in relation to listeria. Because it is able to live almost anywhere, you can expect to find a certain low level of *L. monocytogenes*.

Instead, genetic tests are required to detect serious contaminations. Unfortunately, genome-sequencing tests can cost five times more than standard tests. This prohibits

its use in pretesting – all the more so for small suppliers with shallower pockets. But 10 years from now it could be a very different situation.

The price to generate the raw data for a bacterial genome has fallen from £39,735 to £0.79 in the past decade and the technology has already become standard for researchers, which is usually a sign that it will reach industry a few years later.

In the meantime, food standards are rising anyway – operators in the supply chain are constantly reviewing their safety practices with a focus on consumer safety. These include increased microbial sampling and more sanitation and disinfection programmes.

So while listeria is a tough opponent for the food manufacturing industry, its days as a serious threat could be numbered. Fairly soon, food manufacturers and their retailers are going to face a choice: pay for genome-sequencing technology or save money and risk an outbreak, the result of which would be a catastrophic effect on public health and the possible end of your company.

Alva Smith is a doctoral researcher investigating sources and survival of *L. monocytogenes* at Edinburgh Napier University

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Would you hand in a lost wallet? Most people do - and there are evolutionary reasons why

By **Nigel Holt**

We often assume honesty is a rare quality in a selfish world. But according to research, there's no need to be so cynical. It turns out that most people are honourable enough to return a lost purse or

wallet, especially if it contains a lot of cash. The study, which involved more than 17,000 lost wallets and was published in the journal *Science*, looked at how often people in 40 different

countries decided to return a lost wallet to the owner, after the researchers handed it in to the institution in which they said it had been found.

Surprisingly, in 38 countries, the wallets with higher sums of money were returned more often than those with smaller amounts.

Overall, 51 per cent of those who were handed a wallet with smaller amounts of money reported it, compared with 72 per cent for a larger sum. The most honest countries were Switzerland, Norway

and the Netherlands whereas the least honest were Peru, Morocco and China.

As an informal test of this, we ran a focus group. It found that people's reasons for returning the items were that no one wanted to appear to act in a socially unacceptable way or appear to be a thief. And, of course, the more money in the wallet, the greater the crime.

The "found wallet" test has been used in research before. In 2009, a researcher carelessly "dropped" a

number of wallets all over Edinburgh to see what would happen. He got 42 per cent of the wallets back, but that was not the most interesting finding.

It was not only the money in the wallet that influenced whether it would be returned. Where a family photo, an image of a cute puppy,



a baby or an elderly couple were included, the chances of the wallet being returned significantly improved.

An important aspect of the study, however, was that the wallets were handed in to people working in the institutions in which they were said to be found. Given that people in one workplace or environment may know each other and may start suspecting each other, there was a very real chance of being found out if the wallet was not handed in. This

is perhaps different from finding a wallet on public transport. There may be a scientific reason for us to be honest. As a personal quality that encourages trust and co-operation, being honest gets you more collaborators and greater success, meaning it can provide an evolutionary advantage. If we have evolved in this way, then it is hardly surprising that making a dishonest decision feels like it goes against our very nature. We are all human,

however, and as such open to the same psychological pressures and difficult choices when faced with temptation – we arrive at our own threshold of honesty, and these thresholds can change over a lifetime. There is evidence that, as we age, we get more honest as a result of becoming more norm focused – breaking the rules or seeking excitement becomes less common.

Nigel Holt is a professor of psychology at Aberystwyth University

