Success of rogue online pharmacies: sewage study of sildenafil in the Netherlands
Venhuis, B.J.; de Voogt, W.P.; Emke, E.; Causanilles Llanes, A.; Keizers, P.H.J.

Published in:
BMJ : British medical journal

DOI:
10.1136/bmj.g4317

Citation for published version (APA):

General rights
It is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), other than for strictly personal, individual use, unless the work is under an open content license (like Creative Commons).

Disclaimer/Complaints regulations
If you believe that digital publication of certain material infringes any of your rights or (privacy) interests, please let the Library know, stating your reasons. In case of a legitimate complaint, the Library will make the material inaccessible and/or remove it from the website. Please Ask the Library: http://uba.uva.nl/en/contact, or a letter to: Library of the University of Amsterdam, Secretariat, Singel 425, 1012 WP Amsterdam, The Netherlands. You will be contacted as soon as possible.

UvA-DARE is a service provided by the library of the University of Amsterdam (http://dare.uva.nl)

Download date: 09 Sep 2017
ROGUE ONLINE PHARMACY

Success of rogue online pharmacies: sewage study of sildenafil in the Netherlands

Bastiaan J Venhuis senior scientific officer¹, Pim de Voogt professor of environmental chemistry², Erik Emke scientific researcher², Ana Causanilles PhD student², Peter H J Keizers scientific officer¹

¹National Institute for Public Health and the Environment RIVM, PO Box 1, 3720 BA Bilthoven, Netherlands; ²KWR Watercycle Research Institute, PO Box 1072, 3430 BB, Nieuwegein, Netherlands

The internet continues to harbour thousands of rogue online pharmacies.¹ We investigated the success of their practice by measuring the sewage load of the erectile dysfunction drug sildenafil in three cities in the Netherlands.

We measured concentrations of sildenafil and two metabolites at the three main sewage treatment plants serving Amsterdam, Eindhoven, and Utrecht for seven consecutive days.² Total sewage load was back calculated to original sildenafil consumption.³ For a conservative estimate, we assumed that there were no losses in sewage due to degradation.⁴ We found no indication of dumping of unused drugs.

We estimated the consumption of legitimately dispensed sildenafil from the national dispensary database from 12 months before the study to three months after. We used the repetitive dispensing behaviour for each patient in the sampled area to estimate consumption during the seven days of sampling. About a quarter of the dispensed sildenafil was prescribed to treat pulmonary hypertension.

The figure↓ shows that at least 60% of the sewage loads of sildenafil were not explained by legitimately prescribed sildenafil. The illicit fraction was similar for each city, despite major differences in tourism and commuting.

We conclude that the unexplained fraction of sildenafil in sewage is primarily illicit. If our results are representative of other communities, the consumption of illicit erectile dysfunction drugs might dwarf the consumption of the legitimately dispensed versions. The apparent success of rogue online pharmacies would be an important area of further inquiry.

Competing interest: None declared.

Pim de Voogt is also professor of environmental chemistry at the Institute for Biodiversity and Ecosystem Dynamics, University of Amsterdam, Amsterdam, Netherlands.

Full response at: www.bmj.com/content/346/bmj.f4204.

1 Wise J. Record number of fake drugs are seized in crackdown. BMJ 2013;346:f4204.
Figures

Estimated sildenafil consumption in three cities in the Netherlands by type of prescription (illicit and dispensed)

- Amsterdam: inh. 769,000
- Eindhoven: inh. 450,300
- Utrecht: inh. 300,000