Will Spam Overwhelm Our Defenses? Evaluating Offerings for Drugs and Natural Health Products

Peter Gernburd, Alejandro R. Jadad

Summary Points

- Spam, or unsolicited e-mail received from an unknown sender, now accounts for the largest proportion of all messages delivered online.
- Little is known about health-related spam and the spammers behind it.
- This study shows that it is possible to purchase products purported to be prescription drugs and controlled substances, across traditional national and legal boundaries, with one-third of our attempts to do so being successful.
- Buyers should be fully aware that it may not be possible for them to hold spammers accountable for any claims made in their messages, or to get protection from illegal activities resulting from disclosure of personal or financial information to spammers.
- Spammers are challenging our traditional regulatory, licensing, and law enforcement frameworks, and even threatening their relevance.

Data extraction. All messages deemed to be spam were stored as a common dataset, and were labeled as health-related if they included offers of interventions that could modify a physical, cognitive, behavioral, or emotional state in humans (e.g., medications, natural health products, devices, or professional services).

All health-related messages that contained an active Web link (a URL within a message that led to a working Internet location), and that had been received between November 23 (Thanksgiving day) and November 30, 2006, were analyzed for the extraction of the following information:

- Sender details: The name and Web address of the organization that generated the message, the country of origin, and contact information
- Product offered: Product name, claim of benefit (yes/no/unclear), and mention of potential adverse effects (yes/no/unclear)

Funding: ARJ obtained funding for the study from the Canada Research Chair in eHealth Innovation and the Rose Family Chair in Supportive Care, which he holds. The funder played no role in the decision to submit the paper or in its preparation.

Competing Interests: The credit card used to order products from spammers and the control account were set up by Ms. Martha Garcia, through Foresight Links Corporation (http://www.foresightlinks.com/), a consulting firm owned by Dr. Jadad.

Citation: Gernburd P, Jadad AR (2007) Will spam overwhelm our defenses? Evaluating offerings for drugs and natural health products. PLoS Med 4(9): e274. doi:10.1371/journal.pmed.0040274

Copyright: © 2007 Gernburd and Jadad. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Peter Gernburd is a Research Fellow with the Centre for Global eHealth Innovation, University Health Network and University of Toronto, Toronto, Ontario, Canada. Alejandro R. Jadad is Professor, Chief Innovator, and Founder of the Centre for Global eHealth Innovation, University Health Network and University of Toronto, Toronto, Ontario, Canada.

* To whom correspondence should be addressed. E-mail: ajadad@ehealthinnovation.org

Copyright: © 2007 Gernburd and Jadad. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

The Policy Forum allows health policy makers around the world to discuss challenges and opportunities for improving health care in their societies.
Costs and payment options:
Minimum purchase price, shipping fees, methods of payment

Return policy: Refund (full or partial), product exchange, or not specified

All messages with active Web links were analyzed to determine whether they included unique offers. A unique offer, in our research, was considered for analysis if the active web link in the message pointed to a nonduplicate Internet location or if the message contained unique sender details.

Product purchase. One product was ordered from each unique offer on December 21, 2006, using a Visa card and a Post Office Box. When the offer included more than one product, an item listed was selected randomly for purchase, drawing lots.

Findings
The study accounts received 4,153 unsolicited messages (82% of the total messages received) during the month of November 2006. Health-related spam accounted for 32% (n = 1,334). Nineteen messages had active Web links during the last week of the month. These messages had been received a total of 143 times by the accounts. Of these, 73% (n = 104) had been sent from the United States, 16% (n = 23) from China, and 5% (n = 8) from the Democratic Republic of the Congo (Table 1). Only 58% of the active links in health-related messages received during the first week remained active by end of the second week; while 26% were active by the end of the month. Thirteen of the 19 messages included offers of prescription drugs and six included offers of natural health products. None included services or devices. Three of the messages offered free shipping of products, while the rest charged between US$9.00 and US$19.95. Only half of the messages included statements on refund of products.

The 19 messages contained 27 unique offers, which were used to order products (13 prescription drugs and six natural health products). All of the sites from which the products were ordered included claims of benefit and warned about potential adverse effects, which were so diverse across messages that it was not possible to match them with approved lists. During the order process, four Web sites stopped working after the credit card information was submitted. No further information was provided on whether the transaction was successful. Thirteen sites did not process the order, but received all of the information provided.

As of July 21, 2007, nine orders had been delivered, including five prescription drugs and four natural health products (Tables 2 and 3), with no evidence of attempts by spammers to abuse the credit card information given to them, except for one undelivered product for which the order was successfully completed.

Discussion
We approached and completed this project with trepidation. We knew that we would be interacting with organizations operating at the margins of the law or clearly outside it. It was not easy to get approval from university administrators for a project that could include ordering products from unknown and unverified sources.

Table 1. Spammers: General Characteristics

| Organization            | Messages Received | Target Account | Origin                  | Shipping Cost (US$) | Return Policy |
|-------------------------|-------------------|----------------|-------------------------|--------------------|--------------|
| Advanced Laboratories   | 1                 | R              | 1 (China)               | Free               | Refund       |
| Anatrim*                | 9                 | R, c           | 8 (China), 1 (US)       | Free               | N/S          |
| Canadian Health & Care Mall | 1               | R              | 1 (US)                  | 15.00              | N/S          |
| Discount Pharmacy       | 10                | R, C, c        | 10 (US)                 | 19.95              | N/S          |
| ED Med Choice           | 10                | C              | 1 (China), 5 (Congo), 4 (US) | 10.00 | Refund       |
| EXTRA-TIMEa             | 1                 | R              | 1 (US)                  | 19.95              | N/S          |
| FinestRX                | 1                 | C              | 1 (China)               | 9.00               | N/S          |
| Health Suite            | 3                 | C, c           | 2 (China), 1 (US)       | 9.00               | N/S          |
| Herbal King*            | 2                 | C              | 2 (Brazil)              | 9.95               | Refund       |
| Hoodia-Pillza*          | 5                 | R, c           | 1 (China), 3 (Congo), 1 (USA) | 10.00 | Refund       |
| Hoodia Life*            | 2                 | C              | 2 (Canada)              | 15.00              | Refund       |
| International Legal RX  | 2                 | C              | 2 (US)                  | 15.00              | Refund       |
| My Canadian Pharmacy    | 49                | R, C, c        | 1 (Canada), 2 (Hungary), 45 (USA) | 15.00 | N/S          |
| Pharmacy Express        | 2                 | C              | 2 (China)               | 10.00              | N/S          |
| Premier Pharmacy        | 4                 | C, c           | 4 (China)               | 10.00              | Refund       |
| US Drugs                | 4                 | C              | 4 (US)                  | 15.00              | Refund       |
| VIP Pharmacy*           | 33                | R, C, c        | 33 (US)                 | 15.00              | Refund       |
| WW3 Distributors        | 1                 | C              | 1 (US)                  | Free               | N/S          |
| Your Online Pharmacy    | 3                 | R, c           | 3 (China)               | 10.00              | N/S          |

*Offer included a single product.

The origin of one of the messages could not be determined.
C, commercial account; c, control account; N/S, not stated; R, research account.

doi:10.1371/journal.pmed.0040274.t001
and which could lead to illegal trade of substances, or costs associated with items for the enhancement of sexual function. It was unsettling to order the products, not knowing whether we were contacting undercover law enforcement agents (to whom it would be difficult to explain the research nature of the project) or fronts for unscrupulous criminals who could abuse the financial information or even steal our identities. We believe that the effort and stress were worthwhile.

The study confirms that spam is accountable for any claims made in

much higher rate than the previously reported 17% for generic attempts to purchase products from spammers [6]. It is unclear whether this is a reflection of an increased level of confidence of spammers over the years, or a specific phenomenon related to health-related products. The volume of messages does not seem to relate to the level of outward e-mailing activity of the spam recipient, as the account we set as control received a similar amount of unsolicited material.

Our results also underscore the elusive nature of spammers and their activities. Spam messages are delivered through a rich array of servers, links, and accounts; we found that the group of accounts we identified had a half-life of around two weeks (i.e., it took two weeks for half of the accounts to become inactive). Buyers should be fully aware that it may not be possible for them to hold spammers accountable for any claims made in their messages, or to get protection from illegal activities resulting from disclosure of personal or financial information to spammers.

Although there is concern about the delivery of prescription drugs from Canadian online pharmacies to US-based customers, the bulk of the spam received by the Canada-based accounts used in the study was generated in the United States. As with online pharmacies [7,8], highly mobile spammers are certainly challenging our traditional regulatory, licensing, and law enforcement frameworks, and even threatening their very relevance.

Because of the short life of the active links, it was difficult to take action against the spammers. By the time the products were received, in each case, the spammers had become virtual ghosts, precluding any meaningful effort to report them to custom officers, local or regional police forces, national law enforcement agencies (the Federal...
Table 3. Natural Products Ordered from Spammers

| Product         | Ingredient(s)                        | Manufacturer | Purported Indication(s) | Spammers  | Product Cost (US$ less Shipping/Handling) | Product Delivered |
|-----------------|--------------------------------------|--------------|-------------------------|-----------|------------------------------------------|-------------------|
| Antrim          | Hoodia gordonii, Garcinia cambogia, green tea, dandelion, spirulina, and ginger root | Unclear      | Obesity                 | Antrim    | 74.95                                    | Yes               |
| Extra-Time      | Salabmisi, kokilaksha, vanya kahu, kapikachchhu, suvarnavang, vridhadaru, gokshura, jeevanti, sahileyam | Unclear      | Erectile dysfunction    | Extra-Time| 59.95                                    | No (CNP)          |
| Hoodia          | Hoodia gordonii                      | Several      | Obesity, indigestion, infections | Hoodia Life| 55.95                                    | Yes               |
| Lipothin        | Magnesium, molybdenum, chromium, betaine, choline bitartrate, Inositol, L-methionine, Siberian ginseng, turmeric tuber, L-carnitine, Beta-sitosterol, nettle leaf, spirulina algae, peppermint leaf, potassium, royal jelly, bee pollen powder, rice flour, cottonseed oil | Unclear      | Obesity                 | My Canadian Pharmacy | 69.95                                    | No (WFP)          |
| ManXL           | Vitamin E, soya protein concentrate, Mucuna pruriens, Astaracantha longifolia, Pueraria tuberosa, Withania somnifera, Tribulus terrestris, Albizia lebbeck, Argyrecin speciosa seed, Valeriana wallichii | HerbalKing   | Penile enlargement      | Herbal King, WW3 Distributors | 64.95                                    | Yes               |
| Virility Enlargement patch Rx | Ginseng, fotti, gotu kola, saw palmetto, damiana, menthol | Unclear      | Penile enlargement      | Advanced Laboratory | 59.95                                    | No (WFP)          |

This organization was responsible for more than one offer of the product, using unique web links or contact information. Both offers were selected for purchase. CNP, credit card not processed; WFP, Web site failed during processing of credit card.

doi:10.1371/journal.pmed.0040274.t003

Bureau of Investigations in the United States and the Royal Canadian Mounted Police in Canada), or organizations such as the US Department of Health, the US Federal Drug Administration, Health Canada, or INTERPOL. We are currently searching and contacting, systematically, the Web sites of these organizations, trying to determine the best course of action regarding health-related spam. This is proving challenging, as most of the above bodies seem to lack a clear strategy to deal with spam-related issues.

Our study had limitations, which we hope will be overcome in future efforts to understand health-related spam. Perhaps if we had included a larger number of accounts and focused on a longer study period, we would have increased the generalizability of the results or produced more evidence about the risks associated with pursuing offers from spammers. However, several months following the provision of financial information online, we have no indication of abuse. Instead, we have nine products that seem to match what was offered. We are also conducting a study to determine whether the pharmaceutical products we received are genuine, fakes, or substandard. We hope to report some new insights on these issues in the very near future.

Hope and greed are two powerful human motivators. As the number of people who turn to the Internet for solutions to health or lifestyle problems increases, merchants will rise to the occasion, matching the demand. As this study has shown, current regulatory, legal, and geographic boundaries may be unable to contain the flow of products across the world. Despite its potential for harm, it could be argued that spam is heralding a new era in which, thanks to the power of the Internet, those boundaries will be re-assessed, re-drawn, or even eliminated.

Acknowledgments

The authors thank Ms. Dijana Vasic and Mr. Mike Ravkine, whose e-mail messages were used for this study.

Author contributions. Both ARJ and PG participated in the design of the study, in data collection and analysis, and in the preparation of the manuscript. They had full access to all data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. PG analyzed the source of the messages and ordered the products.

References

1. Electronic Privacy Information Centre (2005) Spam—Unsolicited commercial e-mail. Available: http://www.epic.org/privacy/junk_mail/spam/. Accessed 16 August 2007.
2. Goodman J, Heckerman D, Roumouwaite R. Stopping spam (2005) Scientific American 292:42-49.
3. Industry Canada (2005) The digital economy in Canada: What is spam? Available: http://e-com.ic.gc.ca/epic/site/ecic-creac.nsf/en/h_gv00170e.html#spam. Accessed 16 August 2007.
4. Fallows D (2005) Spam: How it is hurting email and degrading life on the internet. Pew Internet and American Life Project. Available: http://www.gunixinternet.org/pdfs/PIP_Spam_Report.pdf. Accessed 16 August 2007.
5. Federal Trade Commission (2003) False claims in spam: A report by the FTC’s division of marketing practices. Available: http://www.ftc.gov/reports/spams/030429spamreport.pdf. Accessed 16 August 2007.
6. Symantec (2007) What Symantec considers as spam. Available: http://enkb.symantec.com/security/ output/x20041125914502663.html. Accessed 16 August 2007.
7. Armstrong K, Schwartz JS, Asch DA (1999) Direct sale of sildenafil (Viagra) to consumers over the Internet. N Engl J Med 341:1389–1392.
8. Bessell TL, Anderson JN, Silagy CA, Sansom LN, Hiller JE (2003) Surfing, self-medicating and safety: Buying non-prescription and complementary medicines via the internet. Qual Saf Health Care 12:88-92.