**Panic buying of iodine-containing drugs in Europe following the beginning of the war between Russia and Ukraine**

**Running title:** Panic buying of iodines in the context of the Russia-Ukraine war

Karel Kostev, PhD (ORCID: 0000-0002-2124-7227)a; Susanne Abelerb; Ai Koyanagi, MD-PhD (ORCID: 0000-0002-9565-5004)c,d; Josep Maria Haro, MD-PhD (ORCID: 0000-0002-3984-277X)c; Lee Smith, PhD (ORCID: 0000-0002-5340-9833)e; Louis Jacob, MD-PhD (ORCID: 0000-0003-1071-1239)c,f

a Epidemiology, IQVIA, Frankfurt, Germany

b Consumer Health, IQVIA, Frankfurt, Germany

c Research and Development Unit, Parc Sanitari Sant Joan de Déu, CIBERSAM, ISCIII, Dr. Antoni Pujadas, 42, Sant Boi de Llobregat, Barcelona, Spain

d Institució Catalana de Recerca i Estudis Avançats (ICREA), Pg. Lluis Companys 23, Barcelona, Spain

e Centre for Health, Performance, and Wellbeing, Anglia Ruskin University, Cambridge CB1 1PT, UK

f Faculty of Medicine, University of Versailles Saint-Quentin-en-Yvelines, Montigny-le-Bretonneux, France

**Correspondence**:

Prof. Dr. rer. med. Karel Kostev

Epidemiology   
IQVIA

Unterschweinstiege 2-14

60549 Frankfurt am Main

Germany  
Tel.: +49-(0)69-66 04-4878

[karel.kostev@iqvia.com](mailto:karel.kostev@iqvia.com)

**Number of characters in the title (spaces included):** 111

**Number of characters in the running title (spaces included):** 64

**Number of words in the main body:** 583

**Number of references:** 6

**Number of figures:** 0

**Number of tables:** 1

**Supplementary online material:** 1

**Keywords:** panic buying; iodine-containing drugs; Europe; Russia-Ukraine war; pharmacoepidemiology

**Introduction**

In February 2022, Russia invaded Ukraine and aimed to control the country rapidly.1,2 The Russia-Ukraine war has raised multiple concerns globally. Two major concerns are the potential use of nuclear weapons and the environmental consequences of the capture of nuclear sites by the Russian army.1 A nuclear war would result in many immediate deaths and delayed deaths from chronic diseases and climate disruption. Although guidelines from the World Health Organization advocate the prudent prophylactic use of iodine,3 media outlets have reported panic buying of iodine-containing drugs in Europe and other regions of the world since the beginning of the Russia-Ukraine conflict.4

Given that there is no research on this topic yet, the present pharmacoepidemiological study aimed to investigate sales of over-the-counter iodine-containing drugs in 20 European countries between January 2021 and March 2022.

**Methods**

This study used data from the OTCims database (IQVIA), which contains data on sales of over-the-counter drugs in Europe. The present study included sell-out data of drugs with iodine as the only active ingredient. The number of packages of iodine-containing drugs sold per month was analyzed in each country between January 2021 and March 2022. Differences in percentage were assessed between February 2022 and January 2022, and March 2022 and January 2022 (see supplementary online material for more details).

**Results**

In January 2021, the number of packages of iodine-containing drugs sold was the highest in Russia (N=405,437) and the lowest in Portugal (N=7). The number of sales of packages of iodine-containing drugs increased in most countries in February 2022 and all countries in March 2022 compared with January 2022. This increase was particularly strong in Romania (+29,339.3% in March 2022), Bulgaria (+14,507.3% in March 2022), and the Netherlands (+8,765.7% in March 2022) **(Table 1).**

**Discussion**

The findings of this study are in line with recent reports from the media.4 The more pronounced increase in the sales of iodine-containing drugs in Eastern European countries (i.e., Romania and Bulgaria) observed in this study may be related to the fact that these countries are geographically close to Russia and Ukraine and may therefore be more likely to suffer from collateral nuclear damages than other European countries. Interestingly, this is not the first time panic buying of iodine-containing drugs has occurred, and this behavior has also been reported after the Fukushima crisis.5 Panic buying of iodine-containing drugs since the beginning of the war is likely explained by the fear of the use of nuclear weapons and the fear of radiation leaks from nuclear sites.2 Despite international efforts, the nuclear threat is real, and this threat has been found to have adverse effects on mental health.6 Moreover, lack of awareness of international recommendations on iodine prophylaxis following nuclear accidents and inaccurate information from the media may potentiate the effects of the war between Russia and Ukraine on panic buying of iodine-containing drugs.

The major strengths of this study are the number of countries included in the analyses and the use of real-world data obtained every month. Two critical limitations are the absence of data on prescribed iodine-containing drugs and the lack of information on the sociodemographic and clinical characteristics of buyers of iodine-containing drugs.

In conclusion, the war between Russia and Ukraine was associated with increased sales of over-the-counter iodine-containing drugs in 20 European countries in February and March 2022 compared with January 2022. Based on the findings of this study, there is an urgent need to better inform the general population about the international recommendations on iodine prophylaxis following exposure to radioiodine.

**Declarations of interest**

None.

**Role of the funding source**

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

**Author contributions**

Karel Kostev contributed to the design of the study, performed the statistical analyses, and corrected the manuscript. Susanne Abeler, Ai Koyanagi, Josep Maria Haro, and Lee Smith corrected the manuscript. Louis Jacob contributed to the design of the study, managed the literature searches, wrote the first draft of the manuscript, and corrected the manuscript. All authors contributed to and have approved the final manuscript.

**Acknowledgments**

Karel Kostev and Louis Jacob had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

**Data sharing**

The data supporting the findings of this study are available upon reasonable request from the corresponding author.

**References**

1. Laine JE. War in Europe: health implications of environmental nuclear disaster amidst war. *Eur J Epidemiol*. 2022;37(3):221-225. doi:10.1007/s10654-022-00862-9

2. Pereira P, Bašić F, Bogunovic I, Barcelo D. Russian-Ukrainian war impacts the total environment. *Sci Total Environ*. 2022;837:155865. doi:10.1016/j.scitotenv.2022.155865

3. World Health Organization. *Guidelines for Iodine Prophylaxis Following Nuclear Accidents Update 1999*.; 1999:39. Accessed May 17, 2022. https://apps.who.int/iris/bitstream/handle/10665/66143/WHO\_SDE\_PHE\_99.6.pdf;jsessionid=44E00C9ECC7AAFD3E31E7EACD841D3D5?sequence=1

4. Euronews. Ukraine war: Europeans rush to buy iodine pills amid fears of nuclear catastrophe. Published March 7, 2022. Accessed July 4, 2022. https://www.euronews.com/next/amp/2022/03/07/ukraine-war-european-pharmacies-face-jump-in-demand-for-iodine-pills-after-putin-s-nuclear

5. Crépey P, Pivette M, Bar-Hen A. Quantitative assessment of preventive behaviors in France during the Fukushima nuclear crisis. *PLoS One*. 2013;8(3):e58385. doi:10.1371/journal.pone.0058385

6. Poikolainen K, Aalto-Setälä T, Tuulio-Henriksson A, Marttunen M, Lönnqvist J. Fear of nuclear war increases the risk of common mental disorders among young adults: a five-year follow-up study. *BMC Public Health*. 2004;4:42. doi:10.1186/1471-2458-4-42

**Table 1.** Number of packages of iodine-containing drugs sold each month in 20 European countries between January 2021 and March 2022

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Country** | **Absolute number of packages** | | | | | | | | | | | | | | | **Feb 22 vs. Jan 22 (increase in %)** | **Mar 22 vs. Jan 22 (increase in %)** |
| **Jan 21** | **Feb 21** | **Mar 21** | **Apr 21** | **May 21** | **Jun 21** | **Jul 21** | **Aug 21** | **Sep 21** | **Oct 21** | **Nov 21** | **Dec 21** | **Jan 22** | **Feb 22** | **Mar 22** |
| Austria | 150 | 151 | 161 | 248 | 294 | 192 | 201 | 135 | 159 | 225 | 223 | 151 | 230 | 2,393 | 9,418 | 940.4 | 3,994.8 |
| Belgium | 575 | 511 | 583 | 530 | 680 | 628 | 581 | 500 | 503 | 569 | 435 | 472 | 476 | 674 | 891 | 41.6 | 87.2 |
| Bulgaria | 38 | 75 | 45 | 5 | 56 | 45 | 18 | 58 | 58 | 8 | 83 | 10 | 41 | 103 | 5,989 | 151.2 | 14,507.3 |
| Croatia | 75 | 49 | 59 | 86 | 107 | 92 | 97 | 64 | 97 | 155 | 110 | 114 | 71 | 175 | 225 | 146.5 | 216.9 |
| Czech Republic | 3,817 | 3,556 | 4,174 | 4,159 | 4,350 | 4,507 | 3,445 | 3,247 | 3,120 | 3,117 | 3,417 | 3,248 | 3,375 | 8,551 | 15,029 | 153.4 | 345.3 |
| Finland | 613 | 536 | 897 | 767 | 619 | 584 | 393 | 601 | 576 | 784 | 628 | 605 | 1,098 | 9,594 | 93,869 | 773.8 | 8,449.1 |
| France | 4,641 | 4,437 | 4,836 | 4,751 | 4,430 | 4,888 | 4,686 | 4,239 | 4,779 | 4,701 | 4,812 | 4,748 | 5,032 | 6,821 | 16,997 | 35.6 | 237.8 |
| Germany | 173,504 | 157,053 | 183,232 | 171,641 | 165,286 | 170,115 | 180,003 | 170,220 | 165,774 | 174,339 | 181,944 | 174,347 | 165,575 | 254,411 | 497,861 | 53.7 | 200.7 |
| Greece | 57 | 40 | 41 | 56 | 58 | 8 | 18 | 34 | 20 | 33 | 38 | 11 | 63 | 38 | 317 | -39.7 | 403.2 |
| Hungary | 1,622 | 1,699 | 1,757 | 1,551 | 1,687 | 1,734 | 1,707 | 1,599 | 1,622 | 1,750 | 1,782 | 1,575 | 1,605 | 4,361 | 14,846 | 171.7 | 825.0 |
| Italy | 5,611 | 5,376 | 6,467 | 6,233 | 5,899 | 5,771 | 5,941 | 5,051 | 5,926 | 5,693 | 5,487 | 5,959 | 5,646 | 5,790 | 20,588 | 2.6 | 264.6 |
| Latvia | 33 | 16 | 36 | 27 | 38 | 25 | 21 | 13 | 16 | 32 | 15 | 15 | 17 | 89 | 206 | 423.5 | 1,111.8 |
| Netherlands | 383 | 324 | 425 | 390 | 383 | 414 | 521 | 387 | 284 | 147 | 228 | 197 | 303 | 7,081 | 26,863 | 2,237.0 | 8,765.7 |
| Poland | 36 | 50 | 68 | 80 | 64 | 59 | 48 | 80 | 46 | 93 | 61 | 80 | 68 | 75 | 333 | 10.3 | 389.7 |
| Portugal | 7 | 7 | 19 | 15 | 14 | 33 | 5 | 21 | 18 | 14 | 8 | 16 | 13 | 6 | 16 | -53.8 | 23.1 |
| Romania | 25 | 15 | 23 | 20 | 28 | 24 | 21 | 18 | 21 | 20 | 17 | 22 | 28 | 62 | 8,243 | 121.4 | 29,339.3 |
| Russia | 405,437 | 340,740 | 411,485 | 374,053 | 367,833 | 379,620 | 363,544 | 366,279 | 418,043 | 447,584 | 430,143 | 430,530 | 388,945 | 375,232 | 535,666 | -3.5 | 37.7 |
| Slovakia | 317 | 232 | 337 | 327 | 535 | 431 | 197 | 317 | 181 | 231 | 255 | 243 | 428 | 1,057 | 6,090 | 147.0 | 1,322.9 |
| Spain | 72 | 92 | 134 | 171 | 110 | 119 | 102 | 86 | 66 | 101 | 85 | 91 | 60 | 102 | 258 | 70.0 | 330.0 |
| Switzerland | 499 | 416 | 541 | 591 | 482 | 534 | 378 | 493 | 630 | 959 | 458 | 468 | 443 | 5,226 | 34,783 | 1,079.7 | 7,751.7 |

**Supplementary online material**

**Methods**

*Database*

The present pharmacoepidemiological study used data from the OTCims database (IQVIA). This database has already been used in prior scientific studies.1,2 The OTCims database contains data on sales of over-the-counter drugs in America, Asia and Europe. For most European countries, data were collected for the first time 12 years ago. Data are sent to IQVIA every month, one to three months after the month of interest, depending on the country.

*Countries*

Twenty European countries were included in this study: Austria, Belgium, Bulgaria, Croatia, Czech Republic, Finland, France, Germany, Greece, Hungary, Italy, Latvia, Netherlands, Poland, Portugal, Romania, Russia, Slovakia, Spain, and Switzerland.

*Channels of distribution*

Channels of distribution were retail pharmacies, drugstores, supermarket in-store pharmacies and corners, supermarket aisles and shelves, online and mail orders, and other channels (e.g., hospital pharmacies and parapharmacies). Channels of distribution varied by country. Retail pharmacies were the main channel of distribution in all countries. Channels of distribution, sample size and coverage by country are displayed in **Supplementary** **Table 1**. Retail pharmacies were the only channels of distribution of iodine-containing drugs in 35.0% of countries. The number of pharmacies was 59,287 in the overall sample, and ranged from 302 in Croatia to 14,000 in France. Finally, data were projected in 85.0% of countries.

*Type of data*

This study included sell-out data of drugs with iodine as the only active ingredient. Drugs with iodine as one of several active ingredients were excluded from the analyses. Sell-out data corresponded to sales from pharmacies to clients, and retainers were audited to obtain these data. Units corresponded to packages of iodine-containing drugs.

*Coverage*

Sales of packages of iodine-containing drugs were projected or not. When projected, sales corresponded to those obtained at the level of the country. When not projected, sales corresponded to those obtained at the level of the sample.

*Analyses*

The number of packages of iodine-containing drugs sold per month was analyzed in each country between January 2021 and March 2022. Differences in percentage were assessed between February 2022 and January 2022, and March 2022 and January 2022.

**References**

1. Tu CM. Use of Proprietary Names by Prescribers When Prescribing Over-the-Counter (OTC) Drug Products. *Ther Innov Regul Sci*. 2019;53(1):132-137. doi:10.1177/2168479018762376

2. Bousquet J, Schröder-Bernhardi D, Bachert C, et al. Heterogeneity of the pharmacologic treatment of allergic rhinitis in Europe based on MIDAS and OTCims platforms. *Clin Exp Allergy*. 2021;51(8):1033-1045. doi:10.1111/cea.13884

**Supplementary Table 1.** Channels of distribution, sample size and coverage by country

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Country** | **Channels of distribution** | **Number of pharmacies in the country (N)** | **Number of pharmacies in the database (N [%])** | **Coverage** |
| Austria | Retail pharmacies | 1,390 | 495 (35.6) | Projected |
| Belgium | Retail pharmacies | 4,850 | 2,500 (51.5) | Projected |
| Bulgaria | Retail pharmacies / online and mail orders | 3,049 | 670 (22.0) | Not projected |
| Croatia | Retail pharmacies / online and mail orders | 1,148 | 302 (26.3) | Projected |
| Czech Republic | Retail pharmacies / online and mail orders | 2,800 | 1,350 (48.2) | Projected |
| Finland | Retail pharmacies | 810 | Not available | Not available |
| France | Retail pharmacies | 21,242 | 14,000 (65.9) | Projected |
| Germany | Retail pharmacies / drugstores / supermarket aisles and shelves / online and mail orders | 19,205 | Not available (19.0) | Projected |
| Greece | Retail pharmacies | 10,100 | 2,050 (20.3) | Projected |
| Hungary | Retail pharmacies | 2,373 | 730 (30.8) | Projected |
| Italy | Retail pharmacies / supermarket in-store pharmacies and corners / supermarket aisles and shelves / other channels | 19,267 | 8,351 (43.3) | Projected |
| Latvia | Retail pharmacies / online and mail orders / other channels | 789 | 450 (57.0) | Projected |
| Netherlands | Retail pharmacies / drugstores / supermarket in-store pharmacies and corners / supermarket aisles and shelves | 2,021 | 925 (45.8) | Projected |
| Poland | Retail pharmacies / online and mail orders | 13,752 | 6,500 (47.3) | Projected |
| Portugal | Retail pharmacies / supermarket in-store pharmacies and corners / other channels | 2,905 | 1,600 (55.1) | Projected |
| Romania | Retail pharmacies / supermarket in-store pharmacies and corners | 7,366 | 3,071 (41.7) | Not available |
| Russia | Retail pharmacies / supermarket in-store pharmacies and corners | 51,500 | 8,300 (16.1) | Projected |
| Slovakia | Retail pharmacies / online and mail orders | 1,960 | 720 (36.7) | Projected |
| Spain | Retail pharmacies | 22,000 | 6,300 (28.6) | Projected |
| Switzerland | Retail pharmacies / drugstores | 1,787 | 973 (54.4) | Projected |