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Increased demand for pharmaceutical drugs containing potassium iodide in connection with the Russia-Ukraine conflict

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The current conflict between Russia and Ukraine increased concerns in the German population of a release of radioactive substances, e.g. radioactive iodine. A high dose of potassium iodide (PI) may prevent accumulation of radioactive iodine in the thyroid gland. Therefore, the German government keeps a sufficient quantity of PI in stock for public supply in case of an emergency. We investigated ambulatory drug dispensing rates of PI and found that the total dispensing of PI (statutory health insurance (SHI), private health insurance (PHI), and over-the-counter (OTC)) increased by 106% from February to March 2022. Changes in PI dispensing were mainly due to an increase in OTC sales, where PI as an antidote showed a sevenfold increase from around 930 packages (February 2022) to 6,500 packages (March 2022), while SHI and PHI dispensing remained relatively low. Furthermore, we investigated whether these changes in dispensing raised the number of suspected adverse drug reactions (ADR). We found no increase of ADR reports related to the use of PI-containing medicinal products between February and September 2022, neither in our national pharmacovigilance nor in the European EudraVigilance database. The data suggest that the mere possibility of a nuclear disaster in Ukraine raised the demand of PI in Germany. Thus, timely and proactive information and reassurance of the public of supply reliability by the Government in a case of a nuclear emergency could be helpful in preventing potential drug shortages and unfounded concern.

1. Introduction

The current conflict between Russia and Ukraine increased concerns of an associated employment of nuclear forces or an assault on a nuclear power plant (Reguly and Graney 2022; Tsvetkova and Zinets 2022). Damage to a nuclear power plant and the consequent release of radioactive material could result in acute radiation syndromes and neoplastic diseases, for example thyroid cancer caused by radioactive iodine (R-131).

To prevent accumulation of R-131 in the thyroid, iodine tablets should be given in high doses and shortly before or immediately after exposure (Aaseth et al. 2019; Arzneimittelkommission der Deutschen Apotheker 2022; Chai et al. 2022). The German Government keeps 189.5 million high dose potassium iodide (PI) tablets in stock to dispense to the population as an antidote – only if required, since (proactive) intake of high dose PI in absence of a nuclear emergency poses the risk of adverse drug reactions (ADR) without any benefit (Calcaterra et al. 2022). The recommended single dose for adults aged 13–45 years is 2 tablets i.e., 100 mg iodide.

In Germany, there is currently one high-dose pharmaceutical product listed on the market with PI as the active ingredient, which can be used for iodine blockage of the thyroid in case of a nuclear accident, as stated in the summary of product characteristics (Lannacher 2015). In fact, PI as an antidote with 65 mg PI/tablet (50 mg iodide) is dosed several times higher than PI products which are used as iodine substitution therapy, which have 0.1 to 0.2 mg iodide in most cases (Hexal AG), or 100 to 1,000 times of the daily food intake (Strahlenschutzkommission 2019; Rump et al. 2021).

However, after news spread about Russian forces capturing a Ukrainian nuclear power plant, the demand of high-dose PI increased rapidly in Germany, as reported by some media outlets, and the risk of a shortage of PI was suddenly discussed (Dölger 2022). The Federal Institute for Drugs and Medical Devices (BfArM, Bundesinstitut für Arzneimittel und Medizinprodukte) reported no shortages of PI medicines in March 2022 (Dölger 2022), but community pharmacies faced difficulties in ordering respective drugs. PI as drug substance for patient-individual preparations, i.e. capsules, was temporarily unavailable (Burki 2022; Isringhaus 2022).

Therefore, we investigated whether ambulatory PI dispensing rates changed immediately after the invasion of Ukraine on February 24, 2022, and evaluated if an increase of ADR reports related to medicinal drugs containing (high-dose) PI could be observed.

2. Investigations and results

We analysed the amount of dispensed packages of potassium iodide (as a monotherapy medicinal product with ATC code H03C, thyroid iodine therapy and V03AB21, antidotes as well as nutritional supplements) (Federal Institute of Drugs and Medical Devices 2022) in community pharmacies using dispensing data reimbursed by statutory health insurance (SHI) funds as well as private health insurance (PHI) companies and over-the-counter (OTC) sales from the INSIGHT Health database, which includes extrapolated data from a representative sample of over 5,800 community pharmacies (Insight Health GmbH & Co. KG).

With regard to potential risks associated with the use of PI, we examined the national pharmacovigilance database of the Drug Commission of German Pharmacists (AMK), listing spontaneous reports from German community and hospital pharmacists. The European database of suspected ADR (EudraVigilance) was likewise examined.

2.1. Total dispensings

The total dispensing of potassium iodide (SHI, PHI and OTC sales) increased by 106% from February to March 2022, mainly due to an increase in OTC sales (+144% from February to March 2022). Dispensed packages reimbursed by SHI- and PHI funds increased by 32% and 43%, respectively (to 28,300 and 40,000 dispensed packages in March 2022) (Fig. 1). Until the Russian invasion of Ukraine in February 2022, potassium iodide showed a steady level of dispensings.

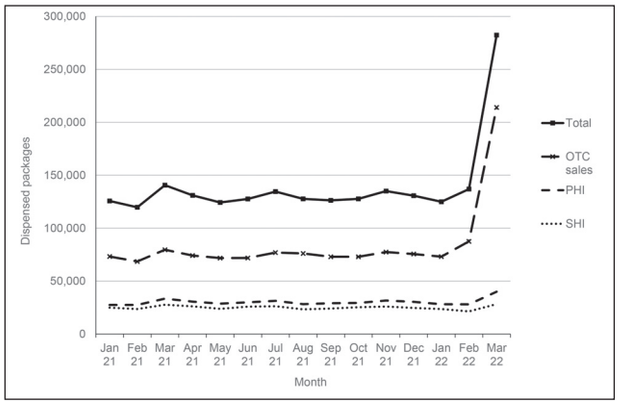

Fig. 1: Monthly dispensing of potassium iodide as substitution therapy and antidote from January 2021 to March 2022. Abbreviations: OTC, over-the-counter; PHI, private health insurance; SHI, statutory health insurance

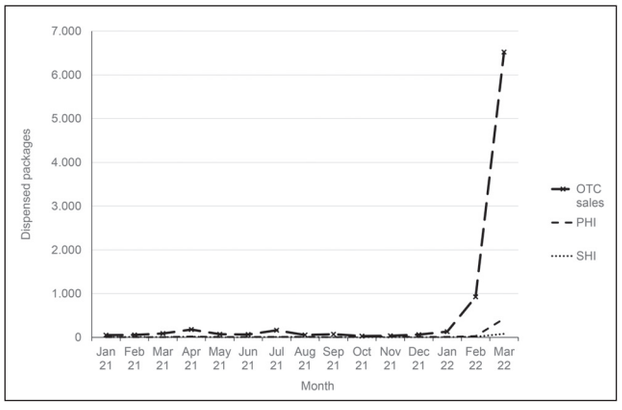

Fig. 2: Monthly dispensing of potassium iodide as antidote from January 2021 to March 2022. Abbreviations: OTC, over-the-counter; PHI, private health insurance; SHI, statutory health insurance

2.2. Dispensings as an antidote

Though potassium iodide as an antidote (ATC-Code V03AB21) showed an increase in dispensings at the expense of the SHI and PHI from less than 50 dispensed packages in February 2022 to a little over 500 in March 2022, the total amount of dispensed packages remained relatively low. In the OTC sales however, potassium iodide as antidote showed a sevenfold increase from around 930 packages in February 2022 to 6,500 packages in March 2022 (Fig. 2).

2.3. Phamacovigilance

The analysis of the AMK database between February 24, 2022 and September 30, 2022, resulted in three reports of suspected cases of quality defects (unsealed blister strip; abrasion on tablets; dented blister). ADR associated to PI-containing medicinal products were not recorded. The query on suspected ADR in EudraVigilance (European database of reported suspected adverse drug reactions 2022) did not show any deviations in the reporting figures for iodine, potassium iodate or potassium iodide in states of the European Economic Area (EEA). Between February and September 2022, EudraVigilance listed a total of 8 reported suspected ADR with PI as a component of a pharmacotherapy (from 0 to 3 reports per month) within the EEA countries. These numbers correlate with last years' figures. However, the number of reports from non-EEA states for PI varied greatly from February to September 2022 (from 0 to 9 reports per month).

3. Discussion

Due to the increase in dispensing rates of PI in Germany without an associated increase of ADR, it can be suggested that PI tablets were stockpiled by the German public in fear of a nuclear power leak or other nuclear incidences. This is despite the Federal Government of Germany assuring the public that there are enough PI tablets stored as an emergency reserve, which will be dispatched to the public by the disaster control authorities in case of a nuclear incidence (Norddeutscher Rundfunk 2022).

In contrast to the overall figures, the number of ADR reports in Germany and EEA states did not differ in the respective period. Nonetheless, one has to be careful when interpreting the available data. Potential delay in detection, reporting, and documentation of ADR as well as the issue of under-reporting (Hazell and Shakir 2006) can be a limitation of a spontaneous reporting system. However, due to the lack of an additional ADR signal, it can be assumed that the purchase of respective tablets occurred mainly for precautionary reasons. Data on the actual intake of PI as an antidote were not available. Thus, further studies are needed to estimate the intake of high dose PI, e.g. via the incidence of iodine-related thyroid-hyperfunction in the population as a surrogate.

Efficacy and safety of a continuous intake of PI over a longer period of time in anticipation of a nuclear power accident has not yet been investigated sufficiently (Toft and Schneider 2022). Following the Chernobyl nuclear power accident in 1986, only rare occurrence of side effects were witnessed in 16 million people receiving PI (Becker and Zanzonico 1997).

The ongoing conflict between Russia and Ukraine highlights the necessity of strategies to provide expert opinion to the public on the detrimental health effects of exposure to ionizing radiation and ways of their mitigation in case of a nuclear disaster with the release of radioactive substances (Rühm et al. 2022). Our data suggest stockpiling of PI by the German Public in reaction to a possible nuclear threat. This may be related to misinformation about the actual danger or mistrust in the Government's abilities. Thus, intensive and proactive information and reassurance of the public of supply reliability by the German Government in a case of a nuclear emergency could be helpful in preventing possible supply shortages and unfounded concern.

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