INTRODUCTION

Some crewmembers have experienced changes in their vision after long-duration spaceflight on the ISS. These impairments include visual performance decrements, development of cotton-wool spots or choroidal folds, optic-disc oedema, optic nerve sheath distention, and/or posterior globe flattening with varying degrees of severity and permanence. These changes are now used to define the visual impairment/intracranial pressure (VIIP) syndrome. It is known that many medications can have side effects that are similar to VIIP symptoms. Some medications raise blood pressure, which can affect intracranial pressure. Many medications that act in the central nervous system can affect intracranial pressures and/or vision. About 40% of the medications in the ISS kit are known to cause side effects involving changes in blood pressure, intracranial pressure and/or vision. For this reason, we have begun an investigation of the potential relationship between ISS medications and their risk of causing or exacerbating VIIP-like symptoms.

METHODS

The medical literature indicates that pain relievers, especially non-steroidal anti-inflammatory (NSAID) medication (like ibuprofen) and glucocorticoids (like dexamethasone) were among the most likely candidate medications, and have the focus of initial queries for this study. Two different data sources were examined.

Data from the general population: The Food and Drug Administration (FDA) maintains a system for collecting suspected medication adverse events in their Adverse Event Reporting System (AER). Patients and medical professionals may enter data regarding suspected events and these unconfirmed raw data are available for public download. In this study, we downloaded 3 years of data representing over 1 million suspected medication-related adverse events from January 2009 – December 2011. To better model the astronaut corps, cases involving individuals younger than 25 or older than 65 were removed from our analysis. Similarly, cases involving cancer, multiple sclerosis or other serious and chronic conditions were removed. Medications used in cases associated with VIIP-like symptoms were examined.

RESULTS

Figure 1. Occurrence of VIIP-like Symptoms With Suspected Link to Medication Use in the General Population

Table 1. Total occurrences of VIIP-like symptoms associated with use of each listed medication in the general population from 2009 - 2012. Data are from the FDA AER and thus, indicate occurrence of symptoms correlated with use of each medication; causality has not been confirmed. Furthermore, these data do not permit an estimate of occurrence rate, because there is no measure of total medication use or medication use without adverse events.

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