

Eye Foreign Body CLIFF Peer Review

1. *Strength of evidence presented in CLIFF in modeling the characteristics and mission impact of this medical condition within the spaceflight environment?*

Score: 3

Grading Scale:

4 - *Confident*

3 - *Somewhat confident*

2 – *Neutral*

1 – *Somewhat unconfident*

0 – *Not confident*

2. How confident are you that these data accurately represent the spaceflight environment?	Tables 1, 2 Composite Incidence and Level of Confidence	Table 3, 4 BC/WC Loss of Crew and probability	Table 4 - Clinical Phase 1, 2 durations Table 5 – CP 2 Loss of Crew	Table 4 – RTDC % Table 6 – RTDC Loss of Crew	Table 4 – Loss of Crew Life % Table 7 – Loss of Crew Life, Loss of Crew	Table 8 – TI
Score	3	3	2	3	3	3

Note: CP2 times for TWC and UTWC need to be completed.

Note: There is an inconsistency in the prose and the composite incidence rationale. The composite incidence was calculated using a reported number of spaceflight cases of 74, while the prose says that the number is 70.

Comments and limitations:

1. **General comments.** Despite filtering of circulating air, crew cabins are often contaminated with floating debris. Foreign bodies are described as being either extraocular (superficial, embedded in or above the conjunctiva, cornea, or sclera but not through these tissues) or intraocular (within the globe itself). Corneal abrasions and ulcerations can be associated with foreign bodies but are considered in another CLIFF, as are foreign bodies leading to eye infections. Thus, the definitions are a bit nebulous, especially for non-specialists who might be treating one of these conditions. Treatment of intraocular foreign bodies requires an emergent ophthalmology consult and often a surgical procedure. There are no spaceflight reports of intraocular foreign bodies or penetration of

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the globe. Data comes from LSAH reports. The best case is a foreign body that is easily removed and leaves no damage or minimal damage or a scleral laceration which has minimal effect on vision. The worst case is a penetrating or perforating foreign body resulting in ruptured globe, hyphema, corneal laceration, or other sequelae that affect vision.

2. **Incidence.** Data came from LSAH reports, and sometimes was ambiguously described, e.g. “eye debris.” However, given the unique environment of space, it was felt that the LSAH data was by far the best source. There is probably significant under-reporting of very small foreign bodies as they are often easily removed. The best case/worst case probabilities, clinical phase durations, RTDC and Loss of crew life probabilities are supported by terrestrial evidence, and I am in agreement with them. The probability density curve that was derived appears to be a reasonable representation of the data presented. It has a fairly wide standard deviation which is appropriate given the possibility of under-reporting.

3. **Clinical phase data.** I am in agreement with the clinical phase durations entered in this CLIFF. CP1 times were compiled by a team of expert clinicians, and I was involved in the discussions leading to their calculation.

4. **Task impairment.** The analysis was performed and reviewed by a separate team of expert clinicians. I am aware of the methods that were used but did not directly participate in the discussions.

5. **Dependence on mission phase or duration of mission.** This medical condition should not be dependent on mission phase.

6. Limitations

- Under-reporting for this condition could have been significant during past space missions which may result in underestimation of the incidence.
- The case definition has changed since IMM and sometimes leads to ambiguity in determining clinical phase durations. In some cases, assumptions about the terrestrial data to calculate CP2 were needed.
- In the best case definition there are varying pathologies of differing severities.
- The case definitions should be reviewed for IMPACT 2.0.

Reviewed by:

David C. Hilmers