

# Operational Morbidity Analysis: Ophthalmic Presentations During Operation Telic

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## Abstract

**Aim:** This paper analyses all ophthalmic attendances to a deployed emergency department (ED) in Iraq to identify patterns of injury to optimise patient care, plan equipment tables for future operations and emphasise need for prevention of ocular morbidity.

**Methods:** The Academic Department of Military Emergency Medicine at the Royal Centre for Defence Medicine in Birmingham maintains an electronic database with details on all attendances to the emergency departments deployed on Operations. This Operational Emergency Department Attendance Register (OpEDAR) was searched for all patients with medical classification of Ophthalmology over a 52 month period between 1 March 2003 and 30 June 2007.

**Results:** During this period 30,195 patients were seen in the ED on Operation Telic and are available for analysis. Patients with ophthalmic complaints account for 5.3% of all presentations to the ED and rank as the 7th most common reason for attendance.

**Conclusion:** This paper identifies patterns of injury to enable future planning of equipment tables and identifies the need for prevention of injury wherever possible. Implications on days lost from full active duty for the injured can be extrapolated. More data needs to be collated on the use of eye protection and the relevance of contact lenses in deployed personnel with eye injuries.

## Introduction

The potential for eye problems has been recognised as a problem particularly in the dusty environment of operations in Iraq and Afghanistan[1,2]. Knowledge of the profile of ocular morbidity presenting to the Emergency Department (ED) could assist in optimising training and planning for ongoing ophthalmic management.

The operational emergency department attendance registry (OpEDAR) was in place on Op TELIC from early 2003 and has subsequently been transferred to an electronic database maintained by the Defence Analytical Services Agency (DASA). It has been constantly developed to facilitate data input in the ED to ensure the most useful information is being captured on all patients presenting for emergency care to the ED; it is validated against other sources of casualty data and contains more than 45,000 data sets [3]. OpEDAR enables large scale data analysis to facilitate optimisation of patient care, equipment table planning for future operations and to predict casualty flow. This article explores these areas, as well as examining the potential for injury prevention, with specific regard to ophthalmic disease and injury.

## Methods

The validated OpEDAR database was analysed using Microsoft Excel software for all Role 3 Emergency Department attendances between 1 March 2003 and 30 June 2007. This was a 52 month period covering the pre-Telic phase through into Op Telic 10. The details of all patients classified as Ophthalmology were entered onto a spreadsheet; free text was analysed for each patient to obtain maximal information on the ED diagnosis.

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## Results

During the period studied, 30,195 patients were seen in the emergency department, of which 1610 (5.3%) were ophthalmic complaints making eye problems the seventh most common cause for ED attendance (Figure 1). Over time ophthalmic complaints varied between the 3rd and 9th most common cause for attendance to the ED, peaking during the height of hostilities in early 2003. The total number of ophthalmic attendances by Op TELIC phase and rates of attendance per 1000 deployed British troops are shown in Figures 2 and 3.

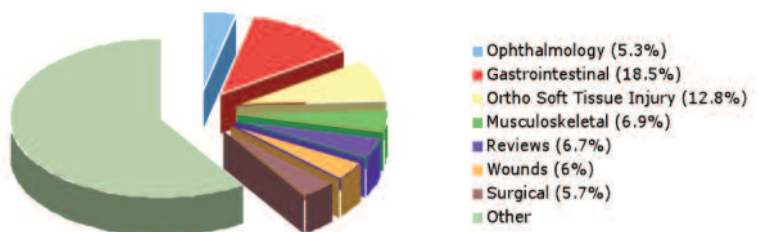


Figure 1. Common aetiology of presentations to the ED according to the classification system [4]

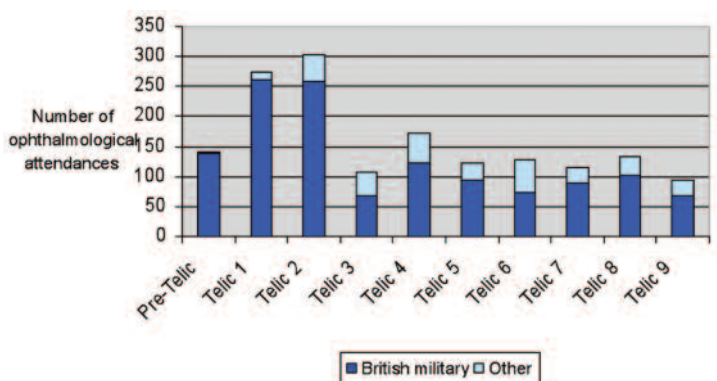


Figure 2. Total number of ophthalmological presentations to the ED by Op TELIC phase

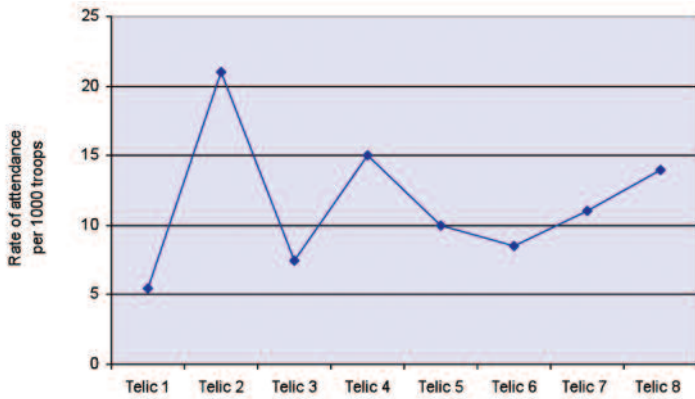


Figure 3. Rates of attendance with ophthalmic complaints per 1000 deployed British troops. Data is available for 19 March 2003-14 Nov 2006 only. Data supplied by DASA.

OpEDAR captures data on all attendances to the ED, only 79% of which are British military personnel – the breakdown of ophthalmic complaints is similar (Figure 4).

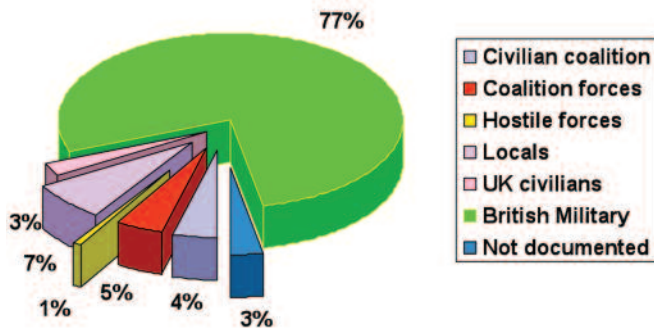


Figure 4. Ophthalmology presentations by status of the patient

The ophthalmic presentation was precipitated by hostile action, defined as injuries sustained en route to or from contact with the enemy as well as during the contact, in 22 cases (1.4%). The remainder were wounded non-enemy action 63.7% (n=1025), illness in 34.7% (n=558), and 5 cases (0.3%) were not documented.

Three quarters of all ophthalmic cases were returned to unit (RTU) (Figure 5); four patients were admitted to the Intensive Care Unit (ICU) for associated blast injuries, an associated heat illness, one systemic illness presenting with ocular symptoms and single patient listed as ‘foreign body to the eye’. The patients undergoing external transfer were diagnosed with a range of complaints included in Table 1. Analysis of the free text held on OpEDAR provided a breakdown of all ophthalmic diagnoses reached in the emergency department and identified those diagnoses requiring external transfer (Table 1). Comparisons of the most commonly made diagnoses and their disposal are illustrated in Figures 6 and 7.

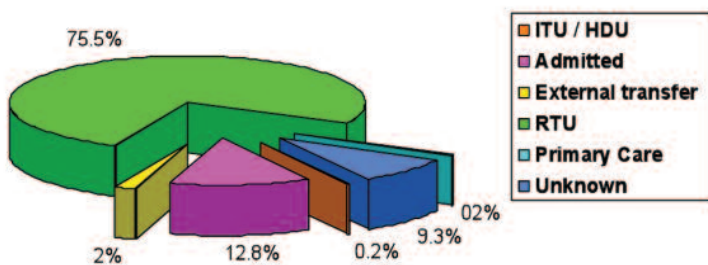


Figure 5. Disposal of ophthalmological complaints

Diagnosis	Admit	RTU	External transfer	ITU or HDU	Unknown	Total (%)
Foreign body	27	442	7	2	45	523 (32.5%)
Injury not specified	45	164	7	0	17	233 (14.5%)
Illness not specified	25	154	1	0	11	191 (11.9%)
Corneal abrasion/ulcer	11	123	2	0	32	168 (10.4%)
Conjunctivitis	16	72	1	0	11	100 (6.2%)
Chemical injury	10	50	1	0	8	69 (4.3%)
Infection not specified	9	35	1	0	4	49 (3.0%)
Stye / Meibomium cyst	0	19	0	0	6	25 (1.6%)
Iritis	10	6	3	0	0	19 (1.2%)
Keratitis	5	8	1	0	0	14 (0.9%)
Episcleritis / Scleritis	1	5	0	0	0	6 (0.4%)
Blepharitis	1	0	0	0	1	2 (0.1%)
Orbital cellulitis	7	1	0	0	0	8 (0.5%)
Thermal burns	4	4	0	0	1	9 (0.6%)
Blast injury	0	2	1	1	3	7 (0.4%)
Reduced visual acuity	12	21	2	0	3	38 (2.4%)
Red eye	4	11	1	0	0	16 (1.0%)
Painful eye	9	48	0	0	0	57 (3.5%)
Swollen eye	3	18	0	0	0	21 (1.3%)
Contact lens problem	3	5	0	0	2	10 (0.6%)
Request for spectacles/assessment	0	8	0	0	0	8 (0.5%)
Penetrating injury	2	1	3	0	1	7 (0.4%)
Orbit laceration	1	5	0	0	0	6 (0.4%)
Detached retina	1	0	2	0	2	5 (0.3%)
Subconjunctival haemorrhage	0	4	0	0	0	4 (0.2%)
Glaucoma	1	0	1	0	1	3 (0.2%)
Photophobia	1	1	0	0	1	3 (0.2%)
Central serous retinopathy	2	0	0	0	0	2 (0.1%)
Perforated globe	0	0	1	0	0	1 (0.1%)
Hyphaema	1	0	0	0	0	1 (0.1%)
Vitreous haemorrhage	1	0	0	0	0	1 (0.1%)
Cataract	1	0	0	0	0	1 (0.1%)
Retinal lesion	1	0	0	0	0	1 (0.1%)
Papilloma	0	1	0	0	0	1 (0.1%)
Strabismus	0	0	0	1	0	1 (0.1%)
TOTAL	214	1208	35	4	149	1610

Table 1. OpEDAR diagnosis of ophthalmological cases, including the eventual disposal

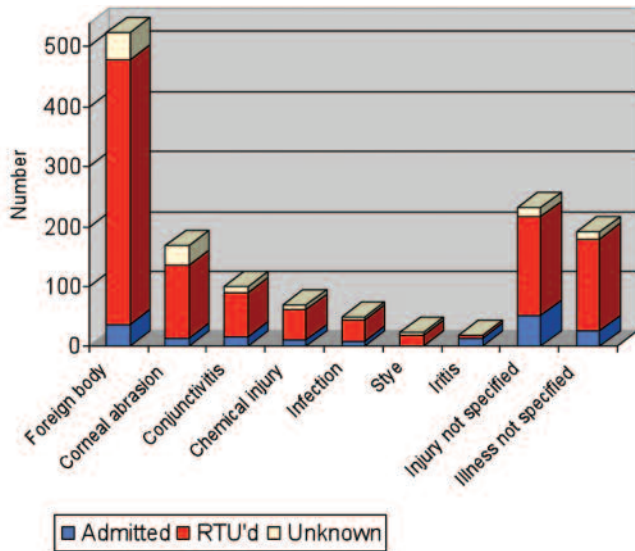


Figure 6. The commonest ophthalmological diagnoses

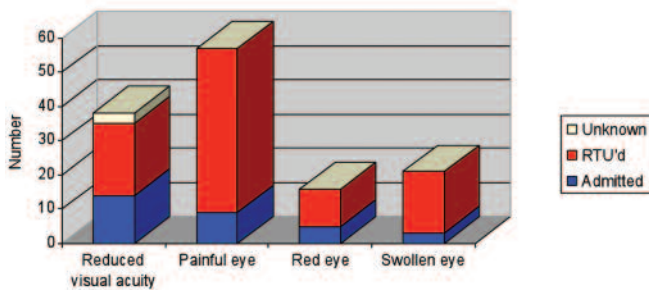


Figure 7. Non-specific diagnoses reached

Disposal from the ED was not noted in 9.3% of cases and a specific diagnosis was not reached in 26.3% of cases – these were attributed to injury or illness not specified (ns). Illness not specified also included presentations of obscure aetiology such as ‘right eye problem’. Chemical injuries included cases attributed to spillage incidents of diesel, kerosene, brake fluid, alcohol cleansing gel and carbon dioxide emitted from a fire extinguisher.

DASA analysed British military attendances by month and year from March 2003 to November 2006 to consider the influence of seasonal variation. Excluding the large initial peak during the height of hostilities in early 2003 the number of presentations has settled to a steady level with a slight trend towards fewer presentations between October and February (Figure 8). This reflects the tendency for increased attendance to the ED for all causes during the summer months, which may correlate to times when the operational tempo was historically greater.

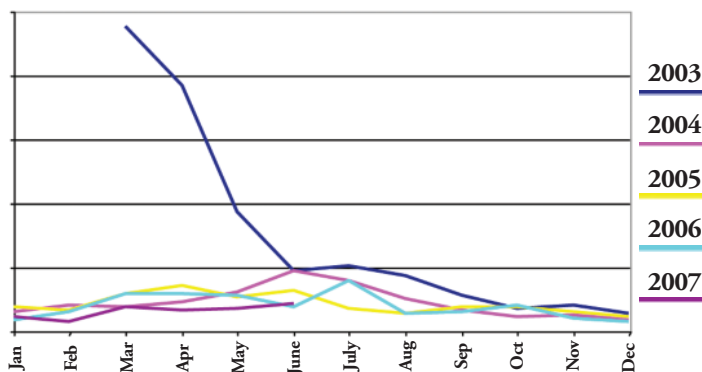


Figure 8 British military ophthalmological attendances by month and year

## Discussion

OpEDAR is a powerful tool for examining trends in ED presentations but has limitations. As with all clinical databases, the conclusions extracted depend heavily on accurate and detailed data

input in the ED. Initially the data input was often prior to a definitive diagnosis or management plan was reached, though more recently data input is completed later during the inpatient stay when more detailed and accurate information is available.

The free text does not include any history of the events leading to the presentation in the ED, so a hand search of individual patient notes would be required to extract information on mechanism of injury or use of eye protection at time of injury. The database has consequently been amended to include this information at the point of data entry. This type of background information is important as it influences the actions required to minimise future injury, the most obvious recent intervention to minimise eye injury is the standard issue of a range of specialised eye protection to all deploying personnel. Sophisticated eye protection modified for individual deployed roles eg driving or ground troops is now standard issue to all personnel deploying on operations with polycarbonate lenses in goggles and eyeshields protective against low velocity fragmentation injury (ESS Advancer V12TM goggle and the ESS ICE 2.4TM eyeshield). In future, OpEDAR data will be able to offer guidance as to whether issued eye protection is relevant to the types of ophthalmological disorders presenting to the ED, is actually being worn and whether it is offering adequate protection under all circumstances.

The classification system will miss ophthalmic presentations in multisystem injuries and all reviews of ophthalmic complaints. It is not possible to extrapolate from OpEDAR what proportion of ophthalmology cases were isolated complaints compared with part of multisystem trauma, nor to consider patterns of injury associated with ophthalmic presentation. During the period analysed the OpEDAR classification attributed reflects the principle diagnosis. OpEDAR has more recently been amended to enable the top 3 diagnoses to be listed to give a better idea of the range and patterns of associated injuries. This will facilitate listing of ocular morbidity associated with primary maxillofacial, neurological or general fragmentation injury as frequently seen in current operations in Afghanistan.

Early data collection identified the high frequency of ocular morbidity, providing evidence for provision of a slit lamp for more detailed examination of eye complaints presenting to the ED. The data gives some idea of the types of conditions needing external transfer for specialist ophthalmic advice at Role 4 in the UK. Thirty five cases (2%) are identified on the database and are detailed in Table 1. This is an underestimate of cases casevac'd from theatre during this period for ophthalmology input as it will not include other primary injury eg neurosurgical with associated eye involvement.

Extrapolation of the information in Table 1 allows us to consider the equipment required to manage ocular complaints in an operational theatre such as Iraq and to plan for the working days lost from full active duty. A worked example is considered in Box 1.

## Clinical Management

- Irrigation – 1litre Normal Saline
- Removal of identified object – 12 gauge needle
- Analgesia – amethocaine eye drops
- Antibiotics for 3 days – chloramphenicol ointment (refrigerated item)
- Dressing - eye pad
- Work Restrictions
- Inability to safely drive or handle weapon – estimated 2-3 days

## Workforce Implications

For the 523 cases identified on OpEDAR, expect over 1000 man days lost from full active service from corneal foreign bodies.

**Box 1.** A worked example of the management of corneal foreign body considering the operational planning and workforce implications. A corneal foreign body such as sand in the eye is likely to cause pain, lacrimation and reduced visual acuity.

Table 1 shows that over half of all cases can be attributed to foreign body, corneal abrasion / ulcer, conjunctivitis and infection. It is likely that the numbers of these are actually much higher due to inclusion in the non-specific diagnoses such as illness not specified. To facilitate evidence-based management of these common conditions, publication of updated treatment algorithms in the Clinical Guidelines for Operations [5] could optimise patient care. Advice can be amended when results of laboratory testing are considered for example trends of infectious agents cultured and sensitivities to antibiotics when relevant.

OpEDAR does not allow consideration of the proportion of patients needing surgery nor does it consider longer term outcomes such as the loss of sight in one or both eyes – these are Role 4 surgical datasets. Presentation of uncomplicated ocular complaints to Roles 1 and 2, and to primary care on operations is also not included in this dataset but would need to be considered to obtain the complete picture of ocular morbidity. More complex ocular complaints not responding to initial primary care at Role 1 or 2 would be included in OpEDAR due to the routine casualty evacuation chain through the emergency department at the Field Hospital and back to the UK if necessary.

Two areas that have been added to OpEDAR ophthalmic data collection are the use of contact lenses and previous refractive surgery, both of which are anecdotally suggested to contribute to ocular morbidity in the military environment, although no published evidence exists.

## Conclusions

Ophthalmic complaints are a common cause of presentation to the ED with a wide range of diagnoses ranging from sight-threatening to minor ailments. All may have an impact on provision of a fighting force as restriction of duties is required for most eye complaints so depleting a unit's capability. More research is required but this data forms a basis for initial interpretation of cases presenting to the ED during Op Telic.

## References

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