THE OPERATIONAL EMERGENCY DEPARTMENT ATTENDANCE REGISTER (OPEDAR): A NEW EPIDEMIOLOGICAL TOOL

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Abstract

Aim: To determine the number, status and nature of emergency department attendances to deployed field hospitals.

Population: All attendances to the emergency department (ED) of deployed field hospitals in support of Operation TELIC (Iraq) from initial entry war fighting to enduring operations.

Methods: Analysis of hand written and electronic registers ED attendance registers and validation with four other data sources.

Results: Validation of data held on OpEDAR against 4 other data sources shows that OpEDAR is accurate, but that accuracy can be further improved. 26,746 ED attendances recorded on OP TELIC from 19 March 2003 to 11 November 2006. 21,112 (78.9%) were UK military. Overall, 43.5% were admitted from ED. Attendances peaked during TELIC phases 2 (422.9 per 1,000 troops deployed), but have settled to around 200 per 1,000 troops deployed in the more recent phases. Ophthalmology rates peaked in TELIC 2 to 20.72 per 1,000 and have since reduced to a consistent 10 to 15 per 1,000. This suggests that preventative measures introduced for eye injury are incompletely effective or incompletely utilised.

Conclusions: OpEDAR is a clinical tool to inform manning, equipment and training requirements for enduring and new operations, focused on the requirements of the emergency department. Multivariate quality control models applied in industry could be applied to OpEDAR to produce a dynamic epidemiological tool that identifies emerging case clusters and facilitates deployed commanders to take preventative action.

Introduction: Historical Developments

The Operational Emergency Department Register (OpEDAR) was started in February 2003 by the staff of 22 Field Hospital, which deployed to support the concentration phase of British troops in Kuwait prior to war fighting in Iraq (Operation TELIC 1). Before this there was no audited record of activity within a deployed Emergency Department (ED) to guide realistic and contemporary assumptions for manning, equipment, organisational processes and training.

OpEDAR was initiated as a hand-kept record in a paper register that was completed by the duty ED doctor at the end of each ED patient episode. This facilitated a more accurate representation of the diagnosis than relying on the presenting complaint recorded by the medic or nurse in the ED Reception register. Successively deployed Emergency Medicine (EM) Consultants have delivered the doctors' parallel register created during their tour to the Academic Department of Military Emergency Medicine (ADMEM) at the Royal Centre for Defence Medicine. The ED Reception registers from serial field hospitals have historically been forwarded to the Ministry of Defence Central Health Records Library.

Data for the concentration phase (11 February-26 March 2003) and war fighting phase (27 March to 01 May 2003) of Op TELIC were independently analysed by Defence Science and Technology Laboratory in 2003 to underpin an internal casualty modelling exercise required for future manning assumptions.

Support from the Defence Analytical Services Agency (DASA) in 2006 allowed the retrospective creation of an electronic database, which coincided with the development of electronic capture of OpEDAR data in the deployed environments (Iraq and Afghanistan). Importantly, an electronic database was established at the Field Hospital in Helmand Province, Afghanistan (Operation HERRICK 4) from its inception. The database is maintained contemporaneously by the ED staff with the EM Consultant and Trauma Nurse Coordinator taking overall responsibility and providing weekly returns.

This article describes the data cleansing and validation techniques used in the creation of OpEDAR and looks at the headline results from the combined attendances recorded during OP TELIC 1-8. Future articles will examine the detail of attendances by specialty over these deployments in order to draw conclusions regarding specific prevention, training and equipment requirements.

Methods

The hand-written log books maintained by the ED doctors were

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supplied to DASA for assimilation into electronic form (MS Access); all original ED Reception registers were also obtained from the Central Health Records Library (MoD Shoeburyness) as the ED doctors' registers supplied to ADMEM were discontinuous. A coding dictionary was developed by ADMEM to allow non-medical personnel to assign medical categories according to the diagnoses recorded in the registers.

The electronic database was comprehensively cleansed serially by an experienced emergency nurse then a consultant emergency physician to ensure consistency in allocation of medical categories, especially for those patients that the database compilers had been unable to categorise. The database was then returned to DASA for further data cleansing and validation, and specifically for removal of duplicate entries, prior to analysis. DASA hold four other sources of casualty data, which were used to assess the accuracy and limitations of the data collected and its transfer to electronic form.

1. TELIC Op Loc Database:

This is obtained from single Service operation location tracking systems using service number, name and rank, and dates into and out of theatre. This dataset is not completely reliable as some personnel are missing and dates are not always accurately recorded, however matching to this will give an indication of how accurately service numbers and names are recorded.

Matching to the Op Loc data was done in 2 stages. The first match used the service numbers held in each dataset. The second used name and rank for those that had not matched in the first stage to identify typing errors.

2. Noticas:

This data set consists of casualties classified by the treating clinicians as "Seriously Ill" and "Very Seriously Ill", which results in a signal being generated and relatives being informed the patient is "listed" as "SIL" or "VSIL". The NOTICAS data set was matched with OpEDAR using the service number, rank, gender, date of incident/onset as well as the diagnosis and the mechanism of injury where appropriate. Before April 2007, no unlisted casualties (ULs) admitted to the Field Hospital were reported under NOTICAS. Since April 2007 ULs admitted for greater than 72 hrs have been routinely reported, but not those admitted for shorter periods with minor injuries/conditions. As a result not all casualties recorded on OpEDAR will have been recorded on the NOTICAS system.

3. Aeromed Data:

The Aeromed Cell at RAF Brize Norton holds the flight records of all medically evacuated personnel. Data fields held include service number, name, date of flight and diagnosis. These fields were used to match the OpEDAR records.

4. Field Hospital Data:

Admission details collected at the Field Hospital on Op TELIC are forwarded to Permanent Joint Headquarters (PJHQ, the headquarters managing all overseas UK military operations). This includes the service number, date of admission and casualty type but not name or rank of all military patients admitted to the Field Hospital. These details allowed matching to the OpEDAR database.

Results

A. Data Validation Results

(i) TELIC Op Loc Database. The OPEDAR data had 22,507 UK Military personnel records: of these 18,204 were successfully matched to Op Loc. The remaining 4,303 could not be matched as the service number was either missing or only partially recorded. The Op Loc dataset is not a definitive list of all those who have been deployed so 100% match would not be expected. Overall, this rate of matching shows that the recording of service numbers and status is fairly reliable. Improvements are expected now data is being recorded electronically and collated on a monthly basis.

(ii) NOTICAS. In total 1,016 OpEDAR records had a matching NOTICAS entry though only the more severe casualties would be expected to appear in the NOTICAS dataset. 194 casualties had enemy action/enemy fire recorded as the cause on the NOTICAS system, but 25 of these were recorded as Non-Hostile by the OpEDAR data. OpEDAR records 183 casualties with an injury due to hostile action. 14 are recorded as non-enemy action by the NOTICAS which shows the cause as friendly fire, other violence or accident. This suggests that the recording of the Hostile/Non-Hostile causes is fairly accurate, but there is room for improvement. This will be seen with the adoption of clearer hostile/non-hostile definitions and electronic recording.

(iii) Aeromed data. Patients are not evacuated by Aeromed directly from the ED. However, some patients are admitted via the ED specifically for Aeromed. The utility of matching using this data set was therefore limited.

(iii) Field Hospital data. No disposal (final destination following ED treatment) was recorded for over 1,000 attendees. Improvements in the accuracy and recording of the patient's disposal are needed.

B. Clinical Results

There were 26,746 ED attendances recorded on OP TELIC from 19 March 2003 to 11 November 2006. 21,112 (78.9%) were UK military; 1,969 (7.4%) were local civilians; 1,632 (6.1%) were coalition forces; 990 (3.7%) were coalition civilians (eg locally employed civilians); 532 (2.0%) were UK civilians (eg contractors); 365 (1.4%) were enemy prisoners of war/detainees; and for 146 (0.5%) the status was not documented. Table 2 summarizes all recorded attendances from the start of OP TELIC 1 (war fighting) to the end of OP TELIC 8 by medical classification and by the status of the attendee.

Table 3 and Fig 1 show attendances by medical classification and by each OP TELIC phase. Gastrointestinal and Orthopaedic Soft Tissue Injuries make up the majority of attendances for all phases of OP TELIC except TELIC 2 when a large number of heat casualties occurred. Musculoskeletal attendances also contribute significantly to the overall numbers. Although the numbers of cases are decreasing, the review attendances are the fourth largest contributor to all attendances in Op TELIC.

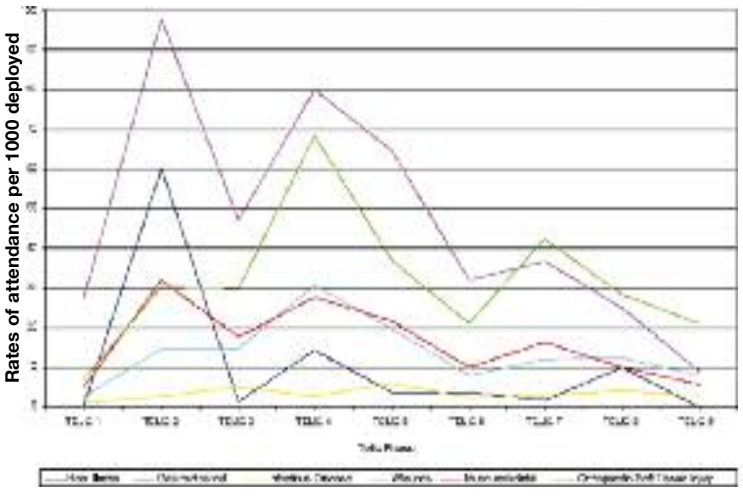

Fig 1: UK Military ED attendances by specialty and TELIC phase.

Table 4 and Figure 2 isolate UK Military attendances and analyse these by medical classification expressed in rates per thousand troops deployed. Attendances peaked during TELIC 2 (422.9 per 1,000 troops deployed) and TELIC 4 (420.7 per 1,000 troops deployed), but have settled to around 200 per 1,000 troops deployed in the more recent phases. Ophthalmology rates peaked in TELIC 2 to 20.72 per 1,000 and have since reduced to a consistent 10 to 15 per 1,000. This suggests that preventative measures are either not effective or are not being used. This is further analysed in a detailed analysis of ophthalmological attendances.

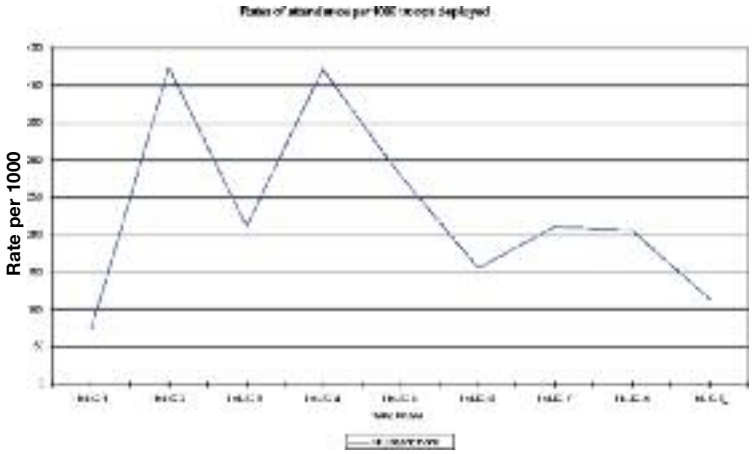

Fig 2: UK Military Rates of ED Attendance by OP TELIC Phase.

Table 5 shows the disposal of all attendees for each TELIC phase. Overall, 46.6% of patients were discharged following ED treatment and 43.5% were admitted (0.5% to mortuary; 1.5% referred to non-medical specialist outpatients, e.g. physiotherapy; 0.5% transferred directly to another hospital from ED; 7.3% disposal not recorded). This is a higher admission rate than UK civilian Emergency Departments, but reflects the nature of operations and the lower threshold for admission whilst deployed (because of the requirement for independence when returned to a unit in the field).

Fig 3 shows that rates of gastrointestinal attendances were very high in Phases 2, 4 and 5 (with 98, 80 and 65 per 1,000 attendances respectively), but have since been decreasing. This probably reflects the effectiveness of preventative measures, especially the increased emphasis that has been placed on hand hygiene around meal times.

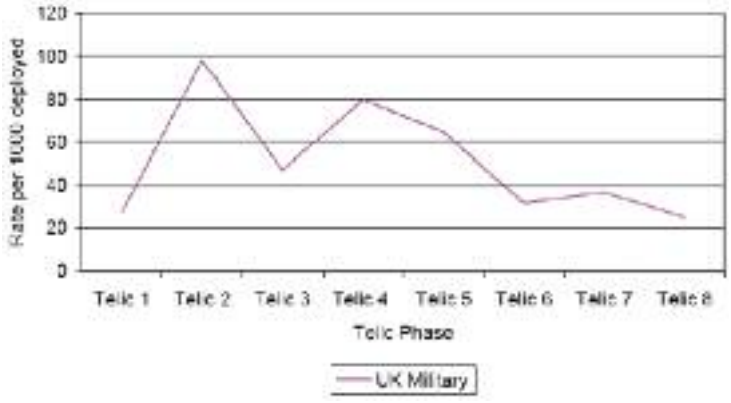

Fig 3: UK Military Attendances with Gastrointestinal disorders by TELIC phase

The rates of heat illness attendances are higher for the summer phases of TELIC as would be expected (Figure 4). In particular, TELIC 2 showed high numbers of heat injuries at 60 per thousand troops deployed. The roulement between TELIC 1 and TELIC 2 took place during the height of the summer to relieve those troops that had taken part in the invasion of Iraq. The consistent reduction in the incidence of heat illness subsequent to TELIC 2 shows the efficacy of acclimatisation measures and training in prevention of the condition, enforced through the chain of command by Permanent Joint Headquarters (PJHQ). Subsequent roulements have been scheduled for spring and autumn periods.

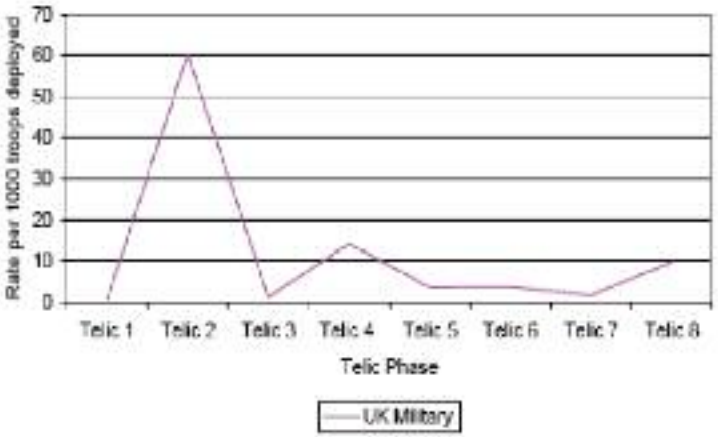

Fig 4: UK Military attendances with Heat Injury by TELIC phase

A sub-analysis has been undertaken for the war fighting period (27 March 2003 to 01 May 2003) for all patients attending ED of the forward based field hospital in Iraq (34 Field Hospital, Shaibah Air Base). There were 2382 attendances and 57.3% were admitted. 67.6% of admissions were 'medical'. There were 7 deaths in ED (1 military); 2 further cases brought to ED were dead on arrival. 4 ED deaths were related to 'battle injuries', and 3 to total body surface area burns. 89% (2120) were coalition forces, 7% (167) were local civilian, and 4% (95) were enemy prisoners of war. 78 patients were children. There were 107 'battle injuries' (9% blast, 57% gunshot, 34% shrapnel; 26% military, 27% civilian, 47% EPW) that accounted for 6.9% of all admissions. There were 73 patients with burns; 18 (25%) were military and 53 (72%) were local civilian. The majority of admissions (777, 58.6%) were for gastroenteritis: this figure is an underestimate of total diarrhoea and/or vomiting admissions as cases were streamed directly to the infectious disease assessment area after 20 Apr 03 and were not recorded in the ED doctors' register. 279 personnel from 34 Field Hospital attended ED as patients, accounting for 15.9% of military attendances.18.2% of total attendances were classified as 'primary care'.

By contrast, in the concentration phase in Kuwait preceding war fighting there were 1126 attendances to the ED of 22 Field Hospital (Camp Coyote), with 41.9% admitted and 58.1% returned to unit.

Operational phase	Start date	End date
TELIC 1	19 March 2003	28 April 2003
TELIC 2	29 April 2003	03 November 2003
TELIC 3	04 November 2003	28 April 2004
TELIC 4	29 April 2004	01 November 2004
TELIC 5	02 November 2004	01 May 2005
TELIC 6	02 May 2005	31 October 2005
TELIC 7	01 November 2005	09 May 2006
TELIC 8	10 May 2006	14 November 2006

Table 1: Operation TELIC Phases

Classification	All		UK Military		Coalition Forces		UK Civilian		Coalition Civilian		Local		POW		Not Documented	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
All	26 746	100	21 112	100	1 632	100	532	100	990	100	1969	100	365	100	146	100
Allergy/Anaphylaxis	82	0.3	67	0.3	6	0.4	2	0.4	5	0.5	2	0.1	-	-	-	-
Bite/Sting	452	1.7	371	1.8	25	1.5	18	3.4	19	1.9	15	0.8	-	-	4	2.7
Burns	463	1.7	242	1.1	18	1.1	22	4.1	24	2.4	148	7.5	9	2.5	-	-
Cardiology	469	1.8	270	1.3	30	1.8	11	2.1	58	5.9	78	4.0	18	4.9	4	2.7
Dead	127	0.5	63	0.3	12	0.7	4	0.8	17	1.7	23	1.2	3	0.8	5	3.4
Dental	268	1.0	217	1.0	15	0.9	5	0.9	11	1.1	16	0.8	2	0.5	2	1.4
Dermatology	713	2.7	618	2.9	41	2.5	10	1.9	22	2.2	15	0.8	1	0.3	6	4.1
Ear/Nose/Throat	543	2.0	451	2.1	30	1.8	8	1.5	31	3.1	19	1.0	2	0.5	2	1.4
Endocrinology	36	0.1	21	0.1	1	0.1	1	0.2	3	0.3	4	0.2	6	1.6	-	-
Gastrointestinal	5 291	19.8	4 915	23.3	120	7.4	83	15.6	63	6.4	74	3.8	9	2.5	27	18.5
Genitourinary	231	0.9	205	1.0	14	0.9	3	0.6	2	0.2	6	0.3	1	0.3	-	-
Obstetrics/Gynaecology	104	0.4	83	0.4	14	0.9	2	0.4	1	0.1	3	0.2	-	-	1	0.7
Heat Illness	1 176	4.4	1 065	5.0	62	3.8	7	1.3	11	1.1	19	1.0	4	1.1	8	5.5
Infectious Disease	331	1.2	272	1.3	15	0.9	5	0.9	15	1.5	21	1.1	-	-	3	2.1
Maxillofacial	168	0.6	122	0.6	18	1.1	4	0.8	10	1.0	6	0.3	5	1.4	3	2.1
Medical NFS	1 382	5.2	932	4.4	104	6.4	34	6.4	74	7.5	208	10.6	26	7.1	4	2.7
Multiple Injuries	198	0.7	101	0.5	27	1.7	1	0.2	15	1.5	45	2.3	9	2.5	-	-
Musculoskeletal	1 830	6.8	1 501	7.1	107	6.6	40	7.5	65	6.6	102	5.2	6	1.6	9	6.2
Neurology	324	1.2	227	1.1	24	1.5	7	1.3	20	2.0	37	1.9	8	2.2	1	0.7
Neurosurgery	403	1.5	287	1.4	19	1.2	13	2.4	21	2.1	56	2.8	4	1.1	3	2.1
Ophthalmology	1 362	5.1	1 065	5.0	76	4.7	33	6.2	54	5.5	115	5.8	11	3.0	8	5.5
Orthopaedic Fracture /Dislocation	981	3.7	685	3.2	120	7.4	16	3.0	43	4.3	91	4.6	19	5.2	7	4.8
Orthopaedic Soft tissue Injury	3 337	12.5	2 586	12.2	258	15.8	62	11.7	109	11.0	242	12.3	63	17.3	17	11.6
Psychiatry	406	1.5	368	1.7	19	1.2	3	0.6	6	0.6	8	0.4	1	0.3	1	0.7
Renal/Urology	511	1.9	401	1.9	45	2.8	9	1.7	18	1.8	27	1.4	9	2.5	2	1.4
Respiratory	389	1.5	263	1.2	42	2.6	12	2.3	21	2.1	39	2.0	11	3.0	1	0.7
Review	1 768	6.6	1 305	6.2	113	6.9	48	9.0	92	9.3	185	9.4	17	4.7	8	5.5
Rheumatology	123	0.5	88	0.4	22	1.3	4	0.8	6	0.6	3	0.2	-	-	-	-
Surgical	1 474	5.5	1 038	4.9	128	7.8	32	6.0	66	6.7	136	6.9	62	1.7	12	8.2
Wounds	1 585	5.9	1 123	5.3	96	5.8	29	5.5	81	8.2	205	10.4	44	12.1	7	4.8
Not Documented	219	0.8	160	0.8	11	0.7	4	0.8	7	0.7	21	1.1	15	4.1	1	0.7

Table 2: Classification by Status

Discussion

OpEDAR provides for the first time a clinically credible and verifiable method of providing data about injury and illness rates presenting at the Field Hospital on operations. This has facilitated epidemiological questions to be answered from parliamentarians, DMS chain of command and individual clinicians.

The deployed emergency department (ED) is an important component in maintaining the fighting force, with >40% attendances returned to their units during war fighting: the ability to return fewer troops to units during the combat phase (compared to the concentration phase) results from a combination of geographical convenience, tactical considerations and the reality of being able to function independently as a soldier at field unit level with even relatively minor illness or injury.

Battle injuries are a numerically small (<0.05%) although resource intensive component of the work of the deployed ED. Major trauma (an Injury Severity Score ≥16) constituted only 0.01% of the overall numerical casualty load at 34 Field

Classification	All	TELIC 1	TELIC 2	TELIC 3	TELIC 4	TELIC 5	TELIC 6	TELIC 7	TELIC 8
	N	N	N	N	N	N	N	N	N
All	26 746	4 018	6 044	2 476	4 517	3 385	2 239	2 120	1 947
Allergy/Anaphylaxis	82	24	20	4	7	5	7	8	7
Bite/Sting	452	68	104	35	73	46	47	38	41
Burns	463	114	74	37	116	40	33	26	23
Cardiology	469	45	83	50	91	79	45	51	25
Dead	127	20	30	12	16	6	14	10	19
Dental	268	44	59	29	50	26	11	28	21
Dermatology	713	122	263	48	80	59	42	48	51
Ear/Nose/Throat	543	84	120	36	96	58	50	49	50
Endocrinology	36	7	12	1	4	5	2	1	4
Gastrointestinal	5 291	1 306	1 262	451	757	664	331	314	206
Genitourinary	231	56	81	7	19	19	18	16	15
Obstetrics/Gynaecology	104	24	38	2	8	5	15	5	7
Heat Illness	1 176	40	778	14	149	37	59	18	81
Infectious Disease	331	47	38	52	33	64	29	31	37
Maxillofacial	168	21	20	16	35	26	18	16	16
Medical NFS	1 382	105	341	129	242	182	108	94	95
Multiple Injuries	198	41	28	25	40	20	11	15	18
Musculoskeletal	1 830	236	448	207	285	276	139	149	90
Neurology	324	47	79	17	42	51	25	34	29
Neurosurgery	403	59	58	36	63	73	41	26	47
Ophthalmology	1 362	274	303	108	173	123	128	116	137
Orthopaedic Fracture /Dislocation	981	122	121	112	158	160	140	69	99
Orthopaedic Soft tissue Injury	3 337	404	467	335	711	462	298	407	253
Psychiatry	406	72	117	61	48	25	29	15	39
Renal/Urology	511	72	115	36	105	70	42	25	46
Respiratory	389	54	72	34	64	66	44	23	32
Review	1 768	54	260	201	329	303	226	233	162
Rheumatology	123	13	26	12	15	22	11	7	17
Surgical	1 474	193	283	134	326	158	127	113	140
Wounds	1 585	175	240	207	334	237	136	128	128
Not Documented	219	45	87	11	27	17	13	7	12

Table 3: All Attendances by OP TELIC Phase

Hospital during war fighting: yet this ostensibly remains the core focus of the hospital and culturally its main reason for existence.

OpEDAR does not replace the current monitoring procedures, but acts as an additional source of information. Analysing Primary Health Care attendances is also an important part of force protection and regeneration; however, it has been difficult to separate Primary and Secondary Health Care under the previous systems.

OpEDAR has generated statistics for Killed in Action (KIA), Died of Wounds (DOW) and Wounded in Action (WIA). Superficially, the US ratio of WIA to KIA appears more favourable: but this is a function of using a different denominator. US statistics include soldiers sustaining minor injuries that are treated at Role 1 and do not require ED attendance; UK figures have relied on the OpEDAR data to identify WIA.

OpEDAR allows a detailed interrogation of attendances by medical specialty. The importance, for example, of being able to conduct an eye examination with a slit lamp in the ED is demonstrated by the number and variety of ophthalmological attendances: previously, the argument to support the provision

Classification	TELIC 1		TELIC 2		TELIC 3		TELIC 4		TELIC 5		TELIC 6		TELIC 7		TELIC 8	
	N	Rate/ 1000	N	Rate/ 1000	N	Rate/ 1000	N	Rate/ 1000	N	Rate/ 1000	N	Rate/ 1000	N	Rate/ 1000	N	Rate/ 1000
All	3 422	74.39	5 287	422.9	1 883	211.6	3 450	420.7	2 561	278.4	1329	156.4	1696	212.0	1484	206.1
Allergy/Anaphylaxis	23	0.50	19	1.52	3	0.34	5	0.61	3	0.33	3	0.35	8	1.00	3	0.42
Bite/Sting	62	1.35	88	7.04	28	3.15	61	7.44	38	4.13	34	4.00	28	3.50	32	4.44
Burns	42	0.91	42	3.36	15	1.69	73	8.90	24	2.61	15	1.76	18	2.25	13	1.81
Cardiology	30	0.65	62	4.96	20	2.25	45	5.49	43	4.67	20	2.35	36	4.50	14	1.94
Dead	8	0.17	18	1.44	4	0.45	9	1.10	1	0.11	4	0.47	6	0.75	13	1.81
Dental	42	0.91	47	3.76	22	2.47	42	5.12	19	2.07	5	0.59	25	3.13	15	2.08
Dermatology	111	2.41	240	19.20	45	5.06	69	8.41	47	5.11	20	2.35	44	5.50	42	5.83
Ear/Nose/Throat	76	1.65	110	8.80	28	3.15	80	9.76	48	5.22	30	3.53	36	4.50	43	5.97
Endocrinology	2	0.04	11	0.88	0	0	2	0.24	4	0.43	1	0.12	1	0.13	0	0
Gastrointestinal	1273	27.67	1224	97.92	420	47.19	656	80.00	596	64.78	271	31.88	295	36.88	180	25.00
Genitourinary	56	1.22	77	6.16	4	0.45	17	2.07	15	1.63	10	1.18	15	1.88	11	1.53
Obstetrics/Gynaecology	21	0.46	26	2.08	2	0.22	6	0..73	5	0.54	13	1.53	4	0.50	6	0.83
Heat Illness	34	0.74	751	60.08	12	1.35	117	14.27	34	3.70	32	3.76	14	1.75	71	9.86
Infectious Disease	44	0.96	33	2.64	44	4.94	21	2.56	56	6.09	21	2.47	23	2.88	30	4.17
Maxillofacial	12	0.26	14	1.12	13	1.46	30	3.66	20	2.17	8	0.94	13	1.63	12	1.67
Medical NFS	86	1.87	288	23.04	95	10.67	163	19.88	117	12.72	50	5.88	63	7.88	70	9.72
Multiple Injuries	11	0.24	17	1.36	14	1.57	28	3.41	9	0.98	8	0.94	6	0.75	8	1.11
Musculoskeletal	227	4.93	399	31.92	159	17.87	226	27.56	200	21.74	86	10.12	132	16.50	72	10.00
Neurology	33	0.72	71	5.68	12	1.35	31	3.78	30	3.26	14	1.65	19	2.38	17	2.36
Neurosurgery	44	0.96	44	3.52	31	3.48	41	5.00	52	5.65	16	1.88	21	2.63	38	5.28
Ophthalmology	262	5.70	259	20.72	68	7.64	122	14.88	95	10.33	73	8.59	88	11.00	98	13.61
Orthopaedic Fracture /Dislocation	84	1.83	95	7.60	87	9.78	109	13.29	113	12.28	61	7.18	55	6.88	81	11.25
Orthopaedic Soft tissue Injury	318	6.91	379	30.32	265	29.78	562	68.54	340	36.96	178	20.94	339	42.38	205	28.47
Renal/Urology	59	1.28	98	7.84	25	2.81	80	9.76	56	6.09	25	2.94	21	2.63	37	5.14
Respiratory	43	0.93	63	5.04	22	2.47	38	4.63	44	4.78	17	2.00	18	2.25	18	2.50
Review	47	1.02	213	17.04	138	15.51	252	30.73	228	24.78	155	18.24	162	20.25	110	15.28
Rheumatology	11	0.24	17	1.36	11	1.24	13	1.59	16	1.74	1	0.12	5	0.63	14	1.94
Surgical	143	3.11	216	17.28	95	10.67	235	28.66	95	10.33	69	8.12	86	10.75	99	13.75
Wounds	121	2.63	184	14.72	132	14.83	252	30.73	181	19.67	68	8.00	96	12.00	89	12.36
Not Documented	27	0.59	72	5.76	10	1.12	20	2.44	10	1.09	6	0.71	6	0.75	9	1.25

Table 4: UK Military Rates of Attendance (per Thousand Troops Deployed) by TELIC Phase and Classification

of such equipment and the requirement for pre-deployment experience could only be based on anecdotal evidence. Detailed sub-analysis of each specialty group is required. The opportunity exists to identify the standardised treatment for each condition encountered (and specifically the consumables, drugs used in the department and prescribed drugs to take out) and use this to construct a reliable prediction of stock consumption to inform initial stock levels for early entry operations.

Like all data collection systems, OpEDAR has weaknesses. In part, these relate to its genesis as hand-written registers that did not capture all the data fields that are now perceived to be required. The quality of data recorded in the early registers is variable in its scope and clinical diagnostic accuracy. This has been corrected by the use of an electronic data base with mandatory fields and weekly reports returned to ADMEM through PJHQ.

OpEDAR has been constructed for clinical reasons in the expectation that accurate data relating to the number and nature of ED attendances will positively influence future deployed care by informing manning, training and equipment. The utility of providing supportive data to answer ministerial and parliamentary questions on casualty demographics is a secondary benefit and is not the principal driver.

Classification	All		TELIC 1		TELIC 2		TELIC 3		TELIC 4		TELIC 5		TELIC 6		TELIC 7		TELIC 8	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
All	26746	100	4018	100	6044	100	2476	100	4517	100	3385	100	2239	100	2120	100	1947	100
Admit	11321	42.3	2306	54.7	2942	48.7	1101	44.5	1796	39.8	1336	395	504	22.5	608	28.7	728	37.4
Admit ITU	320	1.2	28	0.7	74	1.2	34	1.4	72	1.6	47	14	15	0.7	21	1.0	29	1.5
External Transfer	143	0.5	27	0.7	26	0.4	9	0.4	34	0.8	25	07	12	0.5	5	0.2	5	0.3
Professions Allied to Medicine	413	1.5	19	0.5	30	0.5	11	0.4	16	0.4	5	01	14	0.6	10	0.5	19	1.0
Mortuary	124	0.5	56	1.4	82	1.4	27	1.1	79	1.7	72	21	47	2.1	30	1.4	20	1.0
RTU	12463	46.6	1395	34.7	2780	46.0	1234	49.8	1756	38.9	1768	522	966	43.1	1422	67.2	1142	58.7
Not Documented	1962	7.3	187	4.7	110	1.8	60	2.4	764	16.9	132	39	132	30.4	24	2.2	4	0.2

Table 5: Disposal of all Attendances by TELIC Phase

The opportunity also exists for OpEDAR to provide near real-time epidemiological support to deployed commanders and to recognize trends as they emerge on a week by week, or even day by day, basis. This would require weekly guaranteed electronic returns as a minimum or, more effectively, real time electronic individual patient returns to a central repository with automated unusual event reporting.

The manufacturing industry widely adopts the statistical process control approach in order to identify products that fall outside predetermined specification limits. These are documented on a Shewart control chart. Such special causes fall ≥3 standard deviations from the process mean. A special cause of a clinical case cluster could similarly be identified from a rise above 3 standard deviations from the predetermined mean attendance rate for key conditions such as gastroenteritis, heat illness, corneal injury or sports related injury in other words, conditions where preventative health measures can clearly be taken by deployed commanders. Should such an approach be adopted, additional multivariate quality control tools exist (cumulative sum charts; exponentially weighted moving average) that could be applied to OpEDAR to assist epidemiological monitoring.

Conclusion

OpEDAR has been designed as a clinical tool to inform manning, equipment and training requirements for enduring and new operations, focused on the requirements of the emergency department. The robustness of the process has improved with transferring from hand written registers to an electronic register.

There is an opportunity to develop a more dynamic epidemiological function and to use OpEDAR to highlight clinical case clusters that may demand preventative action by deployed commanders, and to monitor the effectiveness of intervention. This requires the importance of OpEDAR to be promoted organisationally in order to both instil the necessary culture for accurate data collection and to establish the necessary resource framework that will facilitate application of multivariate quality control techniques to real-time electronic data capture.

References

Lowry CA, Montgomery DC. A review of multivariate control charts. IIE Transactions 1995; 27(6): 800-810.