

A Review Of 10 Years Of Systematic Health Surveillance In The Army

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ABSTRACT

Health and morbidity reporting has been an important feature of the historical assessment of military campaigns from times of antiquity. Most of these reports have concentrated on hospital admission rates and mortality. In 1994 the British Army introduced a primary care health surveillance reporting system called J94. This provided the first opportunity for the systematic capture and analysis of morbidity data that allowed the identification of disease trends and the audit of remedial action. In parallel with the developments made by the military in the field of health surveillance, a number of initiatives in the NHS tried to develop real time surveillance systems with differing degrees of success.

This paper reviews the developments made by military and civilian programs, identifies the problems that have been faced, areas where success has been achieved and the issues that will have to be considered as we prepare for the introduction of the next generation of IT based medical information systems into the military.

Key Words: Morbidity, Surveillance, Primary, Care.

Introduction

Many military campaigns in history have been accompanied by records of the privations and sickness experienced by the troops from both sides. It could be claimed that current perspectives on preventive medicine in the British Army are the direct result of the epidemiological evidence of the failure to prevent the effects of infectious diseases such as dysentery during the Crimean campaign (1). Statistics on hospital activity and deaths from battle injury, non-battle injury and disease are available from public records for the Boer War (2), the First World War (3) and Second World War (4).

Health surveillance in primary care in the Army was transformed in 1994 by the introduction of a monthly, paper-based, morbidity return from all medical centres based on ICD coding. Called J94, this system allowed the aggregation of data on the attendance, referral and time off work for all episodes of ill-health seen in medical centres across the Army (5). The system has had two

modifications, J95 and J97, to reflect changes in ICD coding and outcome data and although there have been problems with the detailed collection and collation of data, the aggregated figures have rejuvenated the attention of the Chain of Command towards health.

It is ten years since this system was introduced and, with the imminent introduction of the Defence Medical Information Capability Programme (DMICP), it is felt timely to review the lessons identified from the Army's experiences and place these into the broader context of what has been achieved in the National Health Service (NHS) in the field of primary care morbidity surveillance. The aim of this paper is to review some of the uses and developments of the data generated by primary care morbidity surveillance in the British Army and the National Health Service (NHS) and identify areas for future development. The paper will also include previously unreported health surveillance data from the Balkans for the period 1999-2000.

MORBIDITY SURVEILLANCE IN THE ARMY

Health Surveillance In-Barracks

Up to the introduction of J94, there was systematic gathering of morbidity data with medical centres making returns on the numbers of Respiratory, Alimentary, Skin, Infection and Other diagnoses made during the recording period and submitting them to higher headquarters. There was never a process to aggregate such data for health service management. Based on the experience of a pilot project in Germany, Jefferson *et al* suggested the J94 system could do more than gather primary care morbidity data and could be used for strategic level reports on the health of the Army as the foundation data for needs assessment, trend analysis, justification for resource allocation and audit. The pilot programme was expanded to cover the whole Army from 1 July 1996. This system provided the first ever analysis of primary care activity and ill-health in the Army and introduced the concept of working days lost as a measure of the impact of ill-health on the Army's output (7).

J97 is the latest release of the original morbidity surveillance system. It is used to

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gather routine data in the home base and on operations and exercises. First attendances, subsequent attendances, referral and disposal data are all categorised by ICD 9 disease groups on a single A4 sheet of paper by individual Army primary care centres on a monthly basis. These are then submitted directly for analysis at the strategic level by the Army Medical Directorate (AMD). These data have formed a component for the evidence to support recommendations made by the Director General Army Medical Services in the Annual Report on the Health of the Army since 1997 (8). These health surveillance data have consistently shown that injuries, respiratory disease, musculoskeletal disease, knee and joint problems and back problems are the main cause of first attendance and working days lost. Furthermore, Army training establishments have the highest rates of ill-health followed by overseas commands.

Data Processing

Useful as J97 has been at demonstrating adverse trends and the efficacy of remedial action at the strategic level, it is a fact that data are only regularly published annually and then only on a limited distribution. This perceived lack of timely, relevant and focused analysis of data at the local level has led to feelings of lack of inclusion in the J97 process and a subsequent lack of personal incentive to invest the time and thought into gathering data accurately. Indeed, it has been observed that the only stimulus to encourage good compliance with reporting timelines involves negative reinforcement in the guise of some form of rebuke from higher authorities. In addition it has been reported, anecdotally, that in its current paper based and manual recording format, the J97 system represents an unwelcome addition to practice administration.

The Information Technology (IT) that has been used since the inception of J94, and its subsequent releases, has not been as successful at information gathering as had been hoped and attempts to build an automated data gathering process into the medical information systems in use in general practices have not been successful.

Forthcoming developments in IT have the potential to revolutionise the way routine medical data are gathered for surveillance purposes. However IT barriers also remain a significant threat to the J97 program. The DMICP medical information system is likely to remain EMIS based and, as yet, there is no capability automatically to gather routine data for morbidity surveillance. At the operational level, the BOWMAN digitization program will see changes in the speed and security with which tactical level data will be transmitted. However, it remains unclear how tactical medical information systems will communicate with BOWMAN systems.

Health Surveillance On Operations And Exercises

In parallel with the core function of routine, in-barracks primary care data collection for high-level analysis, the J97 system has been used to collect primary care morbidity data in other military environments. The first formal use of the J95 system was on Op RESOLUTE in Bosnia in 1996 when the daily number of consultations for a defined range of medical conditions was reported (9). This system was refined to include the full J95 outcome codes and the diagnostic codes were adjusted to reflect specific conditions of interest to the operational commanders (10). The disease coding system was also used to construct a secondary care reporting system for UK military patients in Bosnia. This used a series of outcome categories suitable for hospital patients (11). J95 reporting was formally extended to cover all overseas operations and exercises at the end of 1996 and for the first time, provided a means to compare Disease and Non-Battle Injury (DNBI) rates for military activities between different operational and geographical environments (12). NATO adopted J95 for its own use in the form of EpiNATO in 1996 (13). The 22nd Quadripartite Working Group on Health Service Support for the American, British, Canadian and Australian (ABCA) coalition endorsed a health surveillance system based on the EpiNATO system in 1999 (14).

The success of the application of the J95 structure for military health surveillance led to a paper by Hawley that discussed the wider application of these principles into the formal estimate process for military operations (15). Bricknell expanded these ideas and proposed the integration of other health surveillance systems such as incident reports and secondary care data sets into a holistic military health surveillance programme (16).

J97 has also been used in a small area context, to analyse specific exposures such as the effect on respiratory disease burden of the British military population in Brunei by the Indonesian and Malaysian forest fires and concluded that the system was adaptable enough to be used as rapid population based health surveillance system that could also generate reports in a timely and accessible format (17).

HEALTH SURVEILLANCE DATA FROM THE BALKANS JUNE 1999-MAY 2000

The Permanent Joint Headquarters in Northwood (PJHQ) commands all UK forces deployed overseas on operations and thus it was appropriate for this headquarters to own health surveillance on operations.

From 1998, PJHQ took over the receipt and analysis of J97 returns for operational deployments from AMD. In 1999 the UK was committed to enduring operations in Bosnia and also undertook an operation to halt ethnic cleansing by the Serbs in Kosovo. The following figures compare the data from these two operations for 1999 and 2000 and demonstrate differences in the epidemiology of primary care utilization between the early phases of an intervention operation and an enduring operation. Operations in Bosnia are titled MND(SW) to reflect the fact that UK commanded the Multi-National Division (South-West) and operations in Kosovo are titled MNB(C) to reflect the UK command of the Multi-National Brigade (Centre).

The data from the figures below have been derived from the returns from Kosovo (MNB(C)) and Bosnia (MND(SW)) over the period June 1999 to May 2000. Figure 1 below shows the data for first attendances for all diseases for the year. It can be seen that there was little difference in the rate of first attendances for all diseases across the 2 theatres which were comparable in terms of ground, population demographics, environmental and operational risks and reporting compliance. This would indicate a high degree of validity in the J97 data collection process.

The validity of the process is also supported when looking at more detailed data such as that for ophthalmic conditions in Figure 2. There is little scope for diagnostic miscoding – an eye problem being difficult to confuse with anything else – and the convergence of the data after the initial force build up at the beginning of the year in Kosovo, allows us to conclude that in a population with similar demographics, similar living conditions, similar operational risks and high levels of reporting compliance, if there is an apparent difference in presentation rate, this difference is likely to exist and acts as an indicator to investigate the situation further.

Figure 3 shows rates of non-battle injury. This category covers all injuries except those caused by hostile acts and usually reflects sporting injuries and accidents. It is interesting to note how closely each theatre mirrors the other, despite the fact that in MNB(C) the force remained balanced for peace enforcement operations. The figures perhaps serve to support the deduction that even in a potentially hostile environment, general fitness training, including organized sports, remains a central component of military activity.

The rates of reporting for respiratory illness are shown in Figure 4. These showed the expected seasonal swings and further emphasizes the utility of using J97 to map disease trends.

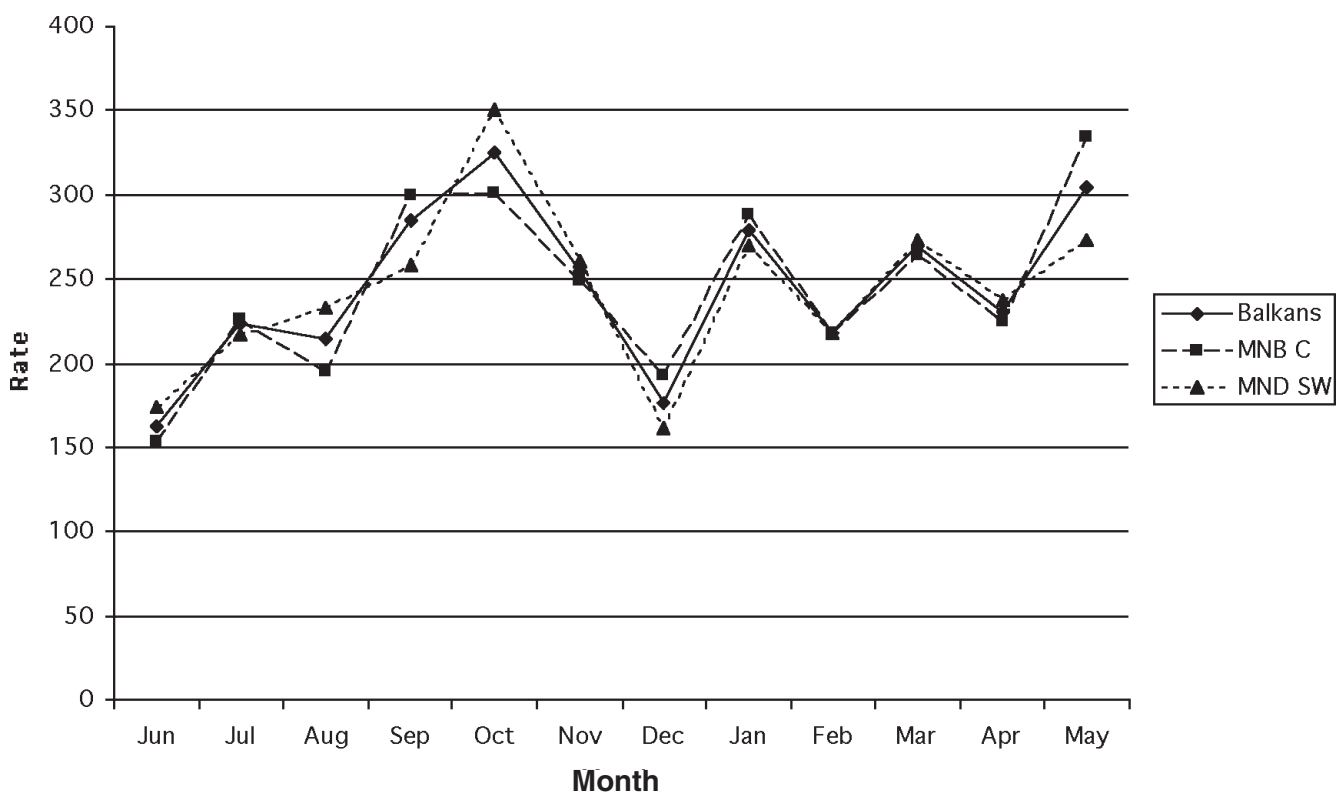


Fig 1. Total Disease and Non Battle Injury First Presentation Rates Per 1000 Personnel Per Month 1999-2000.

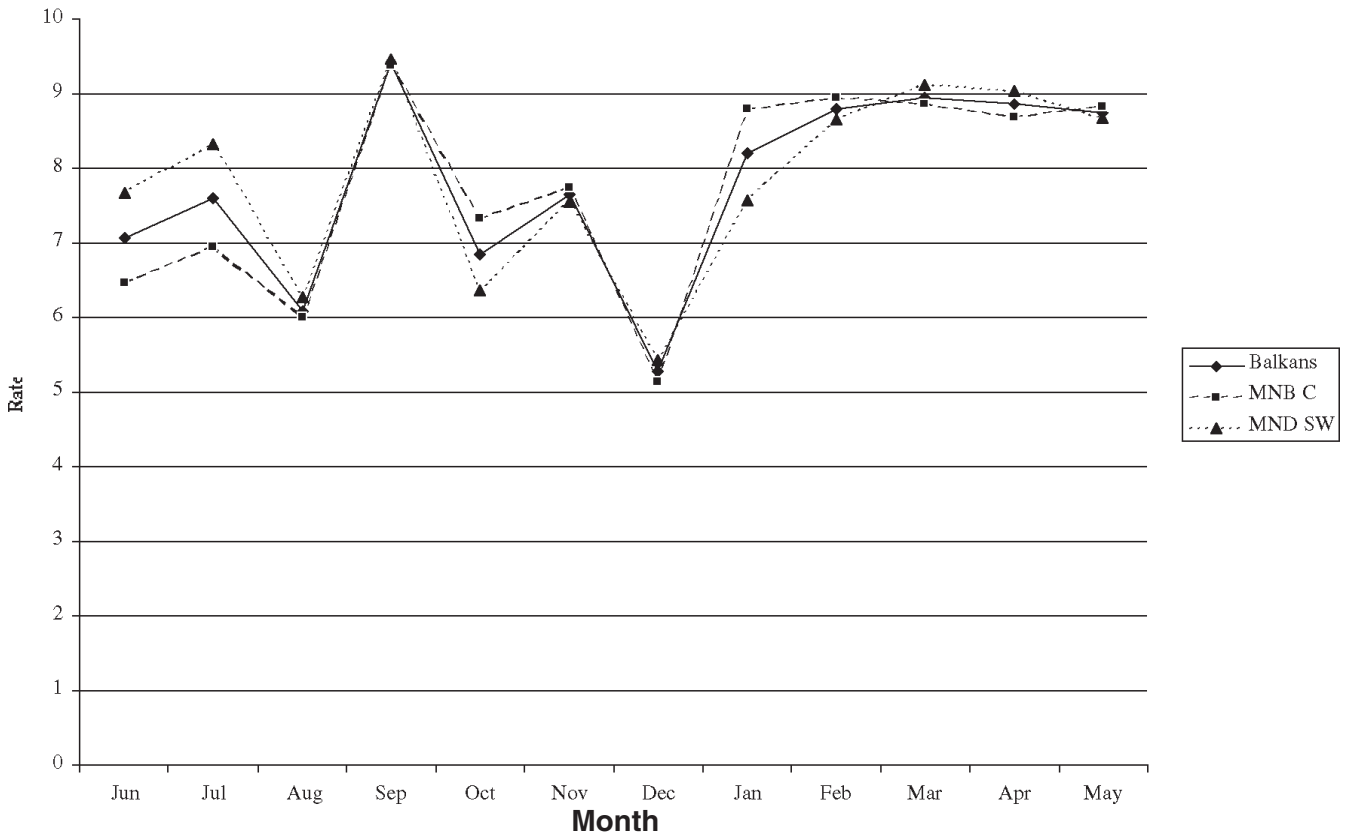


Fig 2. Ophthalmic Conditions First Presentation Rates Per 1000 Personnel Per Month 1999-2000.

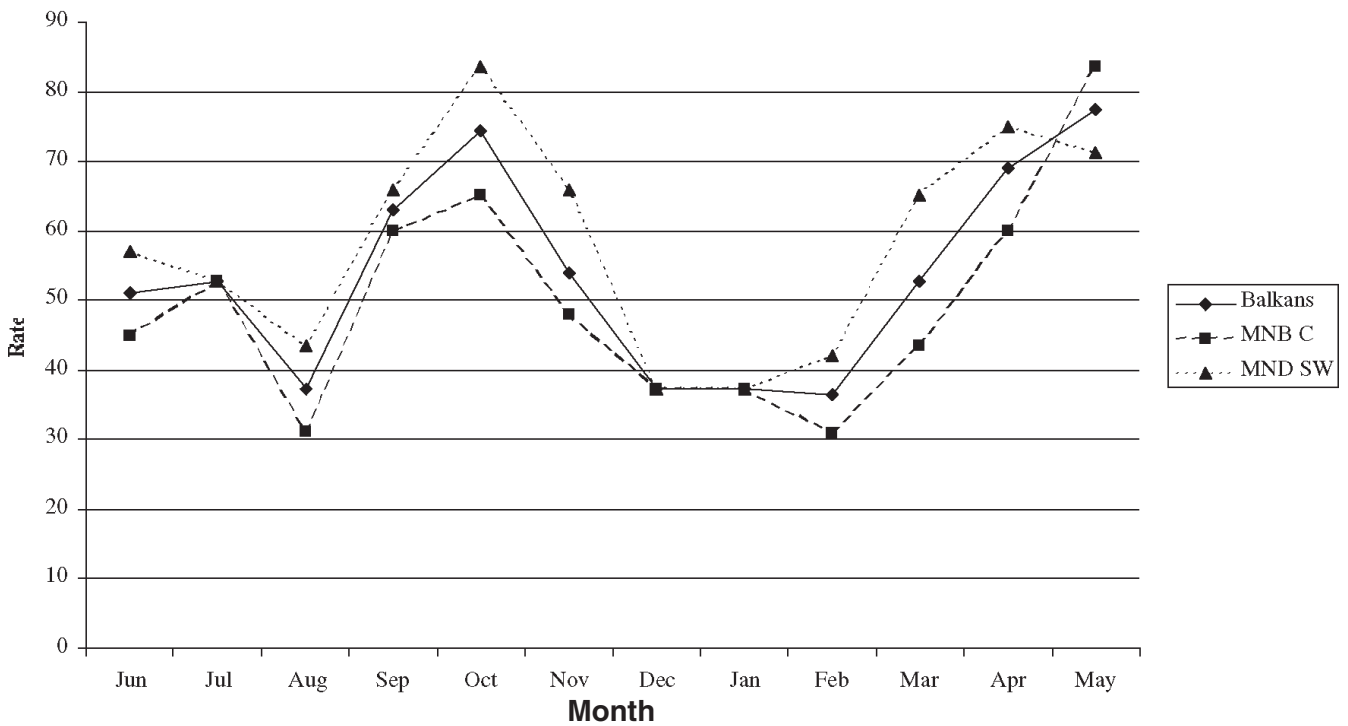


Fig 3. Non Battle Injury First Presentation Rates Per 1000 Personnel Per Month 1999-2000.

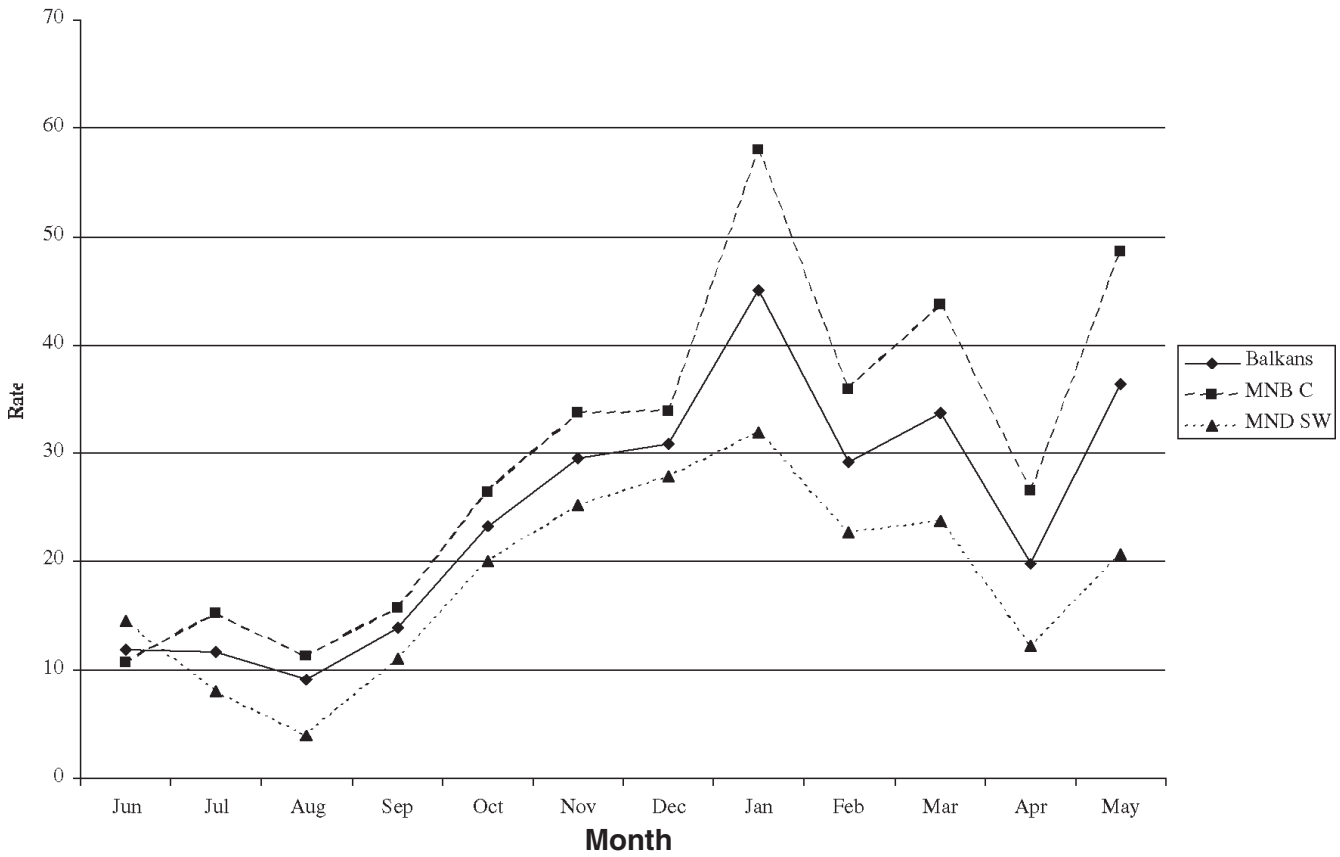


Fig 4. Respiratory Conditions First Presentation Rates Per 1000 Personnel Per Month 1999-2000.

Figure 5 compares the rate of attendance for gastrointestinal illnesses in both Bosnia and Kosovo and of the effects of remedial action on these rates. In terms of the MNB(C) (Kosovo) rates, the cause was narrowed down to poor procedures in the temporary

accommodation at the Pristina APOD. The MND(SW) (Bosnia) rise in attack rate was caused by a general breakdown in hygiene practices across the area of operations. In both cases remedial action was taken and attack rates began to fall.

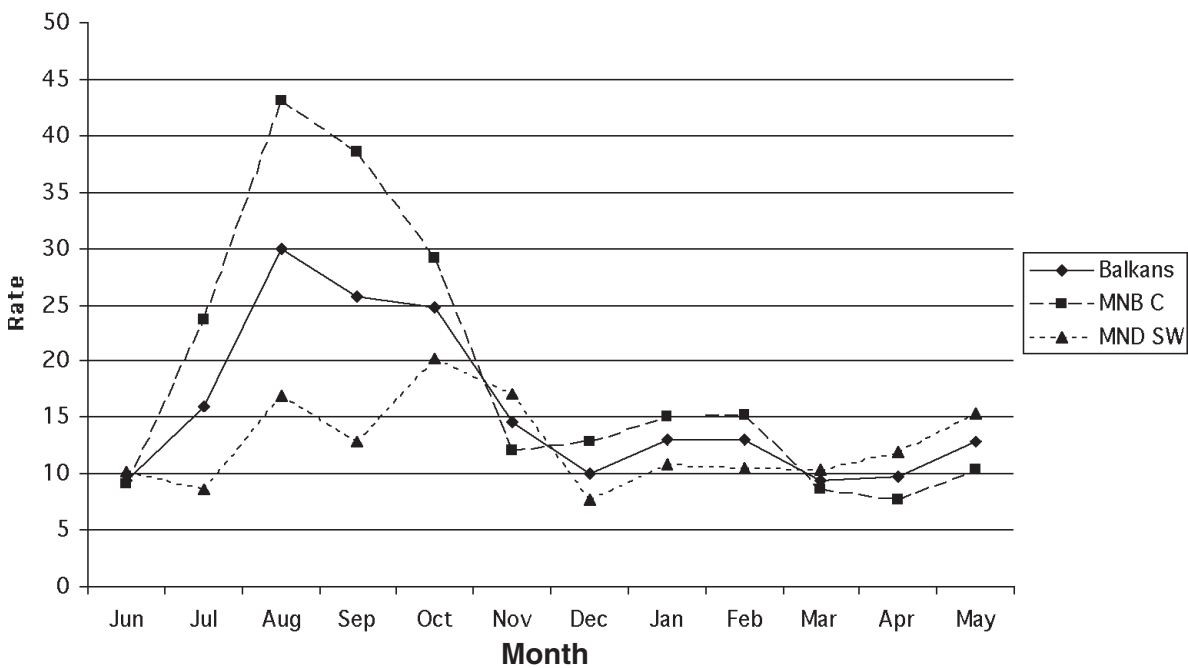


Fig 5. Gastro Intestinal Disorders First Presentation Rates Per 1000 Personnel Per Month 1999-2000.

Bricknell and Wright published the most recent paper that used the J97 methodology. This described the hospital activity data for Exercise SAIF SERREA in Oman from July to Nov 2001 (18). This paper complemented the hospital reports from Bosnia and demonstrated that the J97 coding could be used to describe both hospital admissions and aeromedical evacuation.

However, useful as J97 has been described, its continued development and deployment at the operational and tactical level has been disappointing and the work that has been attempted has, to some extent, been personality driven. A "5 line" variant was trialed as an early warning system for biological attack during Op TELIC 1 with very limited success and, whilst data are still submitted to PJHQ it is currently only being archived and there has been no attempt to analyse the Op TELIC data, although systematic data collection has been improved since August 2004.

PRIMARY CARE MORBIDITY SURVEILLANCE IN THE NHS

Prior to the widespread introduction of computers into General Practice, morbidity data that might be used to inform national research, audit and planning were only collected decennially, were not collected in a way that made them representative of small areas, were highly likely to be incomplete and became out of date almost as soon as the collection was completed (19 - 22). However, the need for General Practice morbidity data was recognised for management reasons (23). As computers became more common in General Practice surgeries and started to contain more clinical information (24), it was recognised that the collected data would be an excellent source of continuous, longitudinal research material (25) although the level of clinical data being recorded remains low in many areas (26).

The work that has been done in the civilian setting has ranged from the development of the centralised GP Research Database (GPRD) through the Birmingham Research Unit (BRU) of the Royal College of General Practitioners (RCGP) to the more devolved, regional and small area collaborations such as the Primary Care Information System (PRIMIS) coordinated by Queens Medical Centre Nottingham and the West Midlands GP Research Database.

The GPRD was originally set up by the VAMP software company. Reuters Health Information Ltd, having acquired VAMP, donated the database to the Department of Health in 1994 on whose behalf the Office for National Survey (ONS) managed the database. The organisation produced publications called Key Statistics from

General Practice (27) that looked at a variety of data concerning diseases such as Coronary Heart Disease (CHD), Stroke and Diabetes. In 1999, however, the Medicines Control Agency (MCA) took over the responsibility of administering the data set and many publications using information from the data set have been in the field of pharmaco-epidemiology (28).

The database is also being more widely used to look at very specific areas of interest (29 - 31) and the MCA has been looking at ways to revitalise the database and its use (32). The database remains to be exploited to its true potential but comparisons of the quality and validity of its data suggest that it is potentially a useful source of morbidity data (33 - 35).

The BRU RCGP which, using its sentinel practices, started collecting data on communicable diseases as long ago as 1964. Disease event data have been made available on its web-site and published in the unit's annual reports, although no reports have been published since 1999. At that time data were gathered from 73 practices throughout the UK, with a patient base of 585,505 representing some 1.1% of the National Population (using 1998 ONS Population Estimates (36)) although it is doubtful that this group was a true representation of the UK population.

PRIMIS, co-ordinated by Queens Medical Centre Nottingham, was the successor to the Collection of Health Data from General Practice (CHDGP) program that, in turn, was a loose affiliation of practices attempting to set up morbidity surveillance programmes for local clinical audit, governance and commissioning purposes (37). The group has helped primary care organisations set up morbidity surveillance programmes, by advising on improving the quality of data gathering, and once practices have achieved a set standard they become part of its Comparative Analysis Service. At even more local levels, collaborations have been set up that analyse general practice data to plan and audit services in specific areas and an up to date example of such a collaboration is the West Midlands GP Research Database (38).

PRACTICAL OBSERVATIONS AND ISSUES

Over the past decade much research and development effort has been invested by the military and civilian organisations into creating viable morbidity surveillance systems. Neither the military or NHS systems has yet managed to address fully all of the issues that affect the validity of their respective programs, in relation to the accuracy of the data being collected and the completeness of the data set, although the excellent convergence of data in the analysis

of the J97 Balkans data demonstrates it is possible to achieve a valid data set on military operations.

NHS systems have all relied on samples of the civilian population and so the results have to be, interpreted carefully, especially if conclusions drawn from the sample are to extrapolated to the population level. In this area, the military system has a distinct advantage over all civilian systems. J97 is population based and, accepting the caveat about data set completeness, can be used for health surveillance covering the entire population at risk, thus providing actual rates of ill-health. Furthermore, with J97 data collection being continuous with a concurrent record of the population at risk, it is possible to do real time denominator based studies. This allows the impact of population-based health interventions to be observed. It is an area that remains to be fully explored but this paper shows how J97 data have been used to observe how changes in recruit training regimes have influenced injury patterns, and how J97 data can be used to measure the effectiveness of preventive medicine measures to reduce gastrointestinal illness and respiratory illness.

This paper has also shown how the inherent simplicity of the J97 system allows it to be used for small area studies as was done by AMD after the Far East forest fires and PJHQ on operations in the Balkans. Whilst small area surveys can be done using the data from local collaborations in the NHS, there is no way that a central organisation could do small area surveys without setting up a bespoke information system to gather the data.

Both the J97 system and civilian primary care surveillance systems rely on accurate coding and records of the population at risk. This requires an investment in the training of all of the staff involved in managing the health surveillance system. It is also important to account for differing coding preferences for diagnostic groups of individual doctors when interpreting variations in rates of conditions with the potential for overlap such as upper and lower respiratory conditions, and injury or musculoskeletal problems.

However, military medical personnel have voiced their concerns regarding the degree of separation (both temporal and operational) between where the data are generated and where they are analysed. Making feedback more timely, relevant and focussed on the needs of the reporting units could answer these concerns and whilst this level of analysis is not yet available, it is not unreasonable to expect that it could become a reality with the introduction of DMICP.

The IT component of the J97 system has, historically, been a weakness and remains a significant threat to the future development

of military morbidity surveillance. However, new developments in IT systems currently being developed such as DMICP and the BOWMAN digitisation process currently represent outstanding opportunities in the field of automated data gathering and rapid and secure data transfer and routine, formation and local level analysis for timely feedback to the gatherers of the original data. Enhanced automation might not only be expected to reduce the practice administrative burden, it might also standardise disease coding thus improving the validity of the system.

Summary

Morbidity surveillance has come a long way in the last 10 years in both the civil and military setting. In both areas similar problems have been encountered and pragmatic solutions developed. However, as a single morbidity surveillance system capable of undertaking strategic, denominator based surveys, or tactical level, small area studies, J97 cannot be matched by any system currently in use in the NHS.

Despite J97s obvious utility there remain significant human and IT weaknesses to the system that have affected the development of the system over the past decade. However, current developments in IT and communications systems represent outstanding opportunities to develop the military routine morbidity surveillance system. These developments could enhance automated data gathering reducing the administrative burden at the practice level and would allow timely analysis of data at local, or formation level, and meaningful feedback to practice level which would go some way to reversing some of the more negative feelings that medical personnel have about the program.

We need to take the lessons of the last decade forward in order to inform future developments. Both the NHS and the Ministry of Defence are developing systems that can electronically gather, transmit, store, retrieve and analyse data from primary care activity in a systematic way. These have the potential to revolutionise capture of data on indicators of health at an individual and population level. It is important to consider how to transform these data into reliable and valid information for real time surveillance, health needs assessment, health service planning and audit.

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