TETRA Industry Group

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Summary of Imperial College presentations at TETRA Industry Group seminar on 18 September 2006

Professor Paul Elliott

Background

- the background to the study is that TETRA handsets 'pulse' at 17.6Hz and unreplicated studies from the 1970s and 80s on the impact of a 16Hz signal on calcium efflux in chick, brain in vitro had suggested there might be a biological effect
- as a result the Stewart Report in 2000 had suggested that although there was no obvious health risk, amplitude modulation at or around 16Hz should be avoided in future developments of signal coding if possible
- the Home Office had been advised to undertake a programme of work to respond to recommendations in the 2001 AGNIR report
- DSTL work on calcium efflux published in December 2005 had found no effect and results were available via the Home Office website
- it had been suggested that police Airwave usage be recorded to inform an epidemiological study and that a cognitive study be undertaken
- the differences between this and previous studies were:

previous:	*this:*
• inadequate exposure measures	• detailed information on handset users
• small cohorts	• large cohort (50k plus)
• not TETRA specific	• TETRA specific
• insufficient follow up	• long term follow up

- data will be collected and follow up high, medium and low use and whether there are any health/disease outcomes
- no such studies have been done on mobile phones, but a study under the auspices of the WHO is planned

Aims and Objectives

The long term monitoring would enable the team to look at:

- incidence of and mortality for diseases such as cancer and Parkinson's
- sick absence levels
- trends for retirements on health grounds

Health screening would be offered to participants, partly to collect data and partly as an incentive to participate in the study

A neuro-cognitive study was taking place in parallel looking at brain function and performance

The focus was on TETRA handset users, not the exposure experienced by the general population. The team is funded to look only at the police; if other TETRA user populations wished to be incorporated funding would have to be secured from appropriate sources. The study team was keen to have as large a cohort as possible as it would enable them to look for rarer health events and outcomes.

Paul Elliott and David Neasham were principal investigators and governance was through a Home Office led forum with representation from police federation, UNISON and senior police officers. There was also an ethics committee, with external academic representation.

Although the current focus was on handsets, the team recognised that there was a need to consider and perhaps to incorporate into the study the use of data terminals and covert handsets as rollout continued. A large user cohort and robust measures of usage were pre-requisites for a successful study - for example recall of usage was generally an unreliable method of data collection.

Dr David Neasham

Enrolment

- it was open to all police forces in England Scotland and Wales to participate in the study. It was valuable to include non-TETRA users in the cohort, partly to act as a control group and partly as they may become users at a later date
- enrolment is voluntary but high levels of participation (more than 40% in a force) are crucial as the study needs to follow up large numbers of users over many years to detect small effect with a good statistical power
- the primary enrolment route was by completion of a questionnaire which obtains basic information as well as consent. It covers Airwave and mobile use and general health questions
- the information is scanned in electronically and stored on secure servers
- health screen requests are extracted and appointments made
- a support letter is needed from each force prior to the participation of individuals within that force

Usage information

- data is captured on the location whether the radio is carried, call types (PTT, DMO, PSTN) shift patterns, the type of radio (personal, pool, vehicle, body-mounted, covert)
- the study will need to address terminals used for data transmission and to address technology changes during the 15 – 20 year project life. It was planned to revisit existing participating forces once rollout was complete and explore web and email based ways of updating, at least on a sample basis, to ensure that data continued to be valid
- call records are received from O2 Airwave and this aspect is working well - the records provide total monthly call duration, and total calls for each ISSI (individual short subscriber ID) and in some forces collar-ID
- most forces embed the collar-ID into the ISSI; on some cases collar-IDs are recycled as staff turnover occurs and that needs to be managed through a protocol to ensure that the information is accurate
- it was recognised that shift patterns and the way radios were carried changed frequently and that these changes needed to be captured. There was work going on to validate the correlation between Airwave records and usage patterns, by looking at records covering a period when the shift pattern and activity for an individual was known. The key is to establish an unambiguous link with collar-ID and the team needed to work with each local force to take account of their own processes and protocols.

Questionnaires

- personal data is collected so that the NHS number for the individual can be obtained and a link made to NHS records to access disease and mortality registers
- sickness and ill-health retirement records are also collected from the force quarterly, covering a list of all those registered as participants

Health Screening

- this gives more complete information on clinical and lifestyle factors which enables improved assessment of and adjustment for other risk factors
- the screening looks at possible interactions through blood pressure, ECG measures etc
- it also provides a resource for future medical research
- around 70 – 80% of those participating in the study are requesting a health screen but people can participate in the study without having one
- the screening, which is free and confidential, takes around 40 minutes, and short term clinical feedback is made available to the participant, and, if they wish, their GP
- the tests include an ECG, body type assessment, blood and urine clinical chemistry and haematology tests and there is a brief questionnaire to complete on a hand held tablet. A food diary is also being trialled as is a measure of arterial stiffness
- the forces generally provide abstraction time for participants to attend the screening, which is carried out locally, and it has proved to be an incentive to participate in early forces>
- health screening data is collated from the nurse's lap top and added to the lab test and ECG data
- written consent is sought to follow up health events vis the NHS registries
- no individually identifiable information will be made available to the Home Office or police forces
- security is through bar coding for anonymity, secure isolated server, staff security cleared and premises inspected by the National Crime Squad
- further details can be found at www.police-health.org.uk and the first line contact number is 020 7594 3250 or 2046.
- hearing loss tests are not currently incorporated, not least as they are time-consuming and the funding available for health screening is limited, but the Steering Group would discuss this to see if there is a way this aspect could be incorporated
- the UK health system does not currently enable access to GP records, but consent for this is taken and it is hoped the facility may become available in a few years
- internal comparisons of low, medium and high users within the cohort would be made and a control group of non-users would be established

Dr Natalie Fouquet

The neuro-cognitive study needed both male and female volunteer participants of any age. It overlapped with the long-term study, as information from the long-term study made it easier to group participants. People with symptoms were being actively recruited whether they were low or high users, as they may be sensitive even to low exposures, although previous double blind studies had suggested that people claiming to be hyper-sensitive could not tell whether an RF signal was on or off.

Neuro-cognitive study methodology

- the neuro-cognitive study was a short term provocation study

- previous studies had given inconsistent results, used different exposure times, had variable demographic participation, variable individual EMF sensitivity, were mostly performance tests without complementary brain function tests, and varied between single or double blind (single is where the participants does not know if the signal is on or off but the researcher does; double blind is where neither knows)
- three groups were being studies – low users, high users and symptomatic people
- a standard neuro-psychological assessment was undertaken incorporating reading, auditory learning, symbol digit coding, pegboard and trail marking tests, and this was supplemented by a general health status questionnaire, dealing with sleep patterns, general health, anxiety and symptoms
- brain activity was measured during the completion of a battery of tests once with the signal off and once with it on, but double blind
- cognitive attention tests were also conducted with EEG recording of the brain activity compared to resting state. This measured both the brain's reaction to stimuli (time to respond and peak response) and the synchronisation of the brain
- brain function could be affected by lesions, drugs, age, and psychiatric disorders but a normal brain response could be plotted and had characteristic amplitude and frequency
- the radio positions being studies were against the ear and on the lapel. Coaxial cabling was used to ensure that the measuring equipment was not measuring the RF source directly, and comparisons had been undertaken to ensure that the electrodes were not themselves creating an effect

Tasks

- the sustained attention task consisted of two 5 minute blocks looking at performance and EEG. Digits appeared rapidly on a screen and participants were asked to press buttons when they saw corresponding digits, with the exception of one digit where they were asked not to respond
- a second attention task in two 25 minute blocks used letters appearing on the screen and participants had to look for sequences and memorise them. This enables a measure of synchronisation. This was important because mobile phones operating at 217 Hz were outside the brain synchronisation range, but TETRA terminals at 17.6hz were within it.

Dr Mark Little

Statistical Power

- there was a need to ensure that the statistical analysis of the results had sufficient power to detect small health outcomes with confidence. This required a large cohort of participants
- there was a natural variation in the occurrence of rare diseases, and expected prevalence (no of cases per total population) and disease rate (no of cases divided by number of person-years observed) could be calculated although in any time period, variations around the expected figure would be observed
- confidence intervals could be constructed by reviewing the probability of random samples having difference that occurred other than as a result of these natural variations and which would therefore be statistically significant
- confidence intervals narrowed as the size of the cohort increased, meaning it was possible to detect smaller increases in risk in terms of health events and have confidence that the results obtained were statistically significant

Cohort and Case Control Studies

- a cohort study was one where a defined population was followed forward in time to examine a range of possible health outcomes

- in a case control study the starting point was to look at participants with diseases and try to work backwards by finding out what these people had been exposed to to try to determine causes versus a control group which did not exhibit the disease

Bias

- bias can arise in a number of ways:
- follow up – has a person with a diseases moved out of the population being studies
- ascertainment – a variation in the ascertainment of a disease and how that links with records of exposure
- recall – people's ability to remember accurately the exposure they have experienced
- investigation – investigators may look more closely for exposure where there are symptoms than they do for controls
- a cohort designed study was the 'gold standard' in eliminating biases and the longer the follow up period, the more the study would have the power to detect smaller increases of risk to health for the exposed group, and rarer health events

Dr David Neasham

The rollout programme was being phased:

- Pilot – Lancs and West Midlands 2005
- Phase 2 – South Wales, Leicestershire, Staffordshire 2006
- Phase 3 – Cheshire, Essex, Gwent, Scotland 2006
- Discussions in progress with 9 further forces for phase 4 and beyond

So far there were 7,929 completed questionnaires, and 6,326 health screening requests with 4,834 completed.

The take-up had exceeded 40% in Lancashire, and 50% in South Wales. The team was confident that a 40% plus take-up would be achieved in participating forces.

It was not possible to recruit everyone at the start of the study so the recruitment process would take a few years. Ideally a cohort of 80,000 people would be recruited.

The first point at which analysis would be undertaken would be around 5 years into the study, although the team would monitor continually as work progressed for any indication of a risk to public health. It would probably take 2 -3 years for analysis work, peer review and publication of findings to be completed. A mortality analysis was likely to be available before an analysis on incidence of disease.

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