

An Approach To Tackle Visual Display Unit User Health Problems

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Abstract

Reported health hazards from video display units (VDUs) vary from headaches to miscarriage and there is some concern that health problems experienced by VDU users could be associated with extra-low-frequency (ELF) electromagnetic field emissions. While investigating an individual case of 'VDU Syndrome' a procedure was developed which could be used to investigate and evaluate other complaints of a similar type. A relationship between the number of hours monitor work and severity of symptoms was observed along with a cyclic nature to the operator's sensitivity to VDU work.

Introduction

There is much public concern over the possible health hazards of ELF magnetic fields, especially amongst those who may be occupationally exposed. Working with video display units has been linked with health problems from eyestrain to miscarriage. Two studies published in 1988 found a significant risk of spontaneous abortion in women who worked more than 15 hours a week at a VDU (McDonald et al, 1988) and more than 20 hours VDU work per week (Goldhaber et al, 1988). However these studies did not measure the electromagnetic fields which were suggested to be harmful. A recent study by Schnorr et al (1991) measured both extra-low-frequency (45-60 Hz) and very-low-frequency (15kHz) electromagnetic fields around a sample of VDUs. This study concluded that the use of VDUs and exposure to accompanying electromagnetic fields were not associated with an increased risk of spontaneous abortion. However, VDU operator anxiety continues along with reports of eyestrain and headaches, as shown in a well controlled study (Rossignol et al, 1987) which found an increased prevalence of adverse conditions related to vision, musculoskeletal discomfort and headaches amongst clerical workers who used VDUs.

The data presented in this paper were gathered during a six month survey on the health of an individual VDU operator who suffered from severe headaches, nausea and eyestrain.

Methods

The VDU operator who was suffering from health problems was given a health questionnaire to quantify the range, severity and frequency of her health complaints. The questionnaire listed a short range of symptoms e.g. sore eyes, headache, nausea, which she was asked to grade daily on a scale of 0 to 4 where 0 corresponded to an absence of symptom and 4 extremely severe discomfort. The number of hours worked at a VDU were also noted.

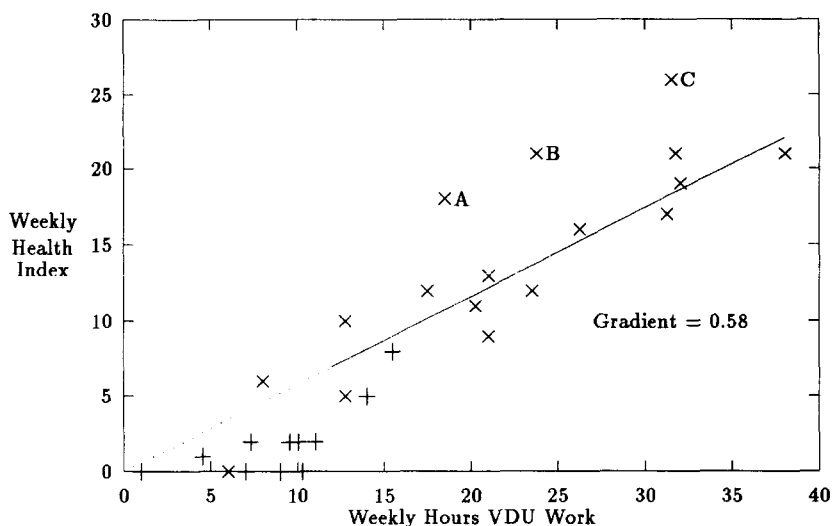


Figure 1: Weekly Health Index against Weekly Hours VDU Work:
 × - initial 3 month survey period, + - final three month survey period

The health of the VDU operator was monitored initially for three months whilst in a VDU intensive post and then for a further three months whilst in a post requiring significantly fewer hours VDU work, although the work was carried out on the same monitor.

Results

From the health survey data, the total hours worked at a VDU and the total of symptom gradings, defined as the weekly health index, were calculated for each week. Figure 1 shows a plot of weekly health index against weekly hours VDU work. A clear dose-response relationship was found, which is probably a personal characteristic. The survey showed that the effects of VDU work seemed to accumulate during a week's work; symptoms worsening towards the end of a week with complete recovery during weekends. If the total weekly VDU hours worked was more than 13, then the weekly health index was directly proportional to the number of VDU hours worked in that week. When the total was less than 13, the relationship was less clear, but the data suggests a threshold at approximately 7 hours, below which little or no adverse health effects were experienced.

As can be seen from Figure 1, points A, B and C lie significantly above the dose-response curve, indicating a particularly sensitive week where the stated number of hours VDU work caused much greater discomfort than might be expected. To investigate this further, a sensitivity index was defined as:

$$\text{Sensitivity} = \frac{\text{Weekly Health Index}}{\text{Weekly Hours VDU Work}}$$

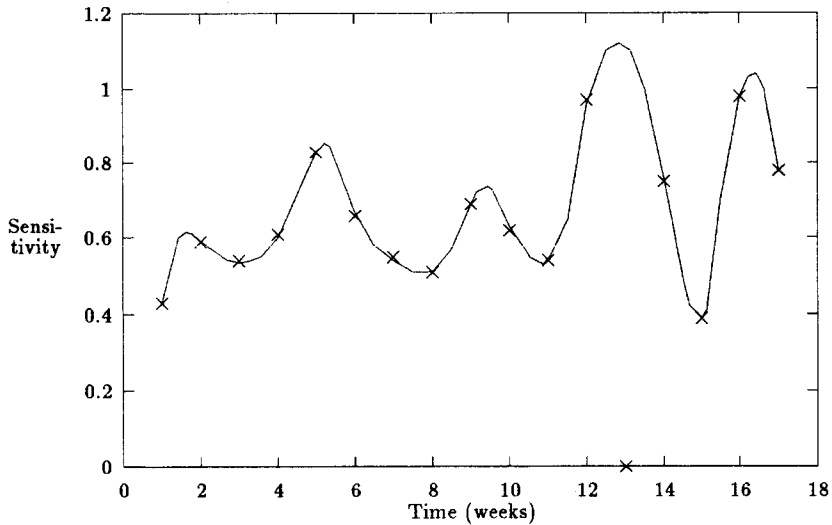


Figure 2: Sensitivity against Time

Figure 2 shows how Sensitivity varies with time. The graph shows a distinct cyclic quality which has an average period of 26 days.

Discussion

Whilst investigating an individual VDU operator suffering from severe headaches, nausea and eyestrain, a clear personal dose-response relationship was found which was a straight line fit when there were more than 13 VDU hours worked in one week. Excluding the three high sensitivity points, the data have a surprisingly small spread, indicating that the health problems seemed to be associated with VDU work and not some other work task. During the initial 3 month survey period, the following ergonomic changes were made in an attempt to reduce discomfort:

- half of the overhead fluorescent lighting was removed to reduce brightness and dazzle,
- screens were positioned behind the operator to eliminate glare, and
- fluorescent lighting was replaced with tungsten lamps to alter the quality of the light.

The workstation was already of a high standard, with a grounded anti-static mesh fitted over the monitor screen, and no significant improvements could be introduced. Although the operator felt more comfortable after these changes, this was not reflected in her health gradings which continued to be high enough to reduce her productivity and at times require sick-leave. When the operator's tasks were altered to require fewer hours VDU work, a significant improvement in health was observed, and the data obtained during this period suggests a shoulder to the dose-response curve with a threshold at approximately 7 hours. The variation of sensitivity with time was investigated during the initial survey period only,

and revealed a cyclic nature with a mean period of 26 days. This relationship may suggest a possible hormonal link and although stress is a possible explanation, this seems unlikely since the high sensitivity points are distributed throughout the range of weekly VDU hours and high stress might be indicated if these points were all due to a high number of weekly hours VDU work.

Any case of VDU user health problems could be tackled in a similar way. By filling in a daily health questionnaire, both the sufferer and employer are able to gauge the severity of the symptoms, and grading symptoms numerically discourages an emotional response. If ergonomic improvements can be made, or alterations in working practice, then a lessening of severity of symptoms would be reflected in the health gradings over a period of time.

This case study of VDU health problems has yielded interesting results, which were consistent throughout an extended survey period. However this is only one case and the symptoms of some other cases have been successfully relieved by altering the workstation design or using the ergonomic changes described earlier. Further research is required to determine whether a high sensitivity group of VDU workers exists, and if so, what factors influence their health symptoms. One such study is being carried out in Aberdeen.

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