Posture, discomfort and performance in a VDT task.

Liao MH, Drury CG.
Department of Industrial Engineering, University at Buffalo, State University of New York, 14260, USA. mhl@advtek.com.tw

Improvements in workplace, working posture, and discomfort need to be justified in terms of improvements in performance. Previously, a visual inspection task has been investigated. The objective of the current study was to demonstrate the interactions between workplace, work duration, discomfort, working posture, as well as performance in a 2-h typing task. Three levels of keyboard heights were used to change working posture (e.g. joint angles and postural shifts), and thus presumably discomfort (e.g. rating of perceived discomfort and body part discomfort), and performance (e.g. typing speed, error rate and error correction rate). The results indicated that the hypothesized posture-comfort-performance interrelationships were partially supported. Keyboard height had effects on working posture adopted. As in previous studies, the rate of postural shift was a good indication of discomfort in a VDT task. Discomfort and postural shift rate had adverse effects on performance (e.g. error rate). However, these effects on error rate may not be strong. PMID: 10755658 [PubMed - indexed for MEDLINE]

Work posture, workstation design, and musculoskeletal discomfort in a VDT data entry task.

Division of Biomedical and Behavioral Science, National Institute for Occupational Safety and Health, Cincinnati, OH 45226.

Self-report data on musculoskeletal discomfort were collected from several hundred VDT users in two agencies of a state government. Aspects of worker posture and workstation design were objectively assessed for 40 of the VDT users. Multiple regression analyses were used to examine the relationship between these ergonomic variables and musculoskeletal discomfort. Effects of ergonomic factors on musculoskeletal discomfort were clearly evident in the analyses. Regression models explained up to 38% of the variance in discomfort at different body sites. Of special interest was that leg discomfort increased with low, soft seat pans, suggesting that postural constraint is more important than thigh compression as a risk factor for leg discomfort in VDT work. In addition, arm discomfort increased with increases in keyboard height above elbow level, supporting arguments for low placement of the keyboard. Finally, high levels of neck and shoulder girdle discomfort observed in the study population suggest the need for further attention to the control of cervicobrachial pain syndromes in VDT work.

Evaluation of methods for the determination of factors inducing fatigue in man at work.

Bulat PV. PMID: 5117620 [PubMed - indexed for MEDLINE]


Relationship between comfort and back posture and mobility in sitting-posture.

Vergara M, Page A. Dept de Tecnologia, Universitat Jaume I, Spain. vergara@tec.uji.es

The objective of this work is to analyze the causes of lumbar discomfort while sitting on a chair, by analyzing the relationship of lumbar curvature, pelvic inclination and their mobilities with discomfort. An experiment has been performed with healthy subjects, in which comfort, postural and mobility parameters have been measured. Their relationship has been analyzed with multivariate analysis. Factorial analysis has been used to represent all the correlated variables measured. Logistic regression and discriminant analyses have been used to classify discomfort/absence of discomfort. The results show that great changes of posture are a good indicator of discomfort, and that lordotic postures with forward leaned pelvis and low mobility are the principal causes of the increase of discomfort. PMID: 11827133 [PubMed - indexed for MEDLINE]

6: Spine 1989 Feb;14(2):204-9

Low-back pain and occupation. A cross-sectional questionnaire study of men in machine operating, dynamic physical work, and sedentary work.

Riihimaki H, Tola S, Videman T, Hanninen K.

LEL Employment Pension Fund, Helsinki, Finland.

The frequency of sciatic pain, lumbago, and nonspecific low-back pain (LBP) and factors related to these symptoms were determined among men occupied in machine operating (541 longshoremen and 311 earthmover operators), dynamic physical work (696 carpenters), and sedentary work (674 municipal office workers). Sciatic pain was more common among machine operators and carpenters than among office workers, and also more frequent among machine operators than among carpenters. The occupational differences were considerably smaller with regard to lumbago and nonspecific LBP. In multivariate analysis, occupation, age, reported back accidents, and postural load showed significant independent effects on the occurrence of sciatic pain. Allowing for other risk indicators, the relative risk was 1.3 contrasting machine operators with both office workers and carpenters, but carpenters had no excess risk as compared with office workers. PMID: 2522244 [PubMed - indexed for MEDLINE]
7: Hum Factors 1985 Apr;27(2):175-87

Studies on ergonomically designed alphanumeric keyboards.

Nakaseko M, Grandjean E, Hunting W, Gierer R.

PMID: 4018810 [PubMed - indexed for MEDLINE]

8: Gig Tr Prof Zabol 1986 Apr;(4):13-7

[Rational work chair for glass polishers]

[Article in Russian]

Chebanova OV, Lashchuk GN, Tetel'boim BM, Bershadskaia LM.

PMID: 3699513 [PubMed - indexed for MEDLINE]


Optimum handle height for an animal-drawn blade harrow.

Gite LP.

Central Institute of Agricultural Engineering, Nabibagh, Bhopal, India.

A blade harrow is a tillage implement commonly used by the farmers of Central and Western India. The handle is one of the main components of a blade harrow and its height has an influence on operator's comfort as well as work performance. Therefore, this study was carried out to determine the optimum handle height for an animal-drawn blade harrow. Two experiments were conducted with four male subjects to study postural discomfort and physiological reactions separately at six handle heights. Downward force applied by the operator on handle, and depth and speed of operation were also recorded. The lowest postural discomfort was noticed at handle height equal to 1.0 metacarpale III height. Here, the overall discomfort rating was 2.4 on an eight point psychophysical rating scale (0 = no discomfort, 7 = extreme discomfort) and the body part discomfort score was 16.3 (the maximum being 53.8 at working height equal to 1.6 metacarpale III height). The mean heart rate and oxygen consumption at this handle height were 103.9 beats/min and 0.536l/min, respectively. Considering the data of postural discomfort and also of heart rate and oxygen consumption, the optimum handle height for the animal-drawn blade harrow worked out to be equal to 1.0 metacarpale III height, i.e. 637 to 732 mm (5th and 95th percentile values respectively, of metacarpale III height of Indian agricultural workers).

PMID: 8064148 [PubMed - indexed for MEDLINE]
10: Sangyo Igaku 1985 Sep;27(5):308-17

[Occupational stress of assembly line female workers in confectionery work]
[Article in Japanese]


Concomitant with frequent occurrence of disorders of the neck, arm, hand and low back among assembly-line female workers in confectionery work, there is an increased number of patients with occupational cervicobrachial disorders and/or low back pain. In suspicion of the close correlation between the working conditions and development of these local disorders, a field study was undertaken. The following are the results obtained. More than 90% of these assembly-line female workers consisted of inexperienced part-time employees, mostly of middle to old age. They were engaged in decorating conveyor-carried cakes with cream and chocolate. The work necessitated repetitive movements of the upper limbs and concentration of visuosensory and nervous attention in a half-sitting slouching posture. This was considered to exert excess load on the local muscles and nervous and sensory systems. The causes that intensified the local symptoms as pointed out by the workers consisted of (1) repetitive use of the arms and hands, (2) static posture during the work and (3) sustained standing position. Complaints of low back pain were conspicuous from the unsuitable height of a conveyor-belt. Thirty five percent of the female workers needed medical treatment for cervicobrachial and/or low back pain. The forced adaptation to the belt height, sustained unnatural working posture and the imposition of forced movements seemed to be the main factors in the onset of cervicobrachial and/or low back pain in interrelation with working hours. On the basis of these results, the work load on a machine-paced assembly-line was analyzed and the necessity of improvement of working conditions was discussed.


Design of check-out systems including laser scanners for sitting work posture.

Hinnen U, Laubli T, Guggenbuhl U, Krueger H.

Institute of Hygiene and Applied Physiology, Federal Institute of Technology, Zurich

Forty-six laser scanner operators were compared with 106 cashiers operating conventional cash registers. The influence of job rotation on the two groups was evaluated, and several design features were examined. For this purpose the prevalence of musculoskeletal disorders was determined by means of a questionnaire and a physical examination. In addition, a three-dimensional movement analysis system was employed. Work postures were analyzed with the Ovako working analysis system. The results indicate that a beneficial effect on the musculoskeletal system is achieved by combining the operation of a laser scanner with job rotation. The study also points out the need for better equipment, including flat scanners and smaller keyboards, and a change in the angle between the scanner and the take-off belt running up to the cashier.

PMID: 1615293 [PubMed - indexed for MEDLINE]
12: Ergonomics 1998 Dec;41(12):1832-44

Evaluation of work-rest schedules with respect to the effects of postural workload in standing work.

Van Dieen JH, Oude Vrielink HH.

Amsterdam Spine Unit, Faculty of Human Movement Sciences, Vrije Universiteit, The Netherlands.

The influence of four work-rest schedules (60-min shift-15-min break, 45-15, 30-15, 30-30) on acute effects of physical workload in the back and legs due to standing work was investigated in 12 poultry inspectors. Subjective discomfort in the legs and back, and swelling in the distal lower leg were significantly affected, with the 60-15 schedule leading to a higher postural load as compared with the other schedules. No effect on spinal shrinkage was found. It was concluded that the 60-15 schedule should be avoided. An optimal work-rest schedule considering visco-elastic deformation of the spine would probably involve frequent short breaks, whereas longer breaks would seem more effective considering leg swelling.


Work stress of women in sewing machine operation.

Nag A, Desai H, Nag PK.

Ergonomics Division, National Institute of Occupational Health, Ahmedabad, India.

The study examined the work stresses of 107 women who were engaged in sewing machine operation in small garment manufacturing units. Of the three types of sewing machines (motor-operated, full and half shuttle foot-operated), 74% of the machines were foot-operated, where throttle action of the lower limb is required to move the shuttle of the machine. The motor-operated machines were faster than the foot-operated machines. The short cycle sewing work involves repetitive action of hand and feet. The women had to maintain a constant seated position on a stool without backrest and the body inclined forward. Long-term sewing work had a cumulative load on the musculo-skeletal structures, including the vertebral column and reflected in the form of high prevalence of discomfort and pain in different body parts. About 68% of the women complained of back pain, among whom 35% reported a persistent low back pain. Common sewing work accident is piercing of the needle through the fingers, particularly the right forefingers. Unsatisfactory man-machine incompatibility, work posture and fatigue, improper coordination of eye, leg and hand are the major problems of the operators. The design mis-match of the work place may be significantly improved by taking women's anthropometric dimensions in modifying
the workplace, i.e. the seat surface, seat height, work height, backrest, etc.

PMID: 1491171 [PubMed - indexed for MEDLINE]


[**Multipurpose facilities for evaluating the functional status of operators**]

[Article in Russian]

**Popov IuB.**

PMID: 2056873 [PubMed - indexed for MEDLINE]

15: J Occup Med 1985 Apr;27(4):269-71

**Relating posture to discomfort in VDT use.**

**Starr SJ, Shute SJ, Thompson CR.**

To identify sources of discomfort in video display terminal (VDT) work stations, the working postures of 100 telephone operators who used VDTs to retrieve directory listings were photographed. Attempts to correlate postural angles and distances derived from the photographs with subjective judgments of physical discomfort reported on a questionnaire were unsuccessful. Possible explanations for the failure of the postural parameters to predict discomfort are discussed, and the absence of other postural data that may be appropriately applied to the specification of VDT work stations is noted. It is concluded that recommendations for VDT work stations that are phrased in terms of static angles and distances are currently unsubstantiated and, thus, are not yet ready to be codified as formal standards.

PMID: 3998878 [PubMed - indexed for MEDLINE]

16: Med Welt 1979 Feb 16;30(7):238-41

[**Improved seating posture in automobile driving**]

[Article in German]


PMID: 431393 [PubMed - indexed for MEDLINE]
Postural differences between asymptomatic men and women and craniofacial pain patients.

Braun BL.

Department of Diagnostic and Surgical Sciences, University of Minnesota School of Dentistry, Minneapolis.

A forward head position and rounded shoulders have been implicated in the development or perpetuation of craniomandibular disorders. Since women seek treatment for these problems more frequently than men, postural differences may account for the increased incidence of symptoms in women. The purposes of this study were (1) to compare the sagittal head and shoulder posture of asymptomatic men and women and (2) to compare the posture of asymptomatic and symptomatic women to determine differences in sagittal plane posture. Subjects were 20 asymptomatic men and women volunteers and nine consecutive women patients presenting for evaluation and treatment of craniomandibular pain. The subjects were compared using a valid, reliable, computer-assisted slide digitizing system called the Postural Analysis Digitizing System (PADS). Asymptomatic men and women did not differ in the postural characteristics associated with craniomandibular disorders. Sagittal posture does not appear to be a gender-related factor in these disorders. Symptomatic women, however, do display these postural characteristics to a greater extent than asymptomatic women. Evaluation and treatment of postural dysfunction should be included in the management of these patients.

PMID: 1859260 [PubMed - indexed for MEDLINE]

Evaluating design proposals for complex systems with work domain analysis.

Naikar N, Sanderson PM.

Defence Science and Technology Organisation, Melbourne, Australia.
neelam.naikar@dsto.defence.gov.au.

In this paper we propose a new framework for evaluating designs based on work domain analysis, the first phase of cognitive work analysis. We develop a rationale for a new approach to evaluation by describing the unique characteristics of complex systems and by showing that systems engineering techniques only partially accommodate these characteristics. We then present work domain analysis as a complementary framework for evaluation. We explain this technique by example by showing how the Australian Defence Force used work domain analysis to evaluate design proposals for a new system called Airborne Early Warning and Control. This case study also demonstrates that work domain
analysis is a useful and feasible approach that complements standard techniques for evaluation and that promotes a central role for human factors professionals early in the system design and development process. Actual or potential applications of this research include the evaluation of designs for complex systems.

PMID: 12002003 [PubMed - indexed for MEDLINE]


**Ergonomics evaluation of a manually operated cassava chipping machine.**

McNeill M, Westby A.

Department of Human Sciences, Loughborough University, Leics., UK. mbmcneill@hotmail.com

A manually operated machine for chipping cassava was evaluated. Six farmers took part in the study, with physiological, postural, and subjective measurements being taken. Using the machine resulted in drudgery and postural discomfort. Following an iterative design process and using appropriate anthropometric measurements, an improved, adjustable prototype was developed. This was tested with the six farmers and six novice users. It was found to reduce discomfort and physiological strain, allowed a faster work-rate (with novice users) and was preferred by all users. The study demonstrated how ergonomics can play an important role in reducing drudgery and improving user satisfaction in technology development and transfer in developing countries.

Publication Types: Clinical Trial   PMID: 10693836 [PubMed - indexed for MEDLINE]


[Back complaints and work] [Article in Dutch]

Hoek JB.   PMID: 4266182 [PubMed - indexed for MEDLINE]

[Stereovideographic evaluation of the postural geometry of healthy and scoliotic patients]  
[Article in French]

De la Huerta F, Leroux MA, Zabjek KF, Coillard C, Rivard CH.

Service de Chirurgie, Faculte de Medecine, Universite de Montreal, Hopital Sainte-Justine, Quebec, Canada.

Idiopathic scoliosis principally characterised by a deformation of the vertebral column can also be associated to postural abnormalities. The validity and reliability of current quantitative postural evaluations has not been thoroughly documented, frequently limited by a two dimensional view of the patient, and do not include the whole posture of the patient. The purpose of this study is to 1) quantify within and between-session reliability of a stereovideographic Postural Geometry (PG) evaluation and 2) to investigate the sensitivity of this technique for the postural evaluation of scoliosis patients. The PG of 14 control subjects and 9 untreated scoliosis patients were evaluated with 5 repeat trials, on two occasions. Postural geometry parameters that describe the position and orientation of the pelvis, trunk, scapular girdle and head were calculated based on the 3-dimensional co-ordinates of anatomical landmarks. The mean between and within-session variability across all parameters were 12.5 mm, 2.8 degrees and 5.4 mm and 1.4 degrees respectively. The patient group was heterogeneous with some noted pathological characteristics. This global stereovideographic postural geometry evaluation appears to demonstrate sufficient reliability and sensitivity to follow-up on the posture of scoliosis patients.

PMID: 9846428 [PubMed - indexed for MEDLINE]


Shoulder posture and localized muscle fatigue and discomfort.

Wiker SF, Chaffin DB, Langolf GD.

In many industries workers perform manual assembly tasks with hands postured above the shoulders. Awkward shoulder and arm postures are often viewed as acceptable given costs of workplace modification, postural exertions which are in compliance with current design recommendations, ready availability of strong workers, and numbers of electromyographic studies which fail to detect significant signs of localized muscle fatigue (LMF). An experiment was conducted to: (a) study the onset and severity of (LMF) in the shoulder when performing a stylus-to-hole Fitts reciprocal movement task under a range of postures, hand loads, ratios of work-to-rest, and task durations, and (b) to evaluate the efficacy of three techniques (i.e., changes in EMG behaviour, postural tremor, and cross-modal matching estimates) in detecting and monitoring posturally-based LMF and discomfort in the shoulder complex. Experimental findings showed that posturing hands above shoulder level significantly increased the risk of LMF and postural discomfort even in light-weight manual assembly environs where postural exertions are small, and that cross-
modal matching estimates and postural tremor were more sensitive metrics of LMF in the shoulder complex than EMG RMS voltage and mean spectral power frequency metrics. The basis for experimental findings, as well as potential application of LMF metrics in future postural stress investigations, are discussed. Recommendations for workplace posture are provided for job designers facing work height decisions in manual assembly environs.

PMID: 2714248 [PubMed - indexed for MEDLINE]
machine has an image of the operator. The designer of an MMS must recognize this, and strive to obtain a match between the machine's image and the user characteristics on a cognitive level, rather than just on the level of physical functions. This article gives a presentation of what cognitive systems are, and of how CSE can contribute to the design of an MMS, from cognitive task analysis to final evaluation. PMID: 11543350 [PubMed]


Three-dimensional measurement of essential tremor.

Matsumoto JY, Dodick DW, Stevens LN, Newman RC, Caskey PE, Fjerstad W.

Department of Neurology, Mayo Clinic and Foundation, Rochester, Minnesota 55905, USA.

A mechanical linkage device was used to measure the three-dimensional position of the fingertip during a postural task. Thirty patients with essential tremor were tested simultaneously with the device, uniaxial accelerometry, and clinical tremor measures. Eighteen patients were tested again 16+/4 days later. The device accurately recorded the three-dimensional behavior of essential tremor. Measures from the device included mean three-dimensional velocity, mean three-dimensional dispersion, and power of the three-dimensional acceleration. The logarithms of these measures were strongly correlated (r = .841-.984) with all clinical measures including self-reported tremor disability. The device measures were reliable within and between testing sessions (intraclass correlation coefficients = .971-.977). The performance of the device was superior to uniaxial accelerometry, most likely as a result of the three-dimensional nature of the measurements. We conclude that essential tremor can be validly and reliably quantified during a postural task providing the recording device records movement in three dimensions and the measurements are logarithmically transformed.

PMID: 10091623 [PubMed - indexed for MEDLINE]

27: Gig Tr Prof Zabol 1989;(10):4-7

[Hygienic assessment of working conditions for schoolchildren at video terminals during their academic studies] [in Russian]

Gel'tishcheva EA, Galaktionova TI, Dedenko II, Orlova TV, Fedorova NE.

Proceeding from the studies on the conditions of schoolchildren's work with video terminals during school lessons there was developed a complex of hygienic measures aimed at reduction of impact of factors specified by the work with video terminals and by anthropogenic pollution. Requirements to design of classrooms equipped by video terminals were listed and optimal and permissible ergonomic characteristics of the workplace established along with air temperature and humidity.

PMID: 2687133 [PubMed - indexed for MEDLINE]
The effects of computer interface design on human postural dynamics.

Karwowski W, Eberts R, Salvendy G, Noland S.

Center for Industrial Ergonomics, University of Louisville, KY 40292.

The main objective of this study was to examine the effects of human-computer interface design on postural dynamics, i.e., changes in working postures and postural discomfort exhibited by operators of the computer-based remote bar coding (RBC) system. In addition, the effects of different work/rest schedules on postural dynamics were evaluated. Twelve subjects participated in the laboratory experiment, which consisted of twelve scenarios utilizing two cognitive task requirement factors, i.e., (1) information presentation mode, defined through the letter image preview on the computer screen (none or one preview image); and (2) the information processing mode, defined through the specific keying method (key all characters or key 5 digits only). The third experimental factor was the work/rest schedule (50 min work/10 min break, 2 h of work/15 min break, or flexible schedule). The results showed that requirements of human-computer interface design significantly affected the operators’ postural dynamics. It was concluded that not only the physical, organizational, or psychosocial work environment characteristics, but also the cognitive task characteristics are important for assessment of postural effects in the VDT work. The relationship between interface design, mental workload and postural dynamics should be carefully considered in future studies aimed at optimizing the human-computer data entry tasks. PMID: 8187753 [PubMed - indexed for MEDLINE]

[Studies on the evaluation of optical information performance in man-machine systems] [Article in German]

Etschberger K. PMID: 5118928 [PubMed - indexed for MEDLINE]
**Ergonomic deficiencies: I. Pain at work.**

Ayoub MA.

Department of Industrial Engineering, North Carolina State University, Raleigh 27695.

This is Part I of a three-part series that examines various aspects of ergonomic deficiencies at work. This paper deals with pain at work and the association between such pain or discomfort and a poorly designed workplace or poorly structured job. Neglect of ergonomic principles brings inefficiency and pain to the workplace. An ergonomically deficient workplace may not cause immediate pain, because the human body has a great capacity for adapting to a poorly designed workplace or structured job. However, in time, the compounding effect of job and/or workplace deficiencies will surpass the body's coping mechanisms, causing the inevitable: physical symptoms, emotional stress, low productivity, and poor quality of work. PMID: 2324844 [PubMed - indexed for MEDLINE]

---

**Effects of different treatments on postural performance in patients with cervical root compression. A randomized prospective study assessing the importance of the neck in postural control.**

Persson L, Karlberg M, Magnusson M.

Department of Neurosurgery, University Hospital, Lund, Sweden.

Patients with cervical root compression were used as a "model" to investigate the possible importance of neck disorders and cervical sensory information in postural control. We assessed postural performance with posturography before and after treatment in 71 consecutive patients with MRI-verified cervical root compression without medullary compression. The patients were randomized to surgery (n = 22), physiotherapy (n = 24) or treatment with cervical collars (n = 25). There were no differences in postural performance or pain intensity between the groups before treatment. After treatment, the surgery group manifested significant improved postural performance and reduced neck pain scores, as compared to the two conservative treatment groups, and their postural performance had improved to the same level manifested by healthy controls. The conservative treatment groups manifested no consistent significant changes in postural performance or pain scores. Decreased muscular tension due to reduction of cervical pain after surgery and normalization of cervical proprioception are suggested as possible explanations of the improved postural control.

Publication Types: Clinical Trial Randomized Controlled Trial

PMID: 8968971 [PubMed - indexed for MEDLINE]

**Measurement and evaluation of postural load in occupational work situations.**

Westgaard RH.

National Institute of Occupational Health, Department of Physiology, Oslo, Norway.

This paper describes methodological considerations and problems experienced when quantifying muscle load in occupational work situations. A system for the quantification of the health effect of prolonged muscle load on the shoulder muscles is also described. Combined measurements of postural load and health effects can be used in a quantitative evaluation of postural load as a risk factor for the development of musculo-skeletal injury. Postural muscle load may be quantified by electromyography or by biomechanical methods. Problems associated with quantitative electromyography are described, including selective inhibition of functional compartments in a muscle. This phenomenon results in other compartments coming under proportionally higher strain, disturbing the force-EMG calibration curves. It is suggested that fatigue measurements, indicated by a shift in the centre frequency of the EMG frequency spectrum, are not easily used for evaluation of vocational EMG recordings if the purpose is to indicate the risk of occupational muscle injury. Load measurements using biomechanical methods may provide an acceptable alternative to electromyography, but more work is required before these methods can be used on a routine basis. PMID: 3371337 [PubMed - indexed for MEDLINE]


**[Experimental evaluation of displacement of body mass center in the man-chair system during head tilt]** [Article in Russian]

Demirchoglian GG, Konakhevich IuG, Petliuk VKh, Peshkov RV, Khlomenok PN, Sholpo LN, Brazhnik VI.

Experimental data concerning the effect of head shifts on the displacement of body mass center in the man-chair system were obtained. The data helped to derive a quantitative evaluation of the relationship between body mass center displacements and head shifts. This relationship can be used to assess the displacement of body mass center in the man-chair system in response to dynamic effects for which kinematic parameters of head shifts can be measured by well-known methods such as time lapse photography and mathematical modelling.

PMID: 2366499 [PubMed - indexed for MEDLINE]

**Human factors usability test and evaluation.**

**Welch DL.**

DLWelch@Carlow.Com

PMID: 9559116 [PubMed - indexed for MEDLINE]


**[Pain symptomatology in premature infants]**  [Article in French]

**Debillon T, Sgaggero B, Zupan V, Tres F, Magny JF, Bouguin MA, Dehan M.**

Service de reanimation neonatale, hopital Antoine-Beclere, Clamart, France.

BACKGROUND--Assessing pain in premature babies is difficult because of their limited capacities to communicate. The aim of this study was to recognize manifestations of acute and chronic pain or, on the contrary, of well-being state, and to validate a "pain scale" for premature babies. POPULATION AND METHODS--Premature babies less than 28 days of age (most of them less than 32 weeks of gestational age) were carefully observed during their stay in a neonatal intensive care unit by nurses, physicians, physiotherapists and a psychiatrist. All signs and symptoms were collected during situations a priori painful and compared to the behavior of the well-being states. Photographs and videofilms were also analysed. RESULTS--Five items, scored from 0 to 4, were established, based on facial activity, movements and posture of the body, quality of sleep, relationship with the examiner, and efficacy of measures of comforting. These items permitted to describe four patterns corresponding to 1: well-being status, 2: acute pain, 3 and 4: durable pain or discomfort either through clinical picture of irritability or motionlessness. A strict concordance of scores for the five items between the different examiners was found in 80% of the 50 babies studied. The sensibility of the scale (studied in 12 babies) appeared accurate (77% of variation of the scores during hospitalization). CONCLUSIONS--An objective assessment of pain and discomfort in premature babies can be made using a "pain scale" useful for care and therapeutic decisions.

PMID: 7849893 [PubMed - indexed for MEDLINE]
Fatigue and strength of upper limb muscles of flight reservation system operators.

Onishi N, Nomura H, Sakai K.

PMID: 4280403 [PubMed - indexed for MEDLINE]

Man-machine interface: a study of injuries incurred during ejection from U. S. Navy aircraft.

Rice EV, Ninow EH.

PMID: 4689494 [PubMed - indexed for MEDLINE]

Analysis of sitting comfortability of driver's seat by contact shape.

Yamazaki N.

Department of Mechanical Engineering, Faculty of Science and Technology, Keio University, Yokohama, Japan.

In order to evaluate sitting comfort qualitatively, a flexible and very thin sensor was developed to measure the contact shape between a seated man and the seat surface. Each tape has twenty strain gauges on it at regular intervals, and the fourteen tape sensors were arranged on the bottom and back surface of the experimental driver's seat. The contact shapes and postures in thirty two male drivers were measured with two types of seat cushion and sitting posture: free and recommended. Sensory evaluation was made for each experimental condition. The results of the interrelation between the characteristics of the surface deformation, the parameters of body build, sitting posture and feeling of comfort shows that the comfort of each morphological fitting does not correspond to one special and single parameter from those physical factors, but is represented by a function with many parameters related to the deformation, posture and body build. By using these relations, a sensory model for the prediction of the sitting comfort was constructed.

PMID: 1612063 [PubMed - indexed for MEDLINE]

LUBA: an assessment technique for postural loading on the upper body based on joint motion discomfort and maximum holding time.

Kee D, Karwowski W.

Department of Industrial Engineering, Keimyung University, Taegu, South Korea.

This paper presents a technique for postural loading on the upper body assessment (LUBA). The proposed method is based on the new experimental data for composite index of perceived discomfort (ratio values) for a set of joint motions, including the hand, arm, neck and back, and the corresponding maximum holding times in static postures. Twenty male subjects participated in the experiment designed to measure perceived joint discomforts. The free modulus technique of the magnitude estimation method was employed to obtain subjects' discomforts for varying joint motions. The developed postural classification scheme was based on the angular deviation levels from the neutral position for each joint motion. These were divided into groups with the same degree of discomforts based on the statistical analysis. Each group was assigned a numerical discomfort score relative to the perceived discomfort value of elbow flexion, which exhibited the lowest level among all joint motions investigated in this study, and, therefore, was set as a reference point. The criteria for evaluating stresses of working postures were proposed based on the four distinct action categories, in order to enable practitioners to apply appropriate corrective actions. The proposed scheme can be used for evaluating and redesigning static working postures in industry.

PMID: 11461037 [PubMed - indexed for MEDLINE]

40: Occup Health Saf 2000 Jul;69(7):8

On seat height--adjust the workstation, not the worker.

Warnes R.

PMID: 10902112 [PubMed - indexed for MEDLINE]
41: Ergonomics 1994 May;37(5):807-15


**Ergonomic guidelines for the prevention of discomfort of static postures based on endurance data.**

Dul J, Douwes M, Smitt P.

TNO Institute of Preventive Health Care, Department of Posture and Movement Research, Leiden, The Netherlands.

This communication aims to show why guidelines to prevent discomfort of static postures can be based on endurance data, and to give insight in the aim and scope of a recent 'work-rest model for static postures' (WR model). The paper is a response to a recent paper of Mathiassen and Winkel (1992) who questioned the usefulness of discomfort and endurance data, and of the WR model for developing guidelines for static postures. It is concluded that discomfort can be considered as an independent evaluation variable for working postures, anchored in European legislation. Discomfort can be predicted from the 'remaining endurance capacity' (REC) because of a known relationship between the REC and discomfort as measured with the Borg rating scale. The WR model estimates at group level the mean REC of a static posture with or without an external force during and immediately after a work-rest schedule. The WR model is meant to assist practitioners in the assessment and optimization of static postures (and external forces) and work-rest schedules in order to avoid high levels of discomfort.

Publication Types:  Comment      PMID: 8206049 [PubMed - indexed for MEDLINE]

42: J Back Musculoskeletal Rehabil 1998;11(2):89-130

**The origin and relief of common pain.**

Irvin RE.

Section of Osteopathic Principles and Practices, Oklahoma State University, Tulsa, USA.

Where pain of the musculoskeletal system is present, commonly, this pain is without objective evidence of disease, trauma, or disorder. Absence of an apparent cause for common pain prompts the consideration of mechanical stress as a contributing factor. The principal stress of the musculoskeletal system is postural. By posture it is usually meant the distribution of body mass with respect to gravity. Past efforts to predict chronic pain by postural analysis or to reduce such pain by strengthening, conscious control or splinting of posture has had marginal success. Past failure to relate posture to pain is attributable to (1) ubiquity of sub-optimal posture that precludes clinical comparison to those with optimal posture; (2) presupposition that the causal relation between posture and pain is of the observational class of causality rather than the manipulable kind; (3) a definition of posture that is too narrow to complete the picture; and (4) inadequate methods for
reduction of postural asymmetry to an extent that is sufficient to elicit a significant and enduring effect on sub-optimal posture and related pain. Posture can be defined more broadly as the stance of the body performing within the boundaries of posture and which is mediated by the Postural Control System towards greatest stability (Fig. 1). The stance of the body is the arrangement of the body with respect to gravity and other accelerative forces. The postural boundaries are the set of forces that resist acceleration and thereby provide the limits within which one functions stably, and this resistance is currently approximated by six principal sources of resistance to acceleration: viscous, elastic, neuromuscular, rigid, viscoelastic, and inertial. The Postural Control System is located in the brainstem and modulates body stance to more economically and stably effect and resist acceleration. The rigid boundaries can be so with respect to compressive, tractive, or tensile qualities that permits three kinds of motion: translation, rotation and oscillation. An example of postural boundaries that are rigid with respect to compression and tensile character are the bones that bear weight. In contrast, ligaments provide a tractive rigidity and musculotendons a relatively elastic boundary. Joint surfaces are considered boundaries that are rigid but not perfectly so. Of fundamental importance are those joints that arc lowermost in a column of the musculoskeletal system namely: (1) the feet and ankles that support the entirety of the musculoskeletal system and; (2) the base of the sacrum that supports the vertebral spine. This broadened definition of posture leads to a greatly enhanced manipulability of posture in the upright stance and alleviation of more than two-thirds of common pain by the coherent combination of (1) manual manipulation to reduce somatic dysfunction; (2) foot orthotics to optimize the amplitude of the arches of the feet and vertically align the ankle; (3) a heel lift to level the sacral base; (4) and a group of therapeutic postures configured to minimize restriction of peripheral soft tissue reflective of the earlier posture, all aimed to optimize posture. Mediated by the postural control system, manipulation of postural boundaries accordingly modifies the structure and function of the entire musculoskeletal system. Typically, this relief is maintained by foot orthotic and heel lift alone without maintenance by manual manipulation, medication, or exercise.

PMID: 11542803 [PubMed - indexed for MEDLINE]
spine, 6.8% in the thoracic column and 18.2% in the cervical column. The discomfort reported immediately after an eight-hour exposure to whole-body vibration was highly age-dependent. The epidemiological study resulted in an objective conformation of the spinal discomfort reported, 2/3 of which were related by the operators to the lumbar syndrome. Lumbar syndrome (81%) accounted for by far the highest number of spinal disorders. Examinations of the operators with at least ten years of exposure to whole-body vibrations showed that morphological changes in the lumbar spine occur earlier and much more frequently than in the case of non-exposed persons. Problems of etiology and pathogenesis are discussed.

PMID: 3497111 [PubMed - indexed for MEDLINE]

44: Med Inform (Lond) 1997 Oct-Dec;22(4):349-58

Cognition-based development and evaluation of ergonomic user interfaces for medical image processing and archiving systems.

Demiris AM, Meinzer HP.

Deutsches Krebsforschungszentrum (German Cancer Research Center), Div. 0805 Medical and Biological Informatics, Heidelberg, Germany.

Whether or not a computerized system enhances the conditions of work in the application domain, very much demands on the user interface. Graphical user interfaces seem to attract the interest of the users but mostly ignore some basic rules of visual information processing thus leading to systems which are difficult to use, lowering productivity and increasing working stress (cognitive and work load). In this work we present some fundamental ergonomic considerations and their application to the medical image processing and archiving domain. We introduce the extensions to an existing concept needed to control and guide the development of GUIs with respect to domain specific ergonomics. The suggested concept, called Model-View-Controller Constraints (MVCC), can be used to programmatically implement ergonomic constraints, and thus has some advantages over written style guides. We conclude with the presentation of existing norms and methods to evaluate user interfaces.

PMID: 9509405 [PubMed - indexed for MEDLINE]
Postural aberrations in low back pain.

Christie HJ, Kumar S, Warren SA.

Department of Rehabilitation Services, St. Boniface General Hospital, Winnipeg, Canada.

The purpose of this study was to measure and describe postural aberrations in chronic and acute low back pain in search of predictors of low back pain. The sample included 59 subjects recruited to the following three groups: chronic, acute, or no low back pain. Diagnoses included disc disease, mechanical back pain, and osteoarthritis. Lumbar lordosis, thoracic kyphosis, head position, shoulder position, shoulder height, pelvic tilt, and leg length were measured using a photographic technique. In standing, chronic pain patients exhibited an increased lumbar lordosis compared with controls (p < .05). Acute patients had an increased thoracic kyphosis and a forward head position compared with controls (p < .05). In sitting, acute patients had an increased thoracic kyphosis compared with controls (p < .05). These postural parameters identified discrete postural profiles but had moderate value as predictors of low back pain. Therefore other unidentified factors are also important in the prediction of low back pain.

PMID: 7717811 [PubMed - indexed for MEDLINE]

PACS. The human side.

Cannavo M.

PMID: 10162611 [PubMed - indexed for MEDLINE]
Converting Chattecx Balance System vertical reaction force measurements to center of pressure excursion measurements.

Grabiner MD, Lundin TM, Feuerbach JW.

Department of Biomedical Engineering, Cleveland Clinic Foundation, OH 44195.

BACKGROUND AND PURPOSE. The purpose of this study was to determine the precision with which the postural stability data generated by the Chattecx Balance System could be converted to center of pressure displacement measurements. SUBJECTS. Two men and one woman were selected to represent a broad range of body sizes (age = 23-33 years, height = 154-175 cm, weight = 45-80 kg). METHODS. The Balance System load cells were placed on a force plate, and data were collected simultaneously from the Balance System and the force plate while the subjects performed standardized postural tasks. Linear regression analysis was used to characterize the relationship between the estimated center of pressure from the Balance System and the calculated center of pressure from the force plate. RESULTS. Significant linear relationships between the center of pressure estimated from the Balance System and the center of pressure calculated from the force plate were determined (all R2 values = > .90). CONCLUSION AND DISCUSSION. System data can be converted, and the methods recommended for use with the Balance System are described.

PMID: 8469715 [PubMed - indexed for MEDLINE]

Principles of quantitative evaluation of the difficulty and intensity of work, based on physiological studies

Novakatikian AO, Kundiev Iul, Okhrimenko AP, Maksimova OF, Vasilenko Iul.

PMID: 5142910 [PubMed - indexed for MEDLINE]

[Demanding work, today]

[Article in Italian]

Vittadini G, Scarpa G.

Wearing work is an old problem of occupational medicine which seems to be resolved by technological progress and progressive disappearance of physical fatigue. On the contrary in these new working conditions new physical and psychical possibilities of wearing work take place and they are less conspicuous but not less important than old conditions. Some examples of such conditions are provided and some possible solutions are proposed.

PMID: 3836914 [PubMed - indexed for MEDLINE]

50: Spine 1985 Dec;10(10):872-7

An epidemiologic study of the relationship between postural asymmetry in the teen years and subsequent back and neck pain.

Dieck GS, Kelsey JL, Goel VK, Panjabi MM, Walter SD, Laprade MH.

This epidemiologic study examined the relationship between postural discrepancies in the posterior plane and the subsequent development of back and neck pain. The study population comprised women who were members of the graduating classes of 1957, 1958, and 1959 of an eastern U.S. women's college. Information on postural asymmetry was gathered from two sources: (1) measurements made from posture pictures taken early in the freshman year of college and obtained from each woman in the study, and (2) subjective evaluations made by the physical education department faculty at the time of examination. Information on the development of back and neck disorders and associated risk factors during the subsequent 25 years was obtained by a postal questionnaire. Three parameters of postural asymmetry were examined from the posture picture measurements: elevation of one shoulder, elevation of one hip, and deviation of the spine from the midline of the body. None of these parameters nor the physical education department evaluations was associated with a subsequent report of low-back pain, mid-back pain, or neck pain.

PMID: 2938272 [PubMed - indexed for MEDLINE]
An evaluation of ergonomic improvements in the woodworking industry.

Burdorf A, van Duuren L.

Institute of Occupational Health, Erasmus University, Rotterdam, The Netherlands.

A survey was conducted among operators in the woodworking industry to study the effect of machine characteristics on exposure to mechanical load. The 28 subjects worked in five small factories and operated four-sided planing machines. Work postures and external load were analysed with the Ovako working posture analysis system. Among the operators awkward postures regularly occurred, such as a bent or twisted back (25%), outstretched arms (25%) and a twisted head (28%). The average percentage of time spent with lifting and carrying wooden boards and planks was 41%. The statistical analysis indicated that beneficial effects on postural load were achieved by various ergonomic improvements, such as rising platforms and roller paths. Work time with external load was reduced by 10% as a result of the presence of rising platforms and tables. The type of analysis presented may guide towards the improvement of work conditions of operators of planing machines by reducing mechanical load on the body.

PMID: 8304682 [PubMed - indexed for MEDLINE]

[3-D evaluation of posture in normal and scoliotic adolescents]

[Article in French]

Le Blanc R, Labelle H, Poitras B, Rivard CH, Kratzenberg J.

Centre de Recherche, Hopital Sainte-Justine, Universite de Montreal, Quebec, Canada.

We have developed a new clinical evaluation of the human posture based on 3D digitization with magnetic fields. This 3D postural evaluation displays the relative position of the head, the shoulders and the pelvis. The main purpose is to identify key morphological parameters in order to demonstrate significant differences between 2 groups of subjects. Nineteen adolescent control subjects and 22 patients with AIS have been evaluated. The t-tests showed significant statistical differences between the 2 groups for every measurements studied. The 2 most significant were tilt of the shoulders in the postero-anterior plane and the angle of the shoulder-blades vs the shoulders in the transverse plane (p < 0.0005). These results support the value of the 3D postural evaluation as a clinical tool for the evaluation of AIS. This technique is non-invasive and could be used for the clinical follow-up in order to evaluate the postural evolution in scoliotic patients. PMID: 9035436 [PubMed - indexed for MEDLINE]
53: Med Monatsschr Pharm 1990 Sep;13(9):276-82

[Postural problems at the work site. Prevention of pain and physical damage by proper sitting, standing, gait and lifting]  [Article in German]

Senn E.

Klinik fur physikalische Medizin, Klinikum Grosshadern, Munchen.

PMID: 2233506 [PubMed - indexed for MEDLINE]

54: Appl Ergon 1997 Apr;28(2):139-43

Measurement variability in upper extremity posture among VDT users.

Ortiz DJ, Marcus M, Gerr F, Jones W, Cohen S.

Georgia Tech Research Institute, Georgia Institute of Technology, Atlanta, USA.

Hand and arm posture while keying is frequently mentioned as a risk factor for upper extremity musculoskeletal disorders (UEMSDs) among video display terminal (VDT) operators. However, many epidemiologic studies have not included measures of posture of VDT operators, in part, because of the difficulty of assessing posture rapidly and reliably among large numbers of subjects. For a single measure of posture to be useful for estimating dose-response relationships between posture and risk of UEMSDs, the within-subject variability of the postural measure must be smaller than the between-subject variability of the postural measure. In addition, the measure must be stable over time. We estimate the ratio of between- to within-subject variability for manual goniometry by measuring six postural angles on six occasions among 19 subjects using VDTs. For each postural angle, between-subject variability was substantially and statistically significantly larger than within-subject variability. Stability of postural measures over time was sufficient to justify a single postural measurement in epidemiologic studies. We conclude that manual goniometry can provide useful information about upper extremity posture among VDT users for use in epidemiologic studies of UEMSDs.

PMID: 9414349 [PubMed - indexed for MEDLINE]
Incidence of common postural abnormalities in the cervical, shoulder, and thoracic regions and their association with pain in two age groups of healthy subjects.


Philadelphia Institute for Physical Therapy, PA 19104.

The purposes of this study were to identify the incidence of postural abnormalities of the thoracic, cervical, and shoulder regions in two age groups of healthy subjects and to explore whether these abnormalities were associated with pain. Eighty-eight healthy subjects, aged 20 to 50 years, were asked to answer a pain questionnaire and to stand by a plumb line for postural assessment of forward head, rounded shoulders, and kyphosis. Subjects were divided into two age groups: a 20- to 35-year-old group (mean = 25, SD = 63) and a 36- to 50-year-old group (mean = 47, SD = 2.6). Interrater and intrarater reliability (Cohen's Kappa coefficients) for postural assessment were established at .611 and .825, respectively. Frequency counts revealed postural abnormalities were prevalent (forward head = 66%, kyphosis = 38%, right rounded shoulder = 73%, left rounded shoulder = 66%). No relationship was found between the severity of postural abnormality and the severity and frequency of pain. Subjects with more severe postural abnormalities, however, had a significantly increased incidence of pain, as determined by chi-square analysis (critical chi 2 = 6, df = 2, P less than .05). Subjects with kyphosis and rounded shoulders had an increased incidence of interscapular pain, and those with a forward-head posture had an increased incidence of cervical, interscapular, and headache pain.

PMID: 1589462 [PubMed - indexed for MEDLINE]

Interface pressure and the prediction of car seat discomfort.

Gyi DE, Porter JM.
Department of Design and Technology, Loughborough University, Leicestershire, UK.
d.e.gyi@lboro.ac.uk

The technique of interface pressure measurement has generated considerable interest in the automotive industry as a method, which could be used to predict driver discomfort during the development of prototype seat designs. Two repeated measures experiments were carried out to evaluate the practical application of the technique. The variables of foam density and posture were used to create discomfort, the whole emphasis of the work being to generate results with real-world applicability. A clear, simple and consistent relationship between interface pressure and driving discomfort was not identified. Future studies using this technique should provide information regarding such factors as gender, body mass, anthropometric data, posture and foam hardness due to the confounding nature of these variables.

Publication Types: Clinical Trial PMID: 10098803 [PubMed - indexed for MEDLINE]
57: Ergonomics 1991 Jul;34(7):909-18

Postural load and back pain of workers in the manufacturing of prefabricated concrete elements.

Burdorf A, Govaert G, Elders L.

Institute of Occupational Health, Medical Faculty, Erasmus University Rotterdam, The Netherlands.

In a population of male workers in a concrete manufacturing plant (n = 114), the occurrence of back pain was studied in relation to a control group of maintenance engineers (n = 52). The prevalence of back pain in the 12 months preceding the investigation was 59% among the concrete workers, and 31% among the controls. After excluding persons with existing back pain before starting work in the present factory, a comparison between concrete workers and maintenance engineers showed an aged-adjusted odds ratio for back pain of 2.80 (1.31-6.01). Postural load of workers in both plants were measured using the Ovako Working posture Analysis System. During 4009 observations working postures concerning the back, lower limbs, and lifting activities were recorded. The average time spent working with a bent and/or twisted position of the back was found to contribute to the prevalence of back pain. The results of this study also suggest that exposure to whole-body vibration, due to operating vibrotables, is a second risk factor for back pain. PMID: 1833181 [PubMed - indexed for MEDLINE]


The relationships between biomechanical and postural stresses, musculoskeletal injury rates, and perceived body discomfort experienced by industrial workers: a field study.

Stuebbe P, Genaidy A, Karwowski W, Kwon YG, Alhemood A.

Industrial and Manufacturing Engineering Program, University of Cincinnati, OH 45221-0072, USA.

A combination of archival, subjective, and observational field data collection methods were used to investigate the relationship between biomechanical and postural stresses, and the resulting physical strain experienced by industrial workers of a packaging plant. Assessment of physical strain was based on the number and incidence rate of Occupational Safety and Health Administration (OSHA)-reportable injuries that were recorded over a period of 27 months, and based on the self-reported ratings of perceived body discomfort. Both the biomechanical and postural stresses correlated with the musculoskeletal injury rate. The results illustrate the usefulness of postural and biomechanical analyses for assessing the risk of injury in industry. PMID: 12067514 [PubMed - indexed for MEDLINE]
Practice, problems and compliance with postural drainage: a survey of chronic sputum producers.

Currie DC, Munro C, Gaskell D, Cole PJ.

Fifty outpatients with chronic respiratory disease, who had previously been requested to perform regular postural drainage, were asked to complete a questionnaire designed to assess their usual practice of postural drainage, their impression of its value and their problems and compliance with it. The group performed a median of one session of postural drainage lasting 15 minutes daily, increasing to two sessions lasting nearly 40 minutes daily during exacerbations of chest symptoms. Seventeen patients had difficulty finding time for postural drainage, 15 found it distasteful and in 17 postural drainage caused discomfort or pain. Twenty-seven patients were judged to be performing inadequate postural drainage, despite individual initial instruction and regular follow-up in a respiratory outpatient clinic. Other diverse reasons for poor compliance revealed by the survey are discussed and recommendations made to encourage improved compliance.

PMID: 3790415 [PubMed - indexed for MEDLINE]

Ideokinetic imagery as a postural development technique.

Fairweather MM, Sidaway B.

Department of HPERD at Louisiana State University, Baton Rouge.

In two experiments we examined the effectiveness of ideokinetic imagery and flexibility combined with abdominal strength training as methods for improving the spinal angles of lordosis and kyphosis and reducing low back pain. Ideokinetic imagery is a postural development technique that involves using movement images to gain subcortical control over the spinal musculature. Experiment 1 investigated the effectiveness of these treatments for males with a previous history of low back pain. Findings indicated that only ideokinetic imagery had a positive effect on the spinal column and low back pain. Experiment 2 extended these findings by investigating males and females using a noninvasive video analysis technique to record changes in spinal angles. This study further supports the effectiveness of ideokinetic imagery as a postural development technique in males with acute spinal angles. In these subjects spinal angles improved significantly, and the subjects reported complete cessation of low back pain. This research supports the use of ideokinetic imagery as an inexpensive and noninvasive technique to improve poor posture and reduce low back pain.

Publication Types: Clinical Trial Randomized Controlled Trial
PMID: 8278664 [PubMed - indexed for MEDLINE]

**Ergonomics moves beyond positions, postures.**

PMID: 4430539 [PubMed - indexed for MEDLINE]


**The contribution of ergonomics to work study.**

de Jong JR.

PMID: 6074339 [PubMed - indexed for MEDLINE]


**Positioning of aircrews--ultima ratio of G protection?**

Von Beckh HJ.

PMID: 5055607 [PubMed - indexed for MEDLINE]


**Man in the control room.**

PMID: 4161217 [PubMed - indexed for MEDLINE]


Rundcrantz BL, Johnsson B, Moritz U.

Department of Physical Therapy, University of Lund, Sweden.

The aim of the investigation was to study the frequency of pain, ache and discomfort in the musculoskeletal system among dentists, above all concerning headache, cervical and shoulder pain and further, to find possible correlations between these symptoms and various working positions and different working actions. A questionnaire was answered by
359 dentists (90.8%). Of those who answered the questionnaire 72% had pain and discomfort from either the neck, shoulders or headaches. Only 60 dentists had no pain or discomfort. Concerning the male dentists, the investigation revealed that younger dentists had pain and discomfort in the neck, shoulders and headaches to a greater extent than the older dentists. Younger female dentists had a significantly higher frequency of pain and discomfort in the neck and headaches than older colleagues. The results showed that dentist who positioned the patient carefully so that a direct view gained had a significantly lower frequency of headaches. Of the 359 dentists 55% mostly used the mirror to facilitate a direct view. From the answers it was clear that those dentists who did not have discomfort in the upper locomotor system used the mirror more often than those who did suffer discomfort. PMID: 2142828 [PubMed - indexed for MEDLINE]


[Industrial health care in the limelight (3). Ergonomy is respect for humanity]  [Article in Swedish]

Yllo A.

PMID: 5450565 [PubMed - indexed for MEDLINE]


Management issues in automating medical systems.

Brown B, Harbort B, Kaplan B.

The nontechnical aspects of medical computing systems are as important as the technical. In order to understand why, it is important to consider the social context of systems, the human engineering necessary for medical systems to work, and the specifics of the man-machine interface. It is also necessary to plan for the change which comes with any new method. This paper contains a discussion of these topics, concluding with a set of guidelines for change-management which we feel organizes the data of years of experience into a systematic approach.

PMID: 10259107 [PubMed - indexed for MEDLINE]
68: Muscle Nerve 1999 May;22(5):635-9

**Assessing muscle stiffness from quiet stance in Parkinson's disease.**

**Lauk M, Chow CC, Lipsitz LA, Mitchell SL, Collins JJ.**

Center for BioDynamics, and Department of Biomedical Engineering, Boston University, Massachusetts 02215, USA.

In previous studies, we developed a postural stiffness measure that is extracted from foot center-of-pressure (COP) trajectories from quietly standing individuals and is based on an analytical mechanical model of posture control. Here we apply this measure to patients with Parkinson's disease (PD). We correlated the postural stiffness measure with different clinical rating scales, obtained from patients. Kendall's rank correlation was highly significant between the stiffness measure and rigidity, bradykinesia, posture impairment, gait, and leg agility, respectively, as rated by the Unified Parkinson's Disease Rating Scale. These results provide further evidence that a higher intrinsic muscle stiffness may contribute to the aforementioned clinically defined symptoms. From a clinical standpoint, this work indicates that the proposed postural stiffness measure may be useful as an assessment tool for the evaluation of PD patients subsequent to pharmacological and surgical treatment. PMID: 10331364 [PubMed - indexed for MEDLINE]


**[Means of enhancing the work capacity of ship's operator specialists]**

[Article in Russian]

**Belyi IuN, Kazennyi IuB.**

PMID: 3439053 [PubMed - indexed for MEDLINE]

70: Fiziol Zh 1983 Jan-Feb;29(1):74-8

**[Relationship of the quality of information processing to the level of professional activity of the human operator]**  [Article in Russian]

**Makarenko NV.**

PMID: 6832422 [PubMed - indexed for MEDLINE]

**Static posture tests for the assessment of postural instability after virtual environment use.**

**Cobb SV, Nichols SC.**

Virtual Reality Applications Research Team, Department of Manufacturing Engineering and Operations Management, University of Nottingham, University Park, UK. epzsvc@epnl.maneng.nottingham.ac.uk

The aim of this experiment was to measure the effect of immersion in a virtual environment (VE) on postural stability and examine the relationship between postural stability and self-reported simulator sickness. Forty healthy subjects were exposed to 20 min of immersion in an interactive VE with restricted user movement. The VE was viewed on a head mounted display (HMD) and the subject remained standing throughout the immersion period. Two static postures, normal stance and tandem romberg, were recorded before immersion, immediately after immersion and again at 10 min postimmersion. Performance in each posture was simultaneously measured by recording time that the posture could be maintained and mm path length of body sway over a 30-s period. The results demonstrated differences in the sensitivity of postural stability measurement techniques and variations in inter- and intraindividual responses to measures. Sway magnetometry measured a significant increase in postural instability in normal stance after VE immersion. None of the other measures were sensitive to this change. Postimmersion reports of simulator sickness symptoms indicate that the VE stimulus was provocative and correlation was found between reports of simulator sickness and balance-related symptoms. However, no association between self-reported symptoms and performance measures of postural instability was found.

Publication Types: Clinical Trial PMID: 10052574 [PubMed - indexed for MEDLINE]

72: JAMA 1974 Apr 29;228(5):591-4

**Criteria in the choice of a computer system. I. The computer in theory.**

**Raymond S.**

PMID: 4594634 [PubMed - indexed for MEDLINE]
73: Gig Tr Prof Zabol 1989;(10):1-4

[The relation of indices of the functional status of computer operators to the quality of the image on display terminals] [Article in Russian]

Doskin VA, Beliavskaiia VI, Khramtsov PI, Kozlovskii SM, Koval'kova SL.

PMID: 2687131 [PubMed - indexed for MEDLINE]

74: Ind Health 1986;24(4):173-89

The effect of VDT work on the fluctuations of accommodation.


PMID: 3818361 [PubMed - indexed for MEDLINE]

75: Ergonomics 1971 Sep;14(5):617-23

Hardware problems in ergonomics measurements.

Rosenbrock F. PMID: 5148239 [PubMed - indexed for MEDLINE]


Ergonomic aspects of portable personal computers with flat panel displays (PC-FPDs): evaluation of posture, muscle activities, discomfort and performance.

Villanueva MB, Jonai H, Saito S.

National Institute of Industrial Health, Kawasaki, Japan.

The advent of compact and lightweight portable personal computers has offered its users mobility. Various sizes of PC-FPDs can now be seen in the occupational setting as an alternative to the desktop computers. However, the increasing popularity of this relatively new technology may not be without any accompanying problems. The present study was designed to evaluate the use of PC-FPDs in terms of postural changes, muscle load, subjective complaints and performance of the subjects. Ten subjects, 5 males and 5 females, were asked to perform a text-entry task for 5 minutes using each of the 5 types of personal computers--1 desktop and 4 PC-FPDs of various sizes. Results showed that the posture assumed by the subjects while using the PC-FPDs was significantly more
constrained than that assumed during work with the desktop computer. Viewing and neck angles progressively lowered and the trunk became more forward inclined. The EMG results also revealed that the activities of the neck extensor in PC-FPDs were significantly higher than in the desktop computers. Trends of increasing discomfort and difficulty of keying with the use of smaller PC-FPDs were noted. Performance was significantly lower for smaller PC-FPDs. This study shows that PC-FPDs have ergonomic attributes different from the desktop computer. An ergonomic guideline specific for PC-FPDs users is needed to prevent the surge in health disorders previously seen among desktop computer users.

PMID: 9701908 [PubMed - indexed for MEDLINE]


[Terminology questions in the problem of the human suitability of items of weaponry and military technology] [Article in Russian]

D'iakonov MM, Skorniakov VV, Shabalin VA.

PMID: 8109091 [PubMed - indexed for MEDLINE]

78: Ergonomics 1971 Sep;14(5):571-7

Variation of operator's strategies and regulating effects on workload.

Spearandio JC. PMID: 5148233 [PubMed - indexed for MEDLINE]


An analysis of posture and back pain in the first and third trimesters of pregnancy.

Franklin ME, Conner-Kerr T.

School of Allied Health Sciences, Department of Physical Therapy, Medical College of Georgia, Augusta 30912-0800, USA.

While the incidence of back pain during pregnancy has been shown to be high, few studies have investigated postural changes that occur during pregnancy and their relationship to back pain. The purpose of this study was to determine if posture and back pain changed from the first to the third trimester of pregnancy and whether there was a relationship between the two. Twelve healthy women who were having uncomplicated pregnancies participated in the study. During the first and third trimesters, each subject had their standing posture and back pain assessed by a Metrecom Skeletal Analysis System and a 0-
to 10-cm line pain scale, respectively. Repeated measures analysis of variance and Pearson correlation coefficients were calculated on or between back pain and nine posture variables and revealed significant increases in third trimester back pain and postures compared with first trimester back pain (p < .05) and postures for lumbar angle (p < .01), posterior head position (p < .01), right pelvic sagittal tilt (p < .01), and left pelvic sagittal tilt (p < .01). No significant relationships were found between magnitude of or change in posture and back pain. These results suggest that in the standing position the lumbar lordosis and sagittal pelvic tilt increased and head position become more posterior as women progressed from the first trimester to the last trimester of pregnancy. These postural changes, however, were not related to back pain. This suggests that many of the posture-correcting clinical exercise regimens given to pregnant women need to be investigated.

PMID: 9742469 [PubMed - indexed for MEDLINE]


Evaluating speech-recognition work.
Lea WA. PMID: 5426313 [PubMed - indexed for MEDLINE]


Pain and discomfort in the musculoskeletal system among dentists.
Rundcrantz BL.

Department of Physical Therapy, University of Lund, Sweden.

The dentists in the Public Dental Service were found to have a high prevalence of pain and discomfort in the locomotor system. Only 60 (17%) dentists reported no pain or discomfort in the study in 1987. Of 359 dentists 72 per cent reported headache and pain and discomfort in the neck and shoulders. Female dentists had a higher prevalence of pain and discomfort. Younger dentists had pain and discomfort in the neck, shoulders and headaches to a greater extent than older dentists. Male dentists, who positioned their patient carefully to gain a direct view suffered less from headache. Furthermore, dentists who used the mirror reported less headache and pain and discomfort in the shoulders. Differences in working position in a simulated case were analysed during a visit to the workplace of 143 dentists. The ergonomic examination showed that dentists without symptoms applied a wedge cushion under the upper part of the patient's back to obtain an optimum view when they examined tooth 2 6 d. They also made use of the pauses intrinsic in the work. The dentists with symptoms experienced the workload as more unsatisfactory, were more burdened by anxiety, had poorer psychosomatic health and less confidence in the future than the dentists without symptoms. Specialists, both with and without cervico-brachial symptoms, were more satisfied with their personal control over their work and the stimulation from their work than were general practitioners. The specialists also had more self-confidence, and experienced less anxiety than general practitioners and head dentists.
Physiotherapy with a psychosomatic approach and individual ergonomic instruction gave better relief from pain and discomfort and an increased feeling of mental well-being than did ergonomic instruction only. In the prospective study it was found that the prevalence of musculoskeletal pain and discomfort had increased since 1987, except with respect to low back pain and headache. However, the only significant difference was found with respect to the shoulders. As in 1987, female dentists had a higher prevalence of pain and discomfort in the neck and shoulders than their male colleagues in 1990. It can be concluded that pain and discomfort in the locomotor system among dentists had a high incidence. The high incidence among dentists could not be explained by the ergonomic risk factors such as positioning of the patient, use of the mirror or alteration of the dentist's position. Regression analysis showed that personal harmony and age had the highest value for explaining the number of painful sites in the musculoskeletal system.

PMID: 1830174 [PubMed - indexed for MEDLINE]

---


**A man-machine model for evaluation of the tactile Vocoder.**

*Aston R, Weed HR.*  PMID: 5155345 [PubMed - indexed for MEDLINE]

---


**[Postural disorders in children and adolescents]**  [Article in German]

*Fialka-Moser V, Uher EM, Lack W.*

Universitatsklinik fur Physikalische Medizin und Rehabilitation, Wien.

Posture is defined as the upright well balanced position of an individual person. A postural fault is a posture that deviates from normal alignment without structural limitations. Postural faults are established in adolescence causing pain syndromes in adulthood. Major components of spinal structure and function are reviewed. The dynamics of posture are described. Characteristics and etiology of common postural faults in childhood and adolescence are characterised. Based on standardised diagnostic techniques, principles of how to manage posture and treatment of postural dysfunctions are discussed.

Publication Types:  Review  Review Literature

PMID: 7709633 [PubMed - indexed for MEDLINE]

[Methods for the measurement of anthropometric parameters for ergonomic design of working places] [Article in Italian]

Grieco A, Masali M.

PMID: 5149863 [PubMed - indexed for MEDLINE]

85: Ergonomics 1971 Sep;14(5):557-64

Conflicting criteria in evaluating air traffic control systems.

Hopkin VD.

PMID: 5148231 [PubMed - indexed for MEDLINE]


The School of Posture as a postural training method for Paraiba Telecommunications Operators.

Cardia MC, Soares Masculo F.

Production Engineering Department, Paraiba Federal University, Brazil.
claudiagatto@ig.com.br

This work proposes to show the experience of posture training accomplished in the Paraiba State Telecommunication Company, using the knowledge of the Back School. The sample was composed of 12 operators, employees of the company, representing 31% of this population. The model applied in TELPA (Paraiba Telecommunication Company, Brazil) was based on the models of Sherbrooke, Canada, and of the School of Posture of Paraiba Federal University. Fifty-eight point four percent of participants showed a reduction of column pain, 25% improved the quality of the rest and the received training was considered enough for the learning of correct postures at work in 75% of the cases. The whole population approved of the training, and 83.3% of the cases considered that this training influenced their lives very positively.

PMID: 11543704 [PubMed - indexed for MEDLINE]

[Evaluation of operator's mental capacity by using an automatic device]  [Article in Russian]

Mozin VA, D'iakonov IF.  PMID: 7445458 [PubMed - indexed for MEDLINE]

88: Ergonomics 1971 Sep;14(5):611-6

The use of subjective rating.

Philipp U, Reiche D, Kirchner JH.  PMID: 5148238 [PubMed - indexed for MEDLINE]


Postural stress in geriatric nursing.

Baty D, Stubbs DA.

Ergonomics Research Unit, Robens Institute, University of Surrey, Guildford, U.K.

An assessment has been made of the static and dynamic forces and postures involved in the nursing day using direct observations and an assessment of truncal stress by means of intra-abdominal pressure (IAP). Subjects were nurses working in the specialty of geriatric nursing in four health regions. Levels of postural activity with regard to stooping, standing, walking and sitting accounted for 98% of the total shift time. Stooping activity was observed at a level of 22% overall which, from the literature, would suggest an increased risk for back pain. Of further concern was the uneven distribution of postural stress with respect to the component hours within shifts. Comparisons of IAP data with other studies indicate that the subjects examined in this study are neither within the 'low' nor 'high' back pain risk categories. This finding, however, should be taken in the context of the high levels of static postural stress reported and the possible cumulative and interactive effects of static and dynamic load. The implications of these findings are discussed in terms of the work system as a whole and attention is drawn to recent recommendations with respect to the prevention of back pain within the nursing profession.

PMID: 2961712 [PubMed - indexed for MEDLINE]


Patient-controlled analgesia.

Publication Types:  Editorial  PMID: 6101741 [PubMed - indexed for MEDLINE]
Musculoskeletal discomfort of music teachers: an eight-year perspective and psychosocial work factors.

Fjellman-Wiklund A, Sundelin G.

Occupational Health Care Center, Skelleftea Municipality, Skelleftea, Sweden. KH-AFV@skelleftea.se

Musicians at all levels of performance, especially string players, are known to have a high prevalence of work-related musculoskeletal disorders. The disorders seem to be most common in the neck, shoulders and low back. In 1988, a survey of the work-related musculoskeletal disorders of 36 music teachers was carried out at a music school in northern Sweden. In 1996, the teachers were reinvestigated. The study also included an investigation of the psychosocial work environment according to the Karasek demand-control theory, as well as measurements of upper-arm elevation during a working day in five violin teachers. The results showed that music teachers, like other professional musicians, often experience discomfort in the neck, shoulders, and low back. The discomfort tended to be of long duration, increasing over the years. The psychosocial work environment was characterized by high psychological demands and low authority over decisions. This was compensated for through good social support. The work required skill and creativity but was monotonous. The measurements of upper-arm elevation indicated considerable variations in shoulder positions between teachers. There were also differences in the work done with the right and left arms, with repetitive motions more commonly involving the right arm. Approximately a fourth of the working day was spent with the arm elevated 30-90 degrees. The relationships between upper-arm movements and ratings of discomfort were moderate.

PMID: 10026470 [PubMed - indexed for MEDLINE]

Posture, postural discomfort, and performance.

Bhatnager V, Drury CG, Schiro SG.

PMID: 4018811 [PubMed - indexed for MEDLINE]

**Effect of model complexity and gait criteria on the synthesis of bipedal locomotion.**

**Townsend MA, Seireg AA.** PMID: 4754317 [PubMed - indexed for MEDLINE]

94: Aviat Space Environ Med 1987 May;58(5):461-7

**Back pain in helicopter aircrew: a literature review.**

**Bowden T.**

Back pain in helicopter aircrew has been reported by the med services of many countries. The problem is compared to the similar phenomenon of back pain in civilian industrial groups, particularly drivers and the operators of heavy equipment. In both drivers and helicopter aircrew, posture and vibration exposure have been identified as causes of the back pain. The significance of these factors, and the mechanisms that relate them to the discomfort, and possible solutions are discussed.

Publication Types: Review PMID: 2954530 [PubMed - indexed for MEDLINE]

95: Ergonomics 1995 Dec;38(12):2485-503

**Postural adaptations to workbench modifications in standing workers.**

**Whistance RS, Adams LP, van Geems BA, Bridger RS.**

Department of Biomedical Engineering, University of Cape Town Medical School, South Africa.

Surveys have shown that many workers operate under conditions that require constrained standing. The aim of this study was to investigate postural adaptations in constrained standing to facilitate the development of design guidelines for standing workspaces. Standing postures were observed in six different workspaces that were designed using combinations of task distance (which was either constrained or unconstrained) and foot position (which was constrained, unconstrained or employed a footrest). Subjects at work were recorded stereophotogrammetrically and postural variables were obtained in three dimensions. Postural adaptation to increased task distance was found to be characterized by increased trunk flexion and increased hip flexion while adaptation to close work was found to be characterized by increased neck flexion and increased thoracic kyphosis. Constrained foot position resulted in increased hip flexion accompanied by increased plantar flexion. Although use of the footrest resulted in some reduced lumbar lordosis, it increased trunk flexion and was not associated with significantly less discomfort than any of the other workspaces. PMID: 8586077 [PubMed - indexed for MEDLINE]

Humanics ErgoSystems, Inc.
The impact of keyboard design on comfort and productivity in a text-entry task.

Swanson NG, Galinsky TL, Cole LL, Pan CS, Sauter SL.

National Institute for Occupational Safety and Health, Cincinnati, Ohio 45226, USA.

Concerns have arisen that the keyboard is a causative factor in the development of work-related musculoskeletal disorders (WRMDs) among video display terminal (VDT) operators. A number of alternative keyboard designs have been developed with altered geometry in an effort to improve comfort in keyboard operation. However, few data are available to substantiate whether these new keyboard designs are actually effective in reducing discomfort and musculoskeletal problems in users. The purpose of this study was to provide data on the efficacy of certain alternative keyboard design features (e.g. splitting the keyboard in half, and laterally inclining the keyboard halves) in reducing fatigue and musculoskeletal discomfort among keyboard operators. The study also explored the effects of these design features on performance. Fifty subjects performed a text-entry task for one day on a standard keyboard, then were assigned to one of five keyboard conditions for an evaluation period of two days (i.e. 10 subjects/condition). Outcome measures included performance (i.e. keystrokes/h, errors/h) and self-report measures of discomfort and fatigue. The results indicated an initial decline in productivity when subjects began typing on two of the alternative keyboards, but these productivity losses were recovered within the two-day evaluation period. The results also indicated no significant differences between keyboard conditions in discomfort and fatigue. These results suggest a minimal impact of the keyboard design features examined in this study on productivity, comfort and fatigue, at least after two days of exposure.

Publication Types: Clinical Trial  Controlled Clinical Trial

PMID: 9414336 [PubMed - indexed for MEDLINE]

[Information interaction of the man-aircraft system as a problem in aviation medicine]

[Article in Russian]

Lapa VV.

The importance of psychophysiological optimization of information interaction in the man-flying vehicle system is discussed having in view maintenance of good health and enhancement of efficiency and reliability of pilots. Several examples are presented that show the necessity of taking into consideration psychophysiological mechanisms, which regulate pilot's activities, in order to develop modified methods of information presentation and display.

PMID: 2761206 [PubMed - indexed for MEDLINE]