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The Use of Ergonomic Analysis in Medical Causation Cases

Vic Zuccarello, OTR/L, C.E.A.S. II, ABDA
BIO-ERGONOMICS, INC.
St. Louis, MO

Role of the Healthcare Provider in Determining Medical Causation

The role that healthcare providers fill in industry continues to expand as insurance companies, attorneys, physicians, and employers realize the unique combination of skills that occupational therapists, physical therapists, nurses, and other health disciplines bring to the table. Especially true with occupational therapists (OTs) and physical therapists (PTs), few professions combine the principles of anatomy, physiology, kinesiology, and task analysis in the same these occupations do way these occupations do in day-to-day practice. The applied distillation of all of these skills, when combined with workers' compensation law, is increasingly called into practice when the healthcare provider performs an ergonomic analysis used in medical causation. This article describes the healthcare provider's role in this process and outlines the manner in which these specialized assessments are performed.

Medical Causation Defined

Causation refers to an act that produces an effect. In forensics, *medical causation* is a medical/legal process in which a set of elements are examined in order to determine whether those elements produced a claimed effect. In workers' compensation, this process is used as a mechanism by which an event is alleged to have caused a condition and/or an injury claimed to be work-related. The process is 'medical' because it consists of analysis processes performed by a physician and a healthcare provider relative to a medical problem. It is a 'legal' process because the process by which the condition is deemed compensable or work-related is argued in court and ruled upon by a judge. Injuries alleged as work-related often seen in medical causation cases are to the spine, upper back and shoulder (National Institutes of Occupational Safety and Health, 1997), and to the elbow, wrist, and fingers (Chin and Jones, 2002).

Goal of the Medical Causation Process

The goal of the medical causation process in these cases is determination of a cause-and-effect relationship between a set of job tasks and a workers' claim of work-related injury. In these cases, it is not a question of whether the worker has a medical problem. Indeed, these workers have a

legitimate, diagnosed medical condition, such as a neuropathy or an inflamed tendon or ligament. It is a question of how the condition occurred, either primarily as a result of a set of job tasks or as a result of a pre-existing medical condition that has been exacerbated by a set of job tasks (Fisher et al, 2004).

Work-Related Injury, Disease, or Condition

Increasing medical evidence has supported the opinion that the manner in which these motions produce an effect on the human body, to a large extent, may be affected by the health of the individual (Werner et al, 2005). For example, carpal tunnel syndrome, formerly assumed as primarily a work-related injury, occurs in the general population at similar rates regardless of the type of work performed (Atroshi et al., 1999) and has been considered by some to be a product of a somatization disorder in which there exists physical symptoms without an identifiable physical origin versus a true physical injury (Barsky and Borus, 1999). Disease processes or conditions can predispose certain workers to development of a cumulative trauma condition. These diseases include arthritis, renal disease, hypothyroidism, obesity, and others. Besides disease, females are three times more likely to develop cumulative trauma disorders because of certain hormonal effects caused by menopause, or from the temporary effects of pregnancy. Finally, lifestyle habits can predispose a worker to development of cumulative trauma conditions, and these can include secondary employment, smoking, drug or alcohol use, high risk or repetitive hobbies (Falkiner and Myers, 2002).

Many states have provisions in their laws that differ in the burden of proof required to begin the workers' compensation benefits process. For example, in the State of Missouri, the current standard is that the job must be "the prevailing factor" for an injury in order for that injury to be deemed compensable (Missouri Division of Workers' Compensation, 2006). Prior to a change in Missouri law in 2005, the "prevailing factor" language was preceded by the provision that the job merely be "a substantial factor" for the injury. This language made it relatively simple to allege a condition was the result of the worker's job since the job merely could be *a factor* (albeit substantial) in its cause.

Determination of Medical Causation in a Workers' Compensation Case

In workers' compensation, physicians have a responsibility to critically examine cases with respect to the manner in which a worker's job tasks contributed to the development of a condition. The physician's job is to balance the effect of pre-existing conditions of the worker versus risk factors in the worker's job to determine if the job is "the prevailing factor" for the worker's claim of injury. Remember, the worker does have a diagnosed musculoskeletal disorder, such as carpal tunnel syndrome, etc. The question is whether the condition is primarily the result of the job tasks they perform on a daily basis, or if the condition is the result of other factors that have made the worker more likely to develop the condition.

But physicians have often been unfamiliar of the manner in which most jobs are performed. Physicians are not trained in determining the tasks and functions of specific occupations as well as how a worker's medical condition interacts with occupational demands (Rondinelli et al, 2008). They have found that they need additional information in the form of a job analysis. Healthcare providers perform ergonomic assessments to assist in identification of job hazards in order to assist

a physician in determining whether the job was indeed "the prevailing factor" for a claimant's injury. Because of their unique combination of skills in anatomy, physiology, and kinesiology healthcare providers have been seen as highly credible analysts in these cases, particularly when these providers have additional training or certification in ergonomic evaluation.

Ergonomics is an applied science concerned with designing and arranging things people use so that the people and things interact most efficiently and safely. *Job hazards* are a result of a combination of various ergonomic risk factors, such as awkward posture, force, repetition, contact stress, or vibration. Secondary hazards are related to temperature, duration and pacing. A risk factor itself is not necessarily a causation factor for an injury (Szabo, 2006). Many times it is not simply the presence of a risk factor, but the degree to which the risk factor is expressed that may lead to an injury. Most often it will be a combination of multiple risk factors rather than any single factor that contributes to or causes a condition. A comprehensive causation analysis case requires that an objective ergonomic evaluation be done to outline the level of risk involved in all essential functions in a claimant's job.

How is an Ergonomic Analysis performed?

There are four basic steps this author follows in performing an ergonomic analysis in causation cases. These steps are reported in the literature as interview, observation and measurement, analysis, and report preparation (Malchaire and Piette, 2002). The claimant's Human Resources (HR) representative and supervisor are interviewed first. If the employer has a job description, it is reviewed in this meeting. The key points covered in this interview are as follows:

- the job purpose and essential functions,
- length of time employed in the present job and other jobs at the company,
- the employee's schedule, breaks, and lunch,
- number of other employees performing the job, and
- personal protective equipment (PPE).

After the HR representative and supervisor are interviewed, the claimant is interviewed. The key points covered in this interview are as follows:

- Age, height, weight, and hand dominance.
- Length of time employed with the company and length of time in the present job.
- Previous employment and secondary employment.
- The claimant is asked to verify the job purpose and essential functions outlined in the interview with the Human Resources representative and the supervisor.
- If a printed job description is being used as a resource, the claimant is asked to verify the accuracy of the job functions listed in the document.
- The claimant is then asked about the development of their symptoms: when they began, what they are, and in what activities (including non-work-related activities) are they most noticed.
- Also asked is whether they have a prior injury to the same body part or the same injury to the contra-lateral (opposite) side.

The claimant is then observed performing their work at the usual and customary pace. Observation of all essential functions and their job tasks should be performed. The analyst determines the work cycle, pacing, duration of work, duration of rest periods, and repetitions. The

tasks should be videotaped and still photographs of the worker's posture(s) taken. Observation occurs for as long as needed to outline and analyze any work cycles included in performing the essential functions of the job. Measurement should include weight, force, height, width, and length of all items handled or operated and all the workstations at which the worker interfaces. A tape measure, calibrated industrial scale, and force gauge are used as measurement devices. If vibrating tools are used the duration, pacing, weight of the tool, posture and height at which the tool is used is recorded.

The appropriate ergonomic assessment tool must be chosen to identify the risk involved in the job's physical tasks. Several standardized ergonomic assessment tools are available, and some of the common tools and applications are as follows. It is recommended that the analyst use at least two assessment tools in the analysis. Each tool allows a level of risk to be assigned to a given task or set of tasks.

- Moore-Garg Strain Index: Risk factor analysis for the elbows, wrists, and hands (Rucker and Moore, 2002).
- Rodgers Muscle Fatigue Analysis: Body part specific analysis of forces, repetitions, and duration/pacing (Rodgers, 1992).
- Rohmert's Recovery Guidelines: Required rest periods for work cycles based upon the level of force required by the job tasks (Rohmert, 1973).
- Washington State Ergonomics Rule: Assessment and classification of job tasks into caution zones or hazards, lifting analysis, and vibration analysis tool (Washington State Dept. Labor and Industries, 2000).
- Threshold Limit Value for Hand Activity Level: Assessment of risk based on force versus pacing in mono-tasks (Latko, 1997).
- Rapid Upper Limb Assessment: Assessment of risk for static upper extremity postures (McAtamney and Corlett, 1993).
- Rapid Entire Body Assessment: Assessment of risk for static upper and lower body postures (Hignett and McAtamney, 2000).

Other tools are available that can be used specifically for use in assessment of keyboard and mouse use. These are used in conjunction with a keystroke counter. To perform a keystroke analysis, the therapist attaches a keystroke counter to the claimant's computer for a specified period of time. This author prefers a full week. The number of hours the claimant is performing computer work is totaled after downloading the data from keystroke counter. One popular keystroke counter is the KeyGhost (KeyGhost Ltd.).

The number of hours the worker is using the mouse is totaled and, based on the ratio of mouse clicks to keystrokes, an estimate of the number of mouse-clicks is calculated. That number of additional clicks is added to the mouse-hand (usually the right) as an additional set of keystrokes. Based on the final total of keystrokes (including mouse-clicks), the number of keystrokes per hour and per minute is calculated and then analyzed, using the following assessment tools. Each of the assessment tools assigns a level of risk to the task:

- American National Standards Institute (ANSI Z365), Proactive Job Survey for Keystrokes per Hour (ANSI Z-365 draft, 1998)
- Kilbom's Guidelines for Keystrokes per Minute (Kilbom, 1994)

- Washington State Ergonomics Rule for use of a Data Input Device (Washington State Dept. Labor and Industries, 2000)

Some workers use vibrating tools in their job, such as grinders, chippers, and sanders. Vibration, in significant quantities has been shown to cause hand-arm vibration syndrome (NIOSH, 1989). Vibratory tools can be assessed by recording the tool type, make and model, and level of acceleration for the tool. The website of the tool manufacturer or other specifications can be used to find a comparable tool for the acceleration level – a figure in meters per second squared. Acceleration is defined as the time rate of change of velocity - a parameter indicating the amplitude of vibration of a tool (Workers' Compensation Board of B.C. 2003). The number of hours the vibrating tool is used per day is calculated via survey of the supervisor, the worker and other workers, and observation. The acceleration level is plotted on a graph relative to the number of hours used per day to arrive at a level of risk using the following ergonomic assessment tool.

- Washington State Ergonomics Rule – Vibration Analysis Tool (Washington State Dept. Labor and Industries, 2000).

The report should outline information derived from the interviews, the job functions and physical tasks, the tools utilized and their numerical levels of risk. The assessment tools may determine one of the following final conclusions:

- The job is not a hazard and no ergonomic controls are indicated.
- The job is not a hazard but general controls are indicated to improve worker comfort.
- The job is a hazard and controls are indicated to reduce or eliminate the hazards.

Final Outcome in Medical Causation cases

After submitting the report to the physician, the analyst's task is usually completed. Usually, the only instance in which the analyst acts in the case after submitting the report is if they testify as an expert or are compelled by subpoena to testify as a fact witness. Administrative determination is made by the judge who renders a decision based on the credibility of the witnesses and the peer-reviewed, scientific basis behind each expert's opinion. The case is finally closed with the decision won or lost by the claimant, and a final cash settlement is determined.

Medical causation cases occur when a question exists as to whether a worker's claim of injury is work-related or is the result of a medical condition. Healthcare providers, such as occupational therapists, physical therapists, nurses or others are often utilized by physicians and employers to identify job hazards; such hazards are identified through observation and analysis, using standardized ergonomic assessment tools. The determination of medical causation is made by the physician, but a final decision is determined after a judge reviews all relevant evidence.

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