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Applying a systems approach to MIS design for occupational health care delivery

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ABSTRACT

Decision making in occupational health care management is complex due to the various parties involved in receiving, delivering, and/or paying for these services. This paper presents the view of MIS to support occupational health care as a system using Anthony's Paradigm to provide the decision making structure. Informational requirements reflect the hierarchy of strategic, tactical, and operational levels. A matrix of occupational health care services, responsibilities, and participants is utilized. Such matrix provides the foundation to couple needs and requirements of all participants with information system specifications.

INTRODUCTION

The health of workers is of increasing concern to all involved with receiving, delivering, and paying for the services which promote improvement in workers' health. All parties in occupational health care systems are seeking new and innovative methods to resolve problems and concerns. Many issues are being discussed including cost containment programs and environmental concerns.

Many of the concerns facing decision makers in occupational health care revolve around the complexity of individual components and the multitude of choices available. The decision domain contains many critical variables with a large number of possible states. This decision making is typically performed in a dynamic environment.

Decisions are often made at an operational level in isolation without perspective of any system impact other than the patient provider relationship. Typically, only during instances of case management and exposure events is information shared across the decision levels. A systematic approach to collecting and sharing information would assist the health care provider in making decisions at the operational level before crisis levels were reached.

Currently, in many organizations occupational health care information is scattered both in location and form. The result is limited accessibility for analysis (Kaplan, 1988). Most information systems in use for occupational health care delivery reflect efforts to build databases for reporting, billing, and tracking activities at the operational level.
Objective

The objective of this paper is to define a conceptual management information system (MIS) for occupational health care in terms of the business hierarchy of strategic, tactical, and operational levels for decision making. Therefore, this paper will present occupational health care delivery as an integrated system within the hierarchy framework utilized by business management for decision making.

This system approach to occupational health care delivery (1) spans the entire schema of occupational health care delivery from preventive to restoration/rehabilitation and (2) recognizes and values needs and requirements of all participants. Such a system approach is defined in terms of informational requirements to support the participants as decision makers.

Schema of Occupational Health Care

The occupational health care system is charged with providing a subset of the general health care system. Within the medical nomenclature, occupational medicine is a specialty field of medicine. By definition, occupational medicine covers activities directed toward the worker's health and worker's environment within the framework of the needs and responsibilities of the entire work community (Guidotti, Cowell, & Jamieson, 1989).

Traditionally, occupational health care delivery services have been categorized as either preventive or ameliorative. However, occupational health care has expanded from one of providing ameliorative treatment and some preventive consultation to include far reaching health issues of the workers. Within this growing field, much discussion has focused on individual elements of occupational health care.

Comparisons of occupational health care delivery with the general health care delivery system reveal a complex and unique relationship of the occupational health care provider within the framework of patient, employer, payor, and government agencies (Guidotti, Cowell & Jamieson, 1989). Each of these players have informational needs. These needs may be addressed by applying the business hierarchy of strategic, tactical, and operational levels for decision making when designing the information system. These levels are briefly reviewed in the following discussion.

SYSTEM HIERARCHY APPLIED TO OCCUPATIONAL HEALTH CARE

The definitive concept of organizing systems along the levels of mission was presented in Planning and Control Systems: A Framework for Analysis. Anthony divided areas of control according to a hierarchy of processes. Operational activities form the foundation or base with strategic planning at the apex. Tactical activities are the middle section of the hierarchy (Wiseman, 1988).

Guidotti, Cowell, and Jamieson (1989) presented occupational health care as an integrated system functioning within the business context. Characterizing the occupational health care services within traditional business policies schema of management level of interaction,

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1Ameliorative is typically defined in terms of curing or limiting disease or managing existing problems.
Applying a Systems Approach

i.e., supervisory, middle and upper, and levels of individuals, groups, and community interaction, they composed a matrix of occupational health services responsibilities. Guidotti, et al. (1989) focused on very general functions within large corporations.

Taking the generic definitions of the system hierarchy, application to informational requirements for occupational health care delivery are now proposed. Application of the generic system structure of decision making to occupational health care is suggested irrespective of whether or not the participants are large corporate entities. The following discussion expands the view and describes the information required.

Strategic Level

Strategic level decisions imply formulation of a policy and objectives for a system. Long-term consequences are part of strategic decision evaluations. Decisions made at the strategic level have a general goal to maximize long-term benefits of resource utilization.

Strategic policies involving occupational health care typically focus on risk/liability control, cost containment, and health policies, e.g., “wellness” health promotion. Research on environmental exposures, conditioned employees, and ergonomics of processes are required to formulate appropriate policies. Additionally, strategic policies cannot violate regulatory compliance. However, companies may influence such regulatory requirements at the strategic level.

Some occupational health care issues with strategic policy implications are:

- Reduction of risks for all participants
- Health promotion/wellness
- Research
- Criteria for evaluation outcomes.

Informational requirements encompass longitudinal studies of worker records, access to national databases, and reports from external community both regulatory and scientific. Cluster studies and longitudinal studies based upon worker records are required to make informed policy decisions (Desjardins, 1983). National databases should provide information of external experiences (Wen, Tsai, Weiss, Gibson & McClellan, 1984).

Tactical Level

Tactical decisions, in general, are responsible for ensuring accomplishments of strategic objectives. This level of decision making is responsible for identifying and acquiring resources needed. The tactical level also has responsibility for assuring that resources are utilized effectively and efficiently to achieve the correct activities without waste.

Activities at the tactical level consist of surveillance monitoring, exposure avoidance, early detection, and regulatory compliance. Identification of sources of potential hazards in terms of equipment, processes, and materials must occur.

Tactical aspects of occupational health care include:

- Preventive - early detection
- Monitoring: environment
Monitoring: costs  
Avoiding exposure  
Fitness to work standards  
Education of participants: benefits/costs  
Establishing standards of care, protocols, and procedures.

Informational requirements include location and description of potential hazards, descriptions of work requirements, records of personal protective devices, and monitoring reports (Carel & Levine, 1984). Worker health and safety training records are vital as is tracking of restricted area entry access and exposure incidents (Desjardins, 1983). Cluster, longitudinal, and epidemiological studies utilizing worker records are needed for evaluation at this level of decision making as well.

Operational Level

The operational level is charged with the responsibility of actually carrying out and performing specific tasks in an efficient, effective manner. Basically, the operational area performs activities which should lead to accomplishment of the strategic objectives within policies formulated.

Operational activities include case management, fitness to work determinations, and regulatory compliance. Such activities from a medical standpoint require application of standards of care of the profession. The worker's health and work records, regulations, and standards of care, protocols, and procedures constitute the basis for meeting system informational requirements at this level. Issues of operational level encompass:

- Regulatory compliance
- Standards of care, protocols, and procedures:
  - Acute and chronic care
  - Case management
- Fitness to work assessments
- Insurance reporting
- Workers' Compensation reporting
- OSHA reporting
- Wellness

At the operational level, information must be utilized to screen workers for work assignments and early detection, track workers during care, and track workers after exposure. Worker records form the foundation for generating information required by all levels of decision making. Therefore, care must be exercised to capture results of preplacement, periodical, injury, illness, and exposure examinations (Rawls, Dwiggins & Feigley, 1983). Work histories consisting of type, location, and duration must be maintained.
INTEGRATED INFORMATION SYSTEM REQUIREMENTS

The three levels of information are not isolated. In fact, at the operational level, the patient records including work histories, exposure exam results, preplacement, and periodic exam results form the basis upon which information is passed upward through the levels. The results of longitudinal studies and cluster analysis performed at the strategic level provide the information necessary to change activities such as preplacement determinations. At the tactical level, information should be passed in both directions to impact operations and strategies.

The various players in the system, patients, providers, companies, third party payors, and governmental agencies have roles at each level of the hierarchy.

SPECIAL REQUIREMENTS

In order to provide an integrated information system for occupational health care, several requirements must be met. These incorporate (1) standardization of data records, (2) confidentiality specifications, (3) longevity guidelines for records, and (4) consistency in nomenclature and descriptions.

Standardization of Data Records

Standardization of worker records must occur across departments involved. Worker records must capture identified data elements in a consistent manner so that meaningful analysis may occur.

It is important that a unique identifier be used as part of the indexing strategy. This unique identifier should allow for various companies to share records as well as within individual organizations. This is especially important as employees tend to work for more than the one company during their working life.

Confidentiality Specifications

Access to occupational health care records of individuals, i.e. workers, are covered under rules for disclosure (Desjardins, 1983) which protect the worker’s best interest. Therefore, confidentiality specifications must restrict access which identifies individuals. A unique identifier which protects the worker’s name should be used when data is shared. Without data sharing, meaningful analysis cannot be performed.

Longevity Guidelines

Maintenance and storage of occupational health care records of workers are regulated. Typically, the longevity guidelines call for records being kept a minimum of 40 years or 20 years after retirement (Guidotti, Cowell & Jamieson, 1989). This is extremely important to computerized information systems. Capacity must exist to store the information. Currently, many organizations have records stored in warehouses without any potential for meaningful analysis.
Consistency in Nomenclature and Descriptions

Within the medical community, a major problem is consistency in nomenclature and descriptions. Such must either be standardized or categorized for consistency. If analysis with trending forecasting to meet strategic informational needs is to occur, then a mechanism to translate common abbreviations must occur. Precedent has already occurred in the commonly recognized and accepted procedures and diagnosis for insurance purposes. It should be noted that the proposed information system does not require computerized medical records. This information system should collect important pieces of information useful to the three levels of decisions.

SUMMARY

A system view of occupational health care spans the decision making spectrum from operational to strategic. Each level has specific issues which should be addressed via information in order to make appropriate decisions regarding policies and procedures.

Worker records collected at the operational level provide the foundation for the information system. Other information required for decision making includes results of monitoring environmental conditions such as hazardous materials. National databases can be a source of information as well.

The occupational health care information system must meet a longevity requirement atypical of many information systems. Various regulations require records be available a minimum of 40 years or 20 years after retirement.

Occupational health care information systems, in order to be useful for analysis, must satisfy specifications of standardization, confidentiality, and consistency of nomenclature and descriptions.

These identified responsibilities and issues at the decision making levels of participants provide the foundation for requirement specifications of an occupational health care information system.

REFERENCES


Cullom: Applying a systems approach to MIS design for occupational health