Transferable skills analysis in vocational rehabilitation: Historical foundations, current status, and future trends

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The analysis of transferable skills is a common procedure in the vocational assessment of individuals with disabilities who have work experience. Although the application of transferable skills analysis has gained broad acceptance within the rehabilitation profession, there is little research concerning its validity and utility. This article a) reviews the concepts which form the basis of transferable skills analysis and b) highlights the need for future research on this widely used approach to vocational assessment.

Keywords: Transferable skills analysis, vocational assessment

1. Introduction

The vocational component of rehabilitation services is devoted to the placement of persons with disabilities into appropriate employment. Effective job placement involves knowledge of the requirements of occupations and the abilities, preferences, and adaptabilities of individuals. As a precursor to job placement, the assessment of interests, aptitudes, skills, and other dimensions of vocational capacity is vitally important. For those without work experience, this process traditionally takes place early in the vocational rehabilitation process, and it may occur in a simulated work environment (i.e., the vocational evaluation laboratory) or in a naturalistic work environment through the use of situational assessment procedures [24]. The goal is the identification of the best possible vocational alternative for the individual in order to maximize the potential for vocational success.

For those persons who have previous work experience and who have acquired disabilities which prevent them from working in their customary occupations, extensive vocational assessment is often considered unnecessary. Rather, the individual's work history can provide, in and of itself, a measure of vocational traits and capacities of the individual which he or she has demonstrated during his or her worklife. The procedure of investigating these traits and characteristics is referred to as transferable skills analysis (TSA). TSA provides information which may be used to establish vocational goals through identification of job placement alternatives which may be immediately pursued by the worker with little or no vocational training.

The foundation of TSA stems from three concepts: a) skills and characteristics associated with occupations the worker has performed in the past will allow the worker to perform related occupations; b) skills and characteristics of past work are observable and measurable; and c) those occupations which are similar to those the worker has performed require less vocational adjustment on the part of the worker and are therefore more appropriate for future work [12]. Each of these components of the theory of skill transfer are rooted within the literature of vocational adjustment, career counseling, and industrial and organizational psychology.

This article will examine the theoretical basis of TSA, the relationship of theory to vocational rehabilitation principles and procedures, suggested methods of performing the analysis, and criticisms of TSA. In the article's conclusions, potential limitations of the process, together with a proposed research agenda, are discussed.

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2. Defining skills and their transfer

The dimensions of vocational skill are distinguished as demands of work and characteristics of workers. Spenner [30] states that skills consist of what workers bring to jobs (viewed as individual possessions) and job demands (viewed as social roles of the individual). Ashley and Ammerman [1] indicate that work skills are learned behaviors which individuals must possess to perform specific work tasks correctly, and they identify three categories of skills: (1) human attributes related to work, including general vocational and cognitive capacities; (2) literacy, communication, and computation; and (3) knowledge of technical and manipulative processes. Affective behaviors are not considered to be skills, but rather are personality traits which could characterize individual work patterns. Sjogren [28] states that various definitions of skill all imply proficiency in some learned behavior, each of which is positively transferable to other work settings and situations. The value of each skill is measured by its utility, or the number of situations in which it can be applied.

Skills transfer from one occupation to another when previously learned work behaviors can be immediately applied to a new work task, or when the time typically required to learn a skill is reduced due to previous experience. Transfer of skill occurs when skills which the worker possesses are utilized in a work situation unlike those previously experienced. The number of environments in which a worker has applied a skill increases the ability of the worker to transfer that skill [1].

Feingold [10] makes the following statement concerning the definition of transferable skills:

> The expression "transferable skills" usually refers to those components of job performance which have been acquired through training or work experience over a period of time. They enable the worker to perform more efficiently with regard to number of units of work produced, quality of work, maximum utilization of materials, and maximum maintenance of equipment (p. 58).

Transferable skills are said to be relevant when they are useful, or marketable, in the labor market. Deneen and Hessellund [9] state that "marketable transferable skills" are "those behaviors which can be measured and used at will that are applicable to different situations and/or various job duties and for which an employer will pay" (p. 57).

The acquisition of vocational skills, like all learning, takes place within a specific environment. Because work environments differ, those which are most similar to what the worker has expereinced in the past will be more amenable to the transfer of work skills. Therefore, the similarity of work environments should be considered along with specific skill requirements [14].

Feingold [10] states that the vocational rehabilitationist may identify transferable skills by considering:

> ... the level of skill from such items of information as (1) general education level required, (2) specific vocational preparation such as on-the-job training, (3) nature of the work, (4) significance of the work, and (5) income from the work (p. 58).

Once these determinations have been accomplished, the rehabilitation professional must ask if the traits are required in other occupations, either as a unit or as a portion of occupational requirements. In addition, basic vocational aptitudes (apart from learned skills) may be considered as valuable components which a worker could use to adapt to new work situations. The methods by which transferable skills are assessed have changed over time but the inherent logic of using one's work history to assist in job placement has remained the essence of TSA.

3. The dimensions of work

The operational measurement of vocational capacity demonstrated in a worker's employment experience is the second component of TSA. An understanding of the dimensions of occupations which individuals have performed in the past provides important estimates of worker capabilities and the situations in which the worker has used them. This knowledge is critical in identifying appropriate vocational alternatives for the individual who, as a result of a disability, is unable to return to his or her customary occupation.

The United States Department of Labor vocational database, presented in the Dictionary of Occupational Titles (DOT) [32] and associated publications provides the standardized and accepted means by which the worker's employment history may be dissected into dimensions which may be compared and contrasted with other occupations [12]. The DOT describes, in broad terms, existing occupations within the national labor market, together with standardized conceptions of the nature of jobs. Definitions of occupations have been collected through job analysis to produce realistic and objective job descriptions, which provide a means for comparing a worker's skills to the demands of jobs through a standardized terminology for describing vocational characteristics [23,29].

A variety of occupational dimensions are considered by the United States Department of Labor. The Revised Handbook For Analyzing Jobs [34], a descriptive and instructional manual relating to job analysis procedures, provides specific definitions of these occupational dimensions. These definitions are separated into two categories: Work Performed Components and Worker Characteristics Components [34, pp. 2–2 – 2–3].

Work Performed Components denote "those job analysis components that relate to the actual work activities" [34, p. 2–2]. Three essential components of Work Performed Characteristics are described by the United States Department of Labor. The first of these components are referred to as Worker Functions, or the complexity of the occupation in relation to data, people and things. Work Fields, or descriptions of the technologies or objectives of occupations, are a second Work Performed characteristic. The 96 Work Fields all end in the suffix "-ing", and indicate in broad terms the actions a worker performs in the occupation. The third Work Performed characteristic is the Materials, Products, Subject Matter, and Services (MPSMS) category, which indicates the materials the worker processes, the products produced, or the services rendered through the occupation which the worker performs. There are 328 three-digit MPSMS categories.

Worker Characteristics denote "job analysis components which reflect worker attributes that contribute to successful job performance [34, p. 2–3]. The seven worker trait components are: 1) General Educational Development (reasoning, mathematics, and language capacities of the worker); 2) Aptitudes, or eleven basic abilities which facilitate the learning of new skills; 3) Specific Vocational Preparation, or the amount of job training time necessary to gain competence in an occupation; 4) Interests, or the liking of a certain type of work, which are classified according to the codes found in the Guide for Occupational Exploration [33]; 5) Temperaments, or the ability of the worker to adjust to specific work conditions; 6) Physical Demands, or the ability of the worker to perform the physical requirements of occupations; and 7) Environmental Conditions, or the characteristics of the environment in which the worker must perform the job.

Weed and Field [37] state a belief that work skills (behaviors, training, and worker characteristics) can be identified and classified, and that such a procedure is critical to successful job placement. Because of the detailed classification systems which have been constructed, much information can be distinguished from an occupational title, both about a worker and the type of work which has been performed. This procedure forms the accepted basis of TSA within vocational rehabilitation.

Many of the classifications of worker functions and worker characteristics will change in the near future as the DOT is replaced by the Occupational Information Network, or O-Net, the next generation of the United States Department of Labor's occupational information database. A prototype version of O-Net has been released which defines components of work for approximately 1,100 occupations. The comprehensive version, O-Net 2001, is expected to be released within the next two years. The content model of O-Net expands upon many of the current definitions of work requirements and worker traits within the domains of Experience Requirements, Occupational Requirements, Occupation Specific Skills, Occupation Characteristics, Worker Characteristics, and Worker Requirements [35]. The increase in the number and breadth of definitions of skill components should lead to greater refinement of occupational searches based upon TSA.

4. Relevance of TSA to general vocational theory

The third component of TSA pertains to the relationship of work experience to the potential vocational adjustment of the worker in other occupations. The investigation of previous work experience present in TSA conforms well to other vocational adjustment theories. In particular, theories of person-environment fit provide a highly relevant corollary to TSA. The process by which workers and occupations achieve goodness of fit has been explained by the Minnesota Theory of Work Adjustment, developed by Dawis, England and Loftquist [8]. The basis of the Minnesota theory is that the work environment must satisfy the worker's requirements for reinforcement, while at the same time the worker must fulfill the vocational requirements of the occupation. The degree to which the individual is satisfied by the work environment (satisfaction) and the degree to which the worker is able to satisfy the demands of the work environment (satisfactoriness) indicates the level of correspondence between the job and the worker. High correspondence results in tenure, or the maintenance of the worker in the job. When correspondence is low, either the worker or the work environment must change or tenure will not be achieved [7].

The investigation of the worker's previous employment history also corresponds well with the hexago-

nal arrangement of personal traits and their correspondence to an individual's work personality, as proposed by Holland [19]. According to this theory, individuals may be described by combinations of six personality traits (realistic, investigative, artistic, social, enterprising, or conventional) which reflect vocational interests. The theory holds that one of the six traits predominates to typify the person; those traits which do not predominate are also present, but in progressively lesser degrees. Likewise, work environments provide reinforcement for people typified by these traits. When individuals work in environments that are similar to their work personality, this results in congruence between the worker and the work performed. Congruence, according to Holland [19], predicts tenure or longevity on a job.

5. Transferable skills analysis and vocational rehabilitation procedures in the private sector

Although TSA is a common procedure in many rehabilitation settings, it is in the area of proprietary rehabilitation that the procedure has gained the greatest acceptance. Proprietary rehabilitation concerns the return-to-work of individuals with compensable injuries covered by Long or Short Term Disability, Workers' Compensation, or insurance policies [37]. Individuals served through proprietary rehabilitation almost always possess work histories, whereas large numbers of persons served in most other rehabilitation settings do not.

Professionals in proprietary rehabilitation are charged with determining the extent of loss of vocational potential which has been caused by a compensable injury and the residual employability of the worker. The rehabilitation professional usually relies upon TSA to identify occupations which the individual could perform within his or her residual physical and psychological capacities. Traditional vocational evaluation tools, such as situational assessment, psychometric testing or work sampling, are included only in those situations when no vocational alternatives can be identified which are compatible with the worker's residual capacities (i.e., jobs that the worker could do without retraining) [27].

The proprietary rehabilitation system relies upon swift job placement within the capabilities of the worker, as opposed to remediation of vocational capacities and maximization of vocational potential which are common in the state-federal vocational rehabiltiation program [37]. The assessment of transferable skills may also be a component of disability-related litigation, in which an adjudicatory body determines an injured worker's theoretical capacity to engage in competitive work activity in order to evaluate the type and amount of disability compensation due the injured worker. In this latter regard, TSA is as important in settlement and disability determination as it is in rehabilitation and placement.

Vocational services are intended to return the worker to a level of vocational functioning as close as possible to his or her preinjury occupational status [2]. As a result, rehabilitation programs in the private sector are based upon cost-effective and goal-oriented service delivery [38]. Toward that end, the following return-to-work hierarchy has become standard within the profession:

1. Return to work – same job, same employer;
2. Return to work – different job, same employer;
3. Return to work – different job, different employer [38].

Rehabilitation in this setting is designed to restore as much of the worker's pre-disability earnings as possible at the lowest cost possible to the insurer [17,37]. The application of the return-to-work hierarchy in proprietary rehabilitation provides the restoration of the loss of employment and earnings to the injured worker through means other than indemnity payments, while allowing employers to realize savings in claim costs, swifter return to work, and reductions in premium assessments when rehabilitation is successful [18]. The worker's prior employment history forms the baseline for determining the vocational goal of the claimant, and that goal is an occupation as similar to the worker's former occupation as possible within his or her residual physical and mental capacity.

The goal of integrating the worker into an occupation resembling the pre-injury occupation, and with the pre-injury employer when feasible [38] also relates to the concept that similar occupations require less adjustment by the worker and therefore provide a greater potential for successful (and cost-effective) job placement. Thus, proprietary rehabilitation procedures seem to conform not only with general insurance principles, but also with accepted vocational adjustment theory.

6. Conducting transferable skills analaysis

Although there are a variety of methods available for performing the TSA, most procedures are based upon several common principles [3]. First, the individual's

previous work history is determined according to the DOT. The worker and environmental characteristics of those occupations are then compiled and compared to produce a profile which represents the demonstrated worker capacities (i.e., those which the worker demonstrated prior to his or her injury). Next, any reductions or changes in worker characteristics which occur as the result of mental or physical injuries, as indicated by medical or allied health professionals, are taken into account in an adjustment of the profile [6].

The basis for this post-injury profiling was developed by the United States Employment Service in the 1950's [16], when occupations were first described in terms of General Educational Development, Specific Vocational Preparation, aptitudes, temperaments, interests, physical capacities, work environment and working conditions. A simplification of this profile, the Functional Occupational Classification Structure, was developed in part as a means for assessment of transferability of skill [13,16]. This structure was based upon three occupational components: Worker Functions, Work Fields, and Materials, Products, Subject Matter, and Services (MPSMS). Similarity between occupations was judged on the following scale:

First Order Similarity: Same Worker Functions, same Work Field, and same MPSMS.

Second Order Similarity: Same Worker Functions, same Work Field, and different but related MPSMS.

Third Order Similarity: Same Worker Functions, same Work Field, and different and unrelated MPSMS.

Fourth Order Similarity: Same Worker Functions, different but related Work Field, and same or related MPSMS.

Fifth Order Similarity: Same Worker Functions, different and unrelated Work Field, and different and unrelated MPSMS [15, p. 944].

Current procedures of TSA are extensions of this concept. The profile which is developed through investigation of the previous work history can be used to identify potential occupational goals. Procedures differ according to the occupational classification category (Work Field, MPSMS, etc.) that is considered as the basis for similarity of targeted placement to previous work history.

The Vocational Diagnosis and Assessment of Residual Employability or VDARE [12] is perhaps the most widely accepted and adopted manual TSA procedure. The VDARE results in the development of a vocational profile in which the worker's previous work history is described in operational terms identical to those utilized in the DOT. The profile is adjusted according to the worker's residual functional capacities as indicated by a physician or allied health professional. The resulting profile can be compared to occupations included in similar classifications and these are said to be related in terms of skill (above and beyond basic innate traits) to the worker's previous employment [12]. A synopsis of DOT related information is available in the Classification of Jobs, or COJ [11], which is designed to be used with other VDARE materials. The COJ also separates jobs into categories based upon occupational classifications (such as MPSMS or Work Field), to allow for category-specific searches [12].

Saxon and Roberts [25], Olsen [22], and Saxon and Spitznagel [26] suggest developing a somewhat different TSA profile based upon DOT and GOE codes, together with information found in the Selected Characteristics of Occupations Defined in the Dictionary of Occupational Titles [31]. The suggested method for determining transferability of skill involves identifying the interest categories associated with previous work and comparing these to other occupations within the same category which are within the residual capacities of the worker.

In recent years, the personal computer has allowed TSA to be performed more quickly and efficiently than manual procedures. Brown, McDaniel, Couch and McClannahan [5] provide a review of many of the available software packages that are available for use in determining vocational options from TSA. The review includes information concerning utility, search rationale, hardware requirements, and costs or each major computerized TSA system. The majority of these job search programs allow users some flexibility in determining search rationale among a number of occupational classifications (e.g., Work Field or MPSMS). Most programs will also allow users to adjust worker characteristics according to test results after considering maximum capabilities from past work experience, and they include provisions for application of results to local labor market information.

7. Applicability of transferable skills analysis

The numerous methods available for performing TSA are all based upon accepted concepts and definitions of occupational characteristics. The variety of methods available for performing this analysis in and of itself gives credence to the acceptance of TSA within vocational counseling in general and vocational reha-

bilitation in particular. However, the increased implementation of TSA has not given rise to significant investigation of its utility as a job placement tool. Little research has been conducted on the viability of TSA in practice. Much of the literature related to TSA consists of reviews of products or suggestions for TSA procedures. There has been practically no research conducted of an analytical, comparative, or inferential nature in relation to TSA. In particular, there has been no research that has addressed the validity of TSA or placement outcomes resulting from the use of TSA.

Research into the veracity of the DOT and its components has been conducted and provides criticisms of the body of knowledge upon which TSA has been constructed. Miller, Tremain, Cain and Roos [21] present an analytical review of the DOT which contains a variety of criticisms that are of interest to the TSA practitioner. Of particular interest are comments concerning occupational classification and worker trait measurement. The worker trait and Worker Function structures of the DOT were specifically criticized as not being representative of certain "conceptually central aspects of occupational content" (p. 224), including organizational setting and responsibility level of the worker. The reliability of worker characteristics was also found to be low, and the DOT's classification structure redundant. A factor analysis of worker trait components of occupations defined in the DOT identified six factors (substantive complexity, motor skills, physical demands, management, interpersonal skills, and undesirable working conditions) which encompassed nearly all of the worker characteristics considered in the review. Many of the scales used to measure vocational components were found to be psychometrically questionable, with GED and SVP particularly bothersome to the reviewers. Finally, validity of worker characteristics was also questionable, as evidenced by ambiguous definitions which appear to relate primarily to unskilled production operations rather than to specific worker traits.

Botterbusch [4] suggests revisions for the DOT. Measures of job training time expressed in days, weeks and months, and also along dimensions of academic, apprenticeship, and on-the-job training could replace the SVP structure. The Data-People-Things code should be replaced or eliminated, due to the invalidity of the hierarchical structure implied in the coding. Temperaments, likewise, are said to be of limited usefulness in selecting occupations (except in cases of psychiatric disability) and could also be eliminated. Concerning environmental conditions, most are stated in a negative manner, and more pleasant conditions (such as working in climate controlled areas) could be added to alleviate this bias. Work Fields and MPSMS are said to be critical to the process of selection of occupations, and they also could be utilized to combine many of the more redundant titles in the DOT into fewer, more comprehensive, definitions.

Recommendations regarding the classification systems used in TSA indicate that these should be modified to allow workers to be considered for work outside of a particular occupational family. It has been suggested that further study be made concerning the patterns of vocational mobility seen in workers who change jobs, to identify potential patterns or components which could define transferability of skill [21].

As computerized job matching systems have gained acceptance as standard vocational assessment instruments, some authors have cautioned against certain procedures. Watters [36] cautions against the use of the GOE and the SCO as selection methods in determining vocational placement alternatives. The rationale for this warning is that the GOE follows a structure of interests, rather than skills, and the relationships to skills of the individual may be dubious. The SCO also was not intended as a means for measuring transferability. The author suggests that using the worker function, Work Field, and MPSMS arrangement is the most appropriate method for identifying alternative occupations through TSA.

8. A research agenda

The acceptance of TSA within rehabilitation might be assumed to be tied to extensive investigation of the usefulness of the outcomes of this process. However, a review of vocational rehabilitation literature reveals very little research on transferable skills in general, and practically none that is empirical in nature. Most of the literature relating to TSA presents guides to procedures and tools, rather than investigations of the validity of the process itself.

Transferable Skills Analysis is based largely upon a chain of principles discussed in this article which individually appear to be high in face validity. However, as a total process, TSA has not been exposed to the rigor of empiricism, and its validity has thus not been well established. Considering that decisions made on the basis of TSA are often critical in determining the vocational futures of individuals with disabilities, such procedures should be given attention through a vigorous research agenda. Such an agenda could include topics such as the following:

8.1. Reliability and validity of current practices

Messick [20], in discussing validity, states that paramount to the measurement of validity are "interpretability, relevance, and utility of scores; the import or value implications of scores as a basis for action; and the functional worth of scores in terms of social consequences of their use" (p. 33). This statement is highly relevant in relation to research into the validity of TSA, because the data involved in the process form the basis for future rehabilitation activities and outcomes.

There are many variables which may be considered in developing the residual functional capacity profile, some of which, in current application, appear to be redundant and formulated upon poor psychometric foundations [21]. Simplification of these profiles and refinement of variables to those which are most relevant in a given situation might greatly increase the validity and utility of TSA.

The United States Department of Labor codes and classifications, imperfect though they may be, provide a standard by which the components of TSA can be examined and compared. Given the existing and accepted operational definitions of occupational constructs, the comparisons of vocational outcomes to previous work histories could be pursued as a first step in investigating the usefulness of this process. Further investigation of variables found to have the most relevance in the process could allow for greater refinement of TSA, thereby providing for improvement in procedures and hence more utilitarian information for the rehabilitation professional.

8.2. Localized variations in utility

Labor market changes, shifts in the demands of occupations, the presence of talents beyond that demonstrated through past vocational activity, and perhaps other factors relating to the individual or the environment could serve as caveats to traditional practices and procedures of TSA. Messick [20] states that contamination of results by local factors is a validity threat to which the test interpreter should be attuned. Investigations of the impact of these issues upon the outcome of the rehabilitation process would move beyond mere questions of theoretical utility, and into analysis of practical utility. This would serve to establish guidelines for rehabilitation professionals to consider as they help their clientele achieve vocational success in their individual locales.

8.3. Rigidity of occupational classifications

The typical procedures of TSA select vocational alternatives in relation to the past activities of workers through their categorization within the same or similar classification (such as Work Field or MPSMS), whereas occupations outside of these classifications are considered less relevant or not given consideration at all. Occupational classifications such as Work Field tend to be rather rigid; in situations when appropriate occupations cannot be identified within these categories, many individuals may be considered to be "unemployable". In reality, the labor market could allow for a variety of occupational alternatives outside of these occupational designations which the injured worker could successfully perform. Such errors of omission could bring a premature and inappropriate end to the rehabilitation process, particularly in cases when the results of a TSA are the only approach to job placement considered. The cautions indicated by Miller et al. [21] concerning the rigidity of occupational classifications remain relevant. Job placement is a process which is as much subjective as objective, and the many components of vocational success cannot be encompassed into the stringent profile of the TSA. Hence, TSA should be used to inform and enhance, not to prescribe, the reemployment process for injured workers.

The issue of rigidity of classification is closely tied to issues concerning localized variations in reliability and validity. The local labor market and the consideration of opportunities available at a given time are essential to effective job placement; yet, within the context of the TSA, these are typically secondary concerns. The TSA will first determine vocational alternatives based upon the injured worker's past work history, and then the feasibility of those alternatives is considered in relation to their availability and accessibility in the local labor market. The rigidity of the DOT's coding systems often results in a number of occupations for consideration in job placement which may be inaccessible or not even present in the locale of the injured worker. Perhaps more conducive to vocational success would be an analysis which first investigates the labor market and potential placement alternatives and then indicates the best alternatives for the injured worker based upon the individual's demonstrated talents and abilities, with an indication of which alternatives would provide the best vocational matches for the injured worker. The primary focus of such a procedure would be placed upon the vocational alternatives present in the environment (a necessary component in successful job placement), and which of these alternatives serve as the most appropriate vocational alternatives for a particular individual.

8.4. Client satisfaction

Outcomes and client satisfaction with placement alternatives suggested by TSA are another possible topic for future inquiry. There is implicit within TSA an assumption that individuals were vocationally adjusted to their previous employment, and that such previous employment constitutes the parameters of the individual's future vocational alternatives. Many individuals who have sustained disabilities were not adjusted to their previous employment; many also have have underutilized potential or legitimate vocational interests and goals above and beyond those related to their prior vocational experience. In such instances, TSA may prove to be an inappropriate element of vocational programming, subjecting injured workers to distasteful occupations and possible placement into jobs which may be quickly abandoned. Vocational programming which considers the priorities of such individuals, while perhaps taking more time and requiring more intensive vocational counseling, could prove to be the difference between ultimate vocational success and career stagnation.

9. Conclusion

If the goal of vocational rehabilitation is successful and satisfactory job placement of persons with disabilities, procedures applied to achieve this goal should be scrutinized for validity and utility rather than their ease of use or relationship to vocational theory. TSA has found acceptance within vocational rehabilitation as a means of vocational assessment for persons with demonstrated work experience, and many individuals have been exposed to this procedure as part of the rehabilitation process. The vocational rehabilitation profession should initiate research which can improve TSA and the quality of services to individuals for whom this process is intended.

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