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## Estimating the Utility of Job Performance the Influence of the Delphi Technique and Behavioral Examples on Supervisors' Estimates

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Estimating the Utility of Job Performance:  
The Influence of the Delphi Technique and  
Behavioral Examples on Supervisors' Estimates

by

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## ABSTRACT

Methods for estimating the standard deviation of performance in dollars (SDy) proposed by Schmidt, Hunter, McKenzie, and Muldrow (1979) (referred to as S & H) and by Burke and Frederick (1984) (referred to as B & F) were compared with a modified procedure which incorporated the Delphi and critical incident methodologies (referred to as Delphi). Sixty-four nursing managers were randomly assigned to one of the three methods. They provided estimates for the jobs of registered nurse and licensed practical nurse. The three methods yielded similar estimates, were equally sensitive to differences between the jobs, and conformed to the assumptions of normality. The Delphi procedure yielded estimates with lower variability than the other two procedures and was slightly more acceptable to estimators than the S & H procedure. In addition, the Delphi procedure produced a list of critical activities that the human resource department believed was a valuable by-product of the estimation process. Point estimates in all conditions were similar to nurse's salaries. The results lend support for the increased use of SDy estimation procedures in applied settings. However, future research should examine manager's use of salary information in generating estimates. The Delphi was an improvement over the previous procedures and thus was recommended for most situations. However, the advantages were not overwhelming and the simpler S & H procedure could be appropriate under certain circumstances.

## DEDICATION

To my father, who taught me the value of learning.

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ESTIMATING THE UTILITY OF JOB PERFORMANCE: THE INFLUENCE  
OF THE DELPHI TECHNIQUE AND BEHAVIORAL EXAMPLES ON  
SUPERVISORS' ESTIMATES

I. INTRODUCTION

Over the last decade, researchers and practitioners have devoted increased attention to the management and development of human resources (cf. Peters & Waterman, 1982). There are several reasons for this phenomenon. One reason is the increased costs associated with human resources. Killian (1976) estimated that the direct cost of payroll and employee benefits typically amount to 70% of the total cost of an organization's operation. The rising cost of human resources along with increased competition from abroad, movement from capital intensive production occupations into more labor intensive service occupations, labor legislation, and a heightened concern with productivity have all contributed to the increased attention organizations are giving to managing people.

With the increased attention comes a greater need and a greater potential for contributions by industrial/organizational (I/O) psychologists. The research efforts of I/O psychologists often result in organizational interventions designed to improve productivity and create a higher quality of worklife (e.g., selection, training, performance appraisal, and job enrichment). However, for these interventions to be implemented they must be successfully communicated to managers. Only then can managers make informed decisions regarding

prospective interventions. The concept of utility provides an important perspective that can improve the link between research developments and practical application.

The utility of a program refers to the degree to which its use improves the quality of individuals' performance beyond what would have occurred had that program not been implemented (Blum & Naylor, 1968). To extend this definition to reflect the current emphasis on economic utility, the costs associated with the program must be included. Thus, the utility of a program is the benefit derived from implementing the program minus the cost of developing and maintaining the program. An analysis of a program's relative utility can be conducted to decide whether that particular program will be cost effective compared to other programs.

Utility analysis is the determination of institutional gain or loss (outcomes) anticipated from various courses of action. When faced with a choice among strategies, management must choose the strategy that maximizes the expected utility for the organization across all possible outcomes. To make the choice, management must be able to estimate the utilities associated with various outcomes (Cascio, 1982, p. 127).

Approaches that are similar to utility analysis include: cost-benefit analysis (Ray, 1984), cost-effectiveness analysis (Levin, 1983), and return on investment (Killian, 1976). These approaches are just beginning to receive attention in the human resource field.

A human resource department has traditionally been viewed by managers as a cost-center. Managers measure the contribution of a cost-center to the organization by comparing actual expenses with budgeted expenses for a specified period of time (Killough & Leininger, 1977). Cost centers usually exist where difficulties are encountered in relating financial measures to outputs. The legal and public relations

departments are other examples of cost centers. In contrast, a profit center is a division of an organization where contribution is based on traceable revenues and expenses that are matched to determine the division's net income (Killough & Leininger, 1977). A useful summarization is that the focus of budgeting for cost centers is on costs and for profit centers the focus is on utility.

As a cost-center, planned changes in a personnel department often focus on reducing costs. Changes may include revising or eliminating programs, or perhaps, reducing the size of the workforce. In many cases these strategies are necessary and useful. However, cost-effective changes can also be made by implementing a program, which increases costs, as long as sufficient benefits are also generated. If a program is presented so that decision-makers consider only the costs and not the economic benefits associated with the program, the potential to improve the organization and to influence the quality of worklife is greatly minimized. In these cases, changes may be limited to those that focus on cost reductions. Conceptually, utility analyses provide decision-makers with information from both the cost and benefit perspectives. This should lead to more informed decisions.

If utility analysis is such a useful concept why has this technique been used so infrequently? Early efforts to assess the utility of human resource programs focused on personnel selection (Brogden, 1946, 1949; Taylor & Russell, 1939). Later work led to refinements of the initial efforts (cf. Cronbach & Gleser, 1965; Naylor & Shine, 1965). The resulting Brogden/Cronbach-Gleser utility model is potentially the most versatile utility model available for human resource applications. However, difficulties in estimating a critical parameter in the model,

the standard deviation of performance in dollars (SDy), minimized the visibility and applicability of this approach (Zedeck & Cascio, 1984).

Recently, research has been directed toward estimating SDy. A new method based on managers' estimates was developed by Schmidt and Hunter and their associates (Schmidt, Hunter, McKenzie, & Muldrow, 1979). This procedure holds great promise but concerns exist regarding its usefulness (cf. Weekly, Frank, O'Connor, & Peters, 1985). If this procedure can be shown to provide valid information and is acceptable to organizational decision-makers it will allow greater application of utility analysis.

In light of the importance of utility concepts and the problems associated with estimating SDy, the current research examined Schmidt and Hunter's estimation procedure (referred to as S & H) and compared it to two modified procedures: a structured feedback procedure developed by Burke & Frederick (1984) (referred to as B & F) and a procedure developed for this study which incorporated the critical incident and Delphi methodologies (referred to as Delphi). Two critical questions were addressed: (1) Is the S & H procedure scientifically sound and acceptable to managers; and (2) Are either of the two modifications of the S & H procedure (i.e., B & F or Delphi) improvements over that procedure?

This study continues research that began over 50 years ago. Therefore, it is important to examine the history and development of the utility concepts. Following the discussion of history, the S & H procedure is examined in detail, prior improvement efforts are critiqued, and the rationale and hypotheses for the current study are presented.

### History of Utility Concepts in Personnel Decisions

The earliest attempts at utility focused on personnel selection (Hull, 1928; Kelley, 1923). These attempts were based entirely on the selection test's validity. The first concept of utility was the index of forecasting efficiency, which was a function of one minus the squared validity coefficient. However, for a test with an extremely high validity of .50, this index provides, "a very unrealistic pessimistic interpretation of the test's economic value" (Schmidt, et al., 1979, p. 610).

The index of forecasting efficiency was replaced by the coefficient of determination (i.e., the squared validity coefficient) as the conception of utility. The coefficient of determination reflects the amount of variance in performance that is accounted for by a selection test. Thus a test with a validity of .50 accounts for 25% of the variance of job performance. Schmidt et al. (1979) noted that the "amount of variance accounted for has no direct relationship to productivity gains resulting from use of a selection device" (p. 610). Both of these concepts, the index of forecasting efficiency and the coefficient of determination, suggest that test validity is the only factor in determining utility. This of course is not true.

Taylor and Russell (1939) went beyond the validity coefficient to incorporate two additional components of personnel selection: selection ratio (the proportion of applicants hired) and base rate (the percentage of applicants who would be successful without the use of the test). The Taylor-Russell model was a significant improvement over the earlier efforts. Utility was conceived as the increase in the percentage of successful hires from using the test. The Taylor-Russell model

indicates that, under certain circumstances, a test with modest validity can substantially increase the percentage of successful hires. For example, when the base rate is 50% and the selection ratio is .10, a test with a validity of .25 will increase the percentage of successful hires from 50% (base rate) to 67%. In the same way, a test with extremely high validity will be of little value as the selection rate approaches 100%.

While better than the earlier efforts, the Taylor-Russell model has two serious drawbacks which are related to its dichotomizing employees as successful or unsuccessful on the performance criterion. The first is that by categorizing all employees into two groups, a great deal of information is lost. That is, all successful employees are considered equally successful. The second drawback to the Taylor-Russell model is that objective information on success or failure is rarely available, thus, the decision about where to set the cutoff on the performance criterion is usually arbitrary. Unfortunately, the utility of a test can vary considerably on the basis of the particular cutoff score that is selected.

Brogden (1946; 1949; Brogden & Taylor, 1950) was the first to conceive of the utility of personnel decisions from a cost-accounting perspective. He recommended transforming job performance into a dollar-based metric using cost-accounting methods and noted the importance of determining the standard deviation of performance in dollars. Brogden (1949) used the principles of linear regression to demonstrate the influence of selection rate and the standard deviation of performance in dollars on the economic utility of a selection test. In addition, Brogden (1949) noted that the cost of testing must be taken into account



when determining utility. However, it was Cronbach and Gleser (1965) who formally incorporated cost into their model. Cronbach and Gleser's (1965) book was the basis for the modern utility model. They applied decision theoretic principles to Brogden's approach as well as extended it to consider placement, classification and other personnel decision strategies.

The Brogden/Cronbach-Gleser model includes selection rate, SDy, and validity information as well as the cost of testing and/or recruiting in the conception of utility. Under the assumptions of the model, the interpretation of the validity coefficient is quite different than those of the earlier conceptions. According to the Brogden/Cronbach-Gleser model, the validity coefficient of a selection device is the proportion of maximum utility which is attained for particular conditions of the selection ratio and the standard deviation of performance. Thus, with other factors held constant, a selection device with a validity coefficient of .50 would yield one half the utility that would result from the use of a selection device with a validity of 1.00. This is a more optimistic and accurate interpretation than either the index of forecasting efficiency or the coefficient of determination (Landy, Farr, & Jacobs, 1982).

While Cronbach & Gleser (1965) recommended extensions beyond selection, subsequent researchers have clarified or further extended the model. For example, Schmidt, Hunter, and Pearlman (1982) clarified Cronbach and Gleser's recommendations for training applications, and Landy et al. (1982) presented suggestions for performance appraisal feedback. Furthermore, Boudreau provided detailed demonstrations of the impact on utility of tax rates, variable costs associated with changes in

productivity, and employee flows (1983a, 1983b).

#### Implementation of the Brogden/Cronbach-Gleser Model

The Brogden/Cronbach-Gleser utility model is "potentially the most versatile model available, but to date it has not received widespread attention" (Cascio, 1980, p. 43). Although considerable effort has been directed toward refining the model, there have been few reported applications of the model. The difficulty of estimating SDy has been the primary reason that the powerful Brogden/Cronbach-Gleser model has been neglected (Schmidt et al., 1979).

Cost-accounting was originally recommended as the appropriate method for estimating SDy. Brogden and Taylor (1950) recommended the use of cost-accounting procedures to estimate the dollar value of performance for a number of employees. A standard deviation was then computed from this data. This method was used in Roche's dissertation with radial drill operators as reported in Cronbach and Gleser (1965, pp. 256-266). A detailed and complex procedure called standard costing was used to determine the contribution of each employee to the profits of the company. Cost estimates for each piece of material machined, direct and indirect labor costs, overhead, and perishable tool usage were all considered. In addition, there was also a burden adjustment for below standard performance. Despite the apparent objectivity of these cost accounting procedures, Roche noted that the procedure included many subjective estimates and arbitrary calculations. Cronbach commented that some of the procedures were unclear or questionable and that the accountants did not appear to understand fully the utility problem. Experimental research with accountants has suggested that even routine judgments can be quite unreliable (Razek & Bernstein, 1976).

Thus, cost accounting appears to be costly and time consuming and to yield a questionable estimate of SDy.

Recently, Schmidt, Hunter, McKenzie, and Muldrow (1979) presented an alternative procedure for estimating SDy. Their procedure is based on the following rationale: If job performance is normally distributed, then the difference between the value to the organization of the average performer and either the 15th percentile or 85th percentile performer is equal to one standard deviation of performance in dollar terms. They asked supervisors to estimate the value to the organization of the products and services produced by a low performing (15th percentile), average performing (50th percentile), and superior performing (85th percentile) computer programmer. The differences between the 85th and 50th percentile performers and between the 50th and 15th percentile performers were two estimates of SDy. Kotler (1970) applied a similar rationale to gather estimates for risk analysis. Clearly, the S & H procedure is less time consuming and expensive to collect than the traditional cost accounting method. The recent interest in revising and extending the Brogden/Cronbach-Gleser model is probably attributable to the ease of the S & H procedure.

While researchers have suggested alternative methods for estimating SDy (e.g., Cascio's CREPID model, 1982), the S & H procedure has generated the greatest interest in the research literature. If proven effective, the S & H method would allow for greater application of the Brogden/Cronbach-Gleser utility model.

#### Research on the S & H Estimation Procedure

The S & H procedure for estimating SDy has attracted the most attention in I/O psychology, and it seems the most likely candidate for

continued use in the future. However, several concerns remain regarding its appropriateness (Weekly et al., 1985). These concerns can be classified into three categories: (1) validity; (2) psychometric properties; and (3) acceptability.

Eleven studies were located that used the S & H procedure. These studies contained 39 SDy estimates from 17 independent samples of supervisors. Table 1 lists the studies and includes information about the jobs that were examined and the number of managers who provided estimates (i.e., sample size). The results from these studies were examined to address the concerns with the technique.

Validity. The validity of SDy estimates is unknown. The ideal way to validate the S & H procedure would be to compare SDy estimates against an objective value of SDy. However, for any job a truly objective value of SDy does not exist. It is impossible to quantify objectively all components of performance that determine its dollar value. In this sense SDy is similar to the concept of the ultimate criterion. Thus, a direct assessment of validity is not possible. Fortunately, indirect evidence can be collected regarding the validity of SDy estimates by examining the convergence of estimates collected by several methods and the sensitivity of the estimates to job differences and changes.

Estimates that are derived from multiple methods should yield similar results; this convergence of methods is evidence for validity. Systematic differences across methods is evidence of undesirable method bias. Some convergence between the S & H procedure and other methods has been demonstrated (See Table 2).

One validation effort was Bobko, Karren, and Parkington's (1983) comparison of S & H estimates to those based on archival sales data. They found strong evidence of agreement between the methods. However, Bobko et al. compared the archival data with SDy estimates based strictly on sales value and not on overall performance value as is usually done. As Brandon and Jacobs (1985) noted, "the fact that objective performance data existed is one indication that estimating the SDy of the sales force hardly compares to a similar estimation process for middle managers" (p. 13). More accurate estimates are likely when the job criterion is specific and objective (e.g., sales). For example, Karren & Bobko (1984) cite the health care industry as a potentially difficult area to generate accurate estimates. The current research collects data from that industry.

While convergence with other SDy methods is desirable, a strong convergence with salary may be problematic. Salary will not always be indicative of performance value. Many organizations do not have accurate compensation systems. Those that do use systematic job evaluation techniques usually adjust salary according to market conditions. While salary may serve as a useful reference point for generating estimates other factors should be considered. As noted by Bobko et al. (1983), one should be suspicious of an estimation method that yields estimates that are too reliant on salary.

A valid estimation procedure should also be sensitive to differences between jobs and to changes in jobs over time. The estimation procedure should yield different point estimates for jobs of differing worth. The estimates for a more critical job, that is one where success and failure have greater benefits or costs for the

organization, should be larger than those for a less critical job. There has been some evidence that the S & H procedure is sensitive to job differences (Brandon & Jacobs, 1985; Mathieu & Leonard, 1984).

In addition, Landy et al., (1982) noted that if organizational changes occur (e.g., layoff of 20% of workforce on the basis of performance), SDy estimates should change accordingly (e.g., SDy should be reduced with a layoff). There has been no research conducted in this area.

As long as an objective standard remains elusive one must continue to gather evidence for construct validity to assess the accuracy of subjective estimation procedures. Research should continue to accumulate along these lines.

Psychometric Properties. A prerequisite for any useful measurement tool is psychometric soundness. Psychometric issues of concern for the S & H estimation procedure include: normality, and variability of estimates.

The S & H procedure is based on the assumption that performance is normally distributed. Managers should provide estimates that conform to that distribution. Only if the assumption of normality is met can the differences between point estimates be treated as standard deviations. Operationally, this has been examined by testing for significant differences between 50-15 estimates (SDy lower) and 85-50 (SDy upper) estimates. Non-significant differences are taken as evidence of normality. Most studies have reported non-significant differences between the two estimates. The general finding of non-significant differences between the upper and lower SDy estimates is encouraging. However, future studies should continue to examine the estimates. It is

probable that generating estimates for some jobs may be more difficult than for others. Differences between upper and lower SDy estimates may highlight estimation difficulties.

Two attempts were made to collect 97th percentile estimates in addition to the 15th, 50th, and 85th percentile estimates (Bobko, et al., 1983; Burke & Frederick, 1984). The rationale for collecting 97th percentile estimates was that in a normal distribution the 97th percentile lies two standard deviations above the mean. Therefore, the difference between the 97th and 85th percentiles would equal other percentile differences. In both studies, SDy estimates based on the 97th percentile estimates did not equal other estimates. This lack of equality for 97th percentile estimates appears troublesome. However, it is possible that estimators simply have a difficult time at the extremes and that the 15th, 50th, and 85th percentile estimates meet the necessary requirements. A more troublesome issue is variability of estimates.

Previous researchers have expressed concern with the lack of agreement among estimators as evidenced by high variability in SDy estimates. Extreme variability is seen as evidence of low interrater reliability. Estimator reliability is critical since reliability is a prerequisite for validity.

Brandon and Jacobs (1985) examined variability in SDy estimates for a number of different jobs. They reported the standard deviation of a set of estimates as a percentage of its mean. This ratio is an indication of the relative variability of SDy estimates. The greater the percentage, the more variable the estimates. This ratio can also be computed for the 15th, 50th, and 85th percentiles.

The ratios were computed for each study reported in Table 2 for which means and standard deviations were available. Table 3 displays ratios for percentiles and Table 4 for SDys. The standard deviations ranged from about 20% of the mean to over 300% of the mean. Clearly, the variability of the estimates could be a problem in many studies.

Schmidt et al. (1979) suggest that the standard error of the mean is the appropriate indication of estimate variability and not the standard deviation of the estimates. Of course, the magnitude of the standard error of the mean is a function of sample size. Thus, the greater the sample size the less the problem of estimator variability. In many organizations and for many jobs, however, a large number of supervisors simply are not available to generate estimates. The median sample size for the 17 independent samples reported in Table 1 was 26. This value may be a high estimate because researchers are likely to select jobs with a "sufficient" number of supervisors to allow for statistical analysis. Other jobs may have even fewer available supervisors. Therefore, controlling the variability of estimates remains a critical issue.

Outliers or extreme estimates often contribute to high variability and are potentially problematic. Extreme estimates also have a great influence on mean SDy estimates. It is possible that outliers are accurate reflections of performance differences. However, outliers may also be indicative of hasty responses or distorted frames of reference regarding performance. If the outliers are randomly distributed and sample size is large, then, theoretically, these values should not be problematic. However, if there is a systematic component to outliers, e.g., ceiling or floor effects, or if a large sample size is not



available, outliers may distort SDy estimates (Einhorn, Hogarth & Klempner, 1977). Schmidt, Mack, and Hunter (1984) found systematic differences between lower and upper estimates. They stated:

supervisors may fail to recognize variation along the entire spectrum of performance because they have developed a mental set focused on avoidance of errors on the part of the low performers rather than attending to outstanding performance. Supervisors may find themselves in the position of responding to complaints from the public...such behavior might create a cognitive set on the part of the supervisors to focus on errors or deficiencies.. (p. 494).

Acceptability. Any useful estimation procedure must be acceptable to managers. Since utility analysis is a decision aid, any procedure that elicits resistance is potentially valueless. A useful estimation procedure should be understandable, have face validity, and should yield estimates that are perceived to be accurate.

Inconsistent estimates have been reported (e.g., 85th percentile estimates less than 50th percentile estimates) in several studies. This is an indication that managers did not understand or attend to the task. More directly, managers have expressed concern about the ambiguity of the estimation task and some resistance has been reported in performing this task (Bobko et al., 1983; Mathieu & Leonard, 1984; Wroten, 1984). This is an important issue because estimators' confidence in their estimates and their acceptance of the estimation procedure will facilitate the use of these estimates.

There are two ways to deal with the issue of acceptability. One is to ignore it and to present final utility estimates to decision makers, assuming (or hoping) that they will not be concerned with estimator acceptability. The second way to deal with this issue is to consider changes in the estimation procedure that may lead to improvements in acceptability.

Utility analyses cannot be viewed as decision makers. Instead, utility analyses are simply decision aids. That is, one cannot point to the conclusions of a utility analysis and say, "it's obvious - we must change the selection system." Quade (1970) noted that cost effectiveness analyses are often designed and carried out as if to assist an individual decision maker to a discrete decision. However, he added that typically several decision makers are usually involved who can counter or at least degrade recommendations. In addition, it is often impossible to implement the recommendations without cooperation. All this suggests that acceptance of the process is crucial if decision makers are to use the results of this decision aid; disbelieving estimators can only serve to short-circuit implementation.

#### Previous Efforts to Improve the S & H Procedure

The concerns associated with the S & H procedure (i.e., validity, psychometric properties, and acceptability) have prompted researchers to attempt to examine and revise it. These efforts have met with mixed success.

One attempt to improve the quality of the estimates was conducted by Bobko, Karren and Parkington (1983). They hypothesized that an estimation procedure that encompassed two standard deviations of performance would provide more accurate estimates of actual variations of job performance than one that encompassed only one standard deviation. On the basis of the Tchebyshev inequality they inferred that if the underlying distribution was not normal the 15th and 85th percentiles may not encompass any of the population values. For this reason they added a 97th percentile estimation task in order to estimate SDy as the difference between the 97th and 85th percentile estimates.

However, inclusion of the 97th percentile did not improve the estimates. They concluded that "in spite of intuitions based on the Tchebyshev inequality, estimates based on extreme percentiles do not enhance the accuracy of estimates of SDy" (p. 174).

Other improvement efforts left the 15th, 50th, and 85th percentile estimates intact but instead revised the procedure by which the estimates were collected. In these studies, managers were provided with 50th percentile estimates as anchors to use for making subsequent estimates. In one case the anchor was generated by the researcher. In the other studies the 50th percentile estimates were generated initially by the managers and an average 50th percentile estimate was fed back as an anchor for subsequent estimates.

In one part of an elaborate study, Wroten (1984) provided managers with a 50th percentile anchor based in part on accounting information. The actual procedure used to develop this anchor is unclear. He found no differences between the mean SDy estimates generated in this condition and those collected using the S & H procedure. In contrast, he did find greater agreement (i.e., lower variability) among percentile estimates in the anchored condition. However, he found less conclusive results regarding the variability of the SDy estimates. An additional manipulation in Wroten's study was to feed back artificially high or low 50th percentile anchors. Manager's SDy values were adversely affected in those conditions where bogus feedback was provided. Wroten's research provides evidence that providing managers with an anchor does affect their estimates and may be useful in reducing variability.

Unlike Wroten's research, which incorporated an externally developed anchor, Karren and Bobko (1984), Burke and Frederick (1984),

and Burke (1985) used mean estimates as anchors for subsequent estimates. Managers in Burke and Frederick's (1984) study first generated 15th, 50th, and 85th percentile estimates. In a second round, they were given the mean 50th percentile estimate and asked to re-estimate their 15th and 85th percentile estimates. In contrast, managers in the Karren and Bobko (1984) and Burke (1985) studies only generated 50th percentile estimates in the first round. Next, they received the mean 50th percentile estimate and were asked to estimate the 15th and 85th percentiles. In all three studies, the procedure was structured so that estimates in the second round were generated without verbal interaction with other group members.

The mean estimates generated by the structured feedback groups in these studies did not differ significantly from the S & H mean estimates. However, in the Burke and Frederick study there was greater agreement among the estimators after feedback. Since time one estimates were essentially S & H estimates, the improved estimator agreement is an encouraging finding. A similar improvement in estimator agreement did not occur in the Karren and Bobko study. This finding may be attributable to the low variance of the initial estimates.

Burke and Frederick (1984) and Wroten's (1984) research also examined a procedure that allowed verbal interaction among group members. In both studies, the verbal interaction procedure failed to reduce estimator variability.

The research to date provides no support for the use of verbal interacting groups. However, there is support for additional research on the use of structured feedback groups, with Burke and Frederick's research providing the most encouraging results to date. Additional

improvements may be possible. Research from the group decision-making literature was examined to identify potential improvements.

A Further Revision to the S & H Technique: Behavioral Examples and the Delphi Procedure.

The basis of the S & H procedure is the pooling of estimates from multiple estimators. This pooling of estimates is called a statistized pooling. As noted before, previous efforts to improve the S & H procedure have attempted to involve the group in some form of interaction.

"The empirical literature clearly points to the superior accuracy of judgments resulting from interacting groups in comparison to a baseline of statistized sets of individuals" (Rohrbaugh, 1975; p. 75). This has been demonstrated in a variety of contexts and tasks (cf. Dalkey & Brown, 1971; Larreche & Moinpour, 1983; Miner, 1984; Uecker, 1982).

Steiner (1966, 1972) identified three critical factors in conceptualizing how well a group will perform: (1) the expertise of the different group members, (2) the process used by the group, and (3) the type of task. For a given group of managers (i.e., fixed expertise), improvements can be made by altering either the group process or the task.

Group process is important because many groups suffer process loss (Van de Ven & Delbecq, 1971). For example, social pressures may force less powerful group members to agree with more powerful group members. With an ambiguous task, such as dollar estimation of performance, people are susceptible to social pressure (Einhorn, Hogarth & Klempner, 1977). It is likely that the poor performances that were exhibited by the

freely interacting or unstructured groups in the SDy research (Burke & Frederick, 1984, Procedure A; Wroten, 1984) were due to process loss.

One method that has been used successfully for controlling process loss is the Delphi technique. The Delphi technique has been viewed primarily as a technological forecasting tool. However, as Martino (1983) noted, the Delphi technique can be used as a method for improving many group decision making tasks. There are several Delphi procedures but three common characteristics distinguish the Delphi from conventional face-to-face group interaction: (1) anonymity through the use of questionnaires, (2) iteration with controlled feedback, and, (3) statistical group response (Martino, 1983).

Research has demonstrated the superior quality of the Delphi procedure over freely interacting groups and statistical pooling (Dalkey, 1969; Dalkey & Brown, 1971; Larreche & Moinpour, 1983; Van de Ven & Delbecq, 1974). Statistized pooling avoids process loss but does so at the loss of interaction among group members. Freely interacting groups allow information exchange but are subject to process loss. The Delphi technique captures the advantages of both freely interacting groups and statistized pooling while avoiding their respective problems.

The Delphi procedure should lead to the enhanced acceptance on the part of individual participants (Quade, 1970). This is because participants are able to compare their estimates with others (unlike statistized pooling) and have the option of changing or retaining their estimates without group pressure (unlike many freely interacting groups). One additional benefit of the Delphi technique is that adding group members increases reliability up to 10-15 members. Increasing the size of groups beyond 10-15 people does not greatly improve reliability

(Fusfeld & Foster, 1971). Thus, reliability should be possible without the large number of managers required by the S & H procedure.

The structured feedback procedures employed in previous SDy research (e.g., Burke & Frederick, 1984) were based on the Delphi technique. However, they did not provide feedback for all estimates (i.e., they only provided 50th percentile feedback, not 15th and 85th), and no iterations were allowed on the 50th percentile (i.e., the 50th percent estimate was fixed for the second round). Because SDy is a function of the 15th and 85th percentile estimates, managers should receive feedback about all three percentile means. This will maximize agreement regarding SDy estimates. The procedure developed for the current research incorporates a Delphi procedure with more extensive feedback to attempt to improve upon the S & H and B & F procedures.

As Steiner noted, another way to improve group performance is to alter the task. The addition of the 97th percentile was an effort, albeit an unsuccessful one, to alter the task. A criticism of the S & H estimation procedure is that some managers find it ambiguous. Task ambiguity can contribute to the problems of consistency and bias. Nowakowski (1973) and Einhorn et al. (1977) suggested that the more ambiguous a task or stimulus the more likely it is that systematic bias may enter into judgments.

The estimation task could be revised to reduce its ambiguity. One change could be the initial generation of critical behavioral incidents related to the value of performance (Karren & Bobko, 1984). These incidents could be combined into a summary activity list and provided as part of the controlled feedback of the Delphi procedure prior to the generation of dollar estimates.

The rationale for developing a summary activity list is to provide a common frame of reference for managers to use when making estimates. This list of positive and negative incidents contains information about the range of performance, and should serve as a frame of reference to reduce the ambiguity of the estimation task. The shared information regarding the range of performance should reduce the variability of SDy estimates. Furthermore, the behavioral focus of the incidents should minimize the need of managers to rely strictly on salary when generating estimates.

The current research incorporated both the Delphi procedure and the summary activity list. This procedure was compared to the S & H procedure and to the most successful revision to date, the Burke and Frederick structured feedback procedure. The three methods were compared with regard to the concerns raised in the previous SDy research: validity, psychometric properties, and acceptability.

#### Research Hypotheses

It was hypothesized that the estimation procedures would yield useful estimates of SDy. This would be evidenced by convergence across methods, sensitivity to job differences, and conformity to the assumption of normality. However, it was also hypothesized that, overall, the Delphi would be the best estimation procedure. Both of the modified procedures (Delphi and B & F) were hypothesized to match or exceed the performance of the S & H procedure without requiring as many managers to provide estimates. The modified procedures should demonstrate less reliance on salary, lower estimator variability, and greater acceptability than the S & H procedure.



## 1. Validity

### A. Convergence

1. The three procedures should yield similar estimates.
2. Managers using the Delphi procedure should report less reliance on salary than those using the B & F procedure, who in turn should report less reliance on salary than those using the S & H procedure.

### B. Sensitivity

1. All three procedures should be sensitive to differences between the jobs.

## 2. Psychometric Properties

### A. Normality

1. None of the three procedures should violate the underlying assumption of normality.

### B. Estimator Variability

1. Managers who use the Delphi procedure should provide SDy estimates with less variability than managers using the B & F procedure who, in turn, should provide SDy estimates with less variability than managers using the S & H procedure.

## 3. Acceptability

Managers using the Delphi procedure should report greater acceptability (i.e., better understanding, sufficient information, less ambiguity, more confident that they completed the task properly, and higher perceived accuracy) than those using the B & F procedure, who in turn should report greater acceptability than managers using the S & H procedure.

## II. METHOD

### Participants and Organizational Setting

The study was conducted at an urban hospital that employed approximately 2,500 people. Participants were managers from the nursing, surgical, and ambulatory care sections. All participants were female. The sample included first-line managers (head nurses), assistant managers (supervisors), support managers, and upper level managers (nursing directors and the vice-president of nursing).

The hospital employed approximately 70 nursing managers. Of these, 64 or 91.4% volunteered and were able to participate. Six managers were dropped because of incomplete or unusable data, leaving 58 or 82.9% of all managers in the study. There was no pattern to the loss of managers, either with regard to research condition or demographics (i.e., no differential mortality). Demographic data for the complete and reduced samples are presented in Table 5.

Recruitment of participants. After receiving approval from hospital administrators, a series of presentations were made to small groups of the managers. The purpose of these presentations was to elicit support and encouragement for the project and to educate the managers about utility analysis. During these presentations the purpose and nature of the study were explained. The managers were told that the hospital administration supported the project but that participation was not mandatory. To help ensure independence of research conditions, the managers were instructed that once they received their questionnaire

package they were not to discuss its contents nor the estimates they generated. Lastly, pre-questionnaire data were collected, including information on each participant's unit, tenure, familiarity with budget data, and the extent of contact with subordinate nurses (Appendix A contains a copy of the pre-questionnaire). Managers were told they would receive feedback at the conclusion of the project.

Managers were told, in advance, that their name would appear on the packages to allow for the collection of follow-up data. If a manager's package was not returned by the specified date, the manager received a phone call or a note from the investigator. Discussions with supervisors prior to the project indicated that because estimates were not being made about specific individuals the data were considered non-threatening and anonymity was not necessary. Only one manager expressed concern about anonymity.

Assignment to conditions. It was hypothesized that the revised procedures (B & F and Delphi) would produce SDy estimates that would match or exceed the quality of those produced by the S & H condition without requiring as many managers to provide estimates. Twice as many managers were assigned to the S & H condition than to either the B & F or Delphi conditions to evaluate this hypothesis. Since some attrition was anticipated, 16 managers were assigned to the B & F and Delphi conditions to allow for groups of optimal size (i.e., 10 to 15).

Managers from each nursing unit were randomly assigned to one of the three research conditions. The only exception to the random assignment process was that prior to the project each participant was asked to provide information about her anticipated leave time during the study; no nurses were assigned to any conditions that required their

participation during leave time. There was no relationship between leave time and any of the other pre-data.

Treatment conditions (coded 1, 0, -1; see Cohen & Cohen, 1983, p. 205) were regressed upon demographic information to ensure that the randomization process yielded non-significant differences between treatment groups. No significant relationships were found ( $p > .05$ ).

### Jobs

Participants generated estimates of the value of job performance for the positions of registered nurse (RN) and licensed practical nurse (LPN). Results must be interpreted within the context of these jobs. For this reason, information about the RN and LPN jobs is provided.

The RN and LPN positions are similar, but the RN position requires greater educational preparation and has greater responsibilities (see their job descriptions in Appendix B). For example, a LPN cannot give intravenous medications to patients. The relative similarity of the positions allows for a rigorous test of the sensitivity of the various SDy estimation procedures to discriminate between jobs. All the managers in the study indicated that they were familiar with both jobs.

The actual duties performed by a given nurse varied from unit to unit. For example, critical care nurses performed some duties that med-surgical nurses did not, and vice-versa. Even greater differences may have existed between operating room nurses and nurses in other units. There is some question as to whether it is appropriate to consider these nurses from different units as performing the same job. However, interviews with the managers suggested that there was sufficient similarity across units to consider the nurses as either registered or licensed practical nurses. Nonetheless, the unit that the manager

supervised (i.e., critical-care, med-surg, operating room, and other) was coded for analysis. None of the study results were related to unit.

The salaries for the RN and LPN positions had been determined using the point system of job evaluation with adjustments made according to the market. The salary range for LPNs was \$13,000-17,000 ( $\bar{X}$ =\$16,711), and for RNs \$17,000-23,000 ( $\bar{X}$ =\$21,407). The pay scale for these positions was similar for all units.

### Design and Procedure

Participants were notified as to when they could expect the delivery of their questionnaire packages. Packages containing the estimation materials were left in mailboxes or delivered directly to a participant. All packages were delivered on Mondays, and managers were requested to complete and return the package, via interoffice mail, by Friday. A one or two week interval occurred between deliveries. A two week interval was necessary to avoid deliveries during the Christmas and New Year holidays when many of the managers were on leave. The time allotted between deliveries allowed the investigator to contact those managers who did not return their packages and to collate the previous responses for feedback at the next administration.

All participants were asked to respond to the open-ended statement, "please describe the factors that you considered in making your estimates for the RN (LPN) position." This statement was presented to participants on the first occasion that they were asked to generate a complete set of estimates (i.e., 15th, 50th, and 85th percentiles).

Since a comparison between the final estimates that were generated under each procedure was of primary interest, treatments were staggered so that final estimates, and participants' reactions were collected

during the same time period for all reseach conditions. This was done to minimize threats to internal validity associated with the date of experimental manipulation. Figure 1 graphically depicts the research design.

Participants were told prior to the study that they were not to share their packages or their estimates with the other managers. In addition, the cover letter in each package reiterated this point to help ensure the independence of the research conditions. Each research condition is examined below in some detail.

S & H condition. This research condition is a replication of the Schmidt et al. (1979) procedure. Since Schmidt et al. investigated the job of computer programmer, minor revisions in wording were necessary to fit the nursing jobs. Specifically, the phrase "products and services produced" was replaced with the phrase "overall performance." This was necessary because nurses do not produce a product. This wording change is consistent with previous research dealing with service occupations.

The instructions to the managers in this condition were as follows:

The dollar estimates that you provide are critical for determining the utility of the programs that the Human Resource Department offers at the Hospital. In providing these estimates, you are required to make some difficult decisions. You will have to ponder for some time before making each estimate. Although there is no way you can be absolutely certain your estimate is accurate, keep in mind these three things:

- (1) The alternative to estimates of this kind is the application of cost accounting procedures to the evaluation of job performance. Such applications are usually prohibitively expensive, and in the end, they produce only imperfect estimates, like this estimation procedure.
- (2) Your estimates will be averaged in with those of other managers. Thus, errors produced by too high and too low estimates will tend to be averaged out, providing more accurate estimates.

- (3) The decisions about human resources programs do not require that estimates be accurate to the last dollar. Substantially accurate estimates will lead to the same decisions as perfectly accurate estimates.

Based on your experience with RNs, we would like you to estimate the yearly dollar value to the Hospital of the overall performance of the 50th percentile, or average RN. Let us define an average performer as an RN who is at the 50th percentile. That is, of 100 RNs this RN performs better than 50 RNs. Consider the quality and quantity of performance typical of the average RN and the dollar value of this performance. In estimating a dollar value for this performance, it may help to consider what the cost would be of having someone from an outside firm provide this service.

Based on my experience, I estimate the value to the Hospital of the average RN to be \_\_\_\_\_ dollars per year.

Managers were provided with six estimation forms, three for the RN position and three for the LPN positions. Naturally, the wording was designed to fit the job and performance level in question (e.g., "better than 85 LPNs"). Within a job, the order in which estimates were presented was held constant: average, superior, low. However, in all conditions, the order in which jobs were presented was counterbalanced. That is, half the participants received the RN estimation forms followed by the LPN estimation forms; the other half received the LPN estimation task first. Appendix C contains the set of the forms used in this condition, including the accompanying cover letter.

B & F condition. This research condition is essentially the same as procedure B in Burke and Frederick's study (1984, p. 484); it is a modification of the S & H estimation task, incorporating a structured feedback component. In this condition, each manager generated an estimate for the 15th, 50th, and 85th percentile performer based on the S & H global estimation instructions (see Figure 1). The 50th percentile estimates were then averaged. This average was provided to

the managers, and they were asked to provide dollar estimates for the 15th and 85th percentiles.

Minor revisions were necessary in the wording from the Burke and Frederick study to allow for direct comparisons between research conditions in the present study. Instructions for the T3 estimates were revised to be identical to those in the S & H estimation task. Appendix D includes a set of the forms used in this condition.

Delphi condition. This condition was a further revision of the S & H estimation task. It incorporated: (1) the critical incident methodology (Flanagan, 1954) to generate a summary list of behavioral examples that describe the yearly value of nursing services; and, (2) the Delphi technique to allow for the iterative refinement of estimates.

At T1 managers were asked to generate three or four examples of staff nurses activities that influence the total yearly value of their services. The instructions read as follows:

In this part of the project we are asking you to provide examples of staff nurses activities that influence the total yearly value of their services. We want to know what RNs and LPNs do that may affect the dollar value of their performance. These can be activities that generate revenue, save costs, or on the negative side, activities that cost the Hospital. You should provide examples of activities that you have observed in the past.

Examples: Forgot to shut off oxygen valve on wall outlet after suctioning which causes wasting of oxygen and increases cost of use.

Courteous to patients' families enhancing the hospital's image and encouraging further business.

Unless it is self explanatory, please include the consequences of the activity (e.g., "which causes wasting of oxygen and increases cost of use"; "enhancing hospital's image and encouraging further business").



These instructions were pilot tested and were accompanied by job descriptions to help managers with their task.

The 16 managers in this condition generated 80 examples for an average of 4.4 examples per manager. The high number of examples suggests that managers were motivated to cooperate in this task.

The researcher and a senior level personnel psychologist independently sorted the incidents into categories or dimensions and then met to discuss them. The data were qualitatively clustered into four dimensions for the RN examples and three dimensions for the LPN examples. Finally, three examples were selected as representative of each dimension. The dimensions and their three examples constituted the critical activity list (see Appendix E for a copy of the RN and LPN lists). Managers were provided with a copy of this list and the relevant job descriptions at T2, T3, and T4. Managers were instructed to refer to them when making their estimates.

The principles of the Delphi technique were used in this condition to reduce estimate variability and to increase acceptability in the estimation process. In all Delphi groups, members could not associate specific responses with other members. This allowed managers to change their estimates during a subsequent round without publicly admitting to the other participants that they had done so. In addition, participants could not be pressured into agreeing with managers with greater authority.

Four iterations were used, including one round to develop the critical activity list (see Figure 1). In rounds three and four, the median of all managers' estimates and each manager's own estimates from the previous round were provided.

At T1, critical incidents were collected from the participants. These data were collated and returned to the panel at T2 as the critical activity list. In addition to the activity list, at T2, T3, and T4 participants were provided with a summary of the project to date and were asked to make estimates regarding the RN and LPN positions. The instructions that accompanied the estimation component of this condition (at T2, T3, and T4) were similar to those used for the global estimation task. However, the following statement was added to focus attention on the critical activity list:

You should refer to the RN (LPN) job description and the RN categories and example activities [critical activity list]. Remember that employees will perform these activities at differing levels of proficiency and/or frequency. That is, superior RNs will demonstrate some cost-saving or revenue generating activities more often (or cost-producing activities less often) than average RNs, who in turn will do better than below average RNs.

At T2 only 50th percentile estimates were collected. At T3 and T4, six estimates were requested, i.e., 15th, 50th, and 85th percentile estimates for each job.

The feedback component incorporated in this condition was similar to the structured feedback procedure used in the B & F condition. However, there were several key differences. The most obvious difference is the qualitative data collection and feedback, i.e., the critical activity list. Other differences were that for the Delphi condition: (1) The initial estimation task only focused on the 50th percentile such that estimates of the performance extremes were not requested until participants received the 50th percentile feedback; (2) Participants were allowed to reestimate their 50th percentile estimates, while in the B & F condition, after initial estimates, participants used the average of 50th percentile estimates; (3) Feedback was in the form

of medians; (4) An additional iteration was used such that participants were able to revise their estimates twice; and, (5) Participants were provided with more detailed feedback such that the group's 15th and 85th percentile averages, as well as the 50th percentile averages, were provided as feedback. Clearly, the Delphi condition is more akin to previous applications of the Delphi procedure than is the B & F condition. Appendix F includes a set of the forms used in the Delphi/behavioral example condition.

Post-questionnaire. All participants received a post-questionnaire at T4. This questionnaire consisted of 13 to 15 statements (i.e., two statements were condition specific). Each statement used a 5-point, agree-disagree, Likert-type scale, with 1 anchored as "strongly disagree", 3 as "neither agree nor disagree" and 5 as "strongly agree". Several statements requested participants' reactions to: (1) the estimation task (e.g., task ambiguity, time requirements); (2) the estimates they generated (e.g., the accuracy of their estimates); and, (3) the use of the estimates (e.g., to evaluate a training program). Two statements pertained to the overall performance of nurses.

Finally, one statement pertained to the critical activity list and was only administered to the Delphi participants, and one statement addressed group feedback and was administered to B & F and Delphi participants. Appendix G includes a copy of the post-questionnaire, including instructions.

### III. RESULTS

#### Analytic Approach

A series of mixed model ANOVAs, with SDy estimation method (i.e., research condition) as the between factor, were used to address the validity and psychometric property hypotheses. The within factors varied by analysis but included: jobs (RN, LPN), percentile (15, 50, 85, linear and quadratic), and SDy (upper, lower). In addition, Hartley F-max tests were conducted on SDy variances to test the estimator variability hypothesis. Finally, one-way ANOVAs were conducted on the post-questionnaire responses to assess the relative acceptability of the three conditions.

#### Descriptive Statistics

Tables 6 and 7 present the means and standard deviations for each percentile estimate and for each SDy estimate (SDy lower; SDy upper; SDy total) across the two jobs (RN & LPN). Table 6 contains the data from T3; Table 7 contains the data from T4. The average SDy totals for the RN and LPN jobs, collapsed across conditions, at T4, were: \$4367.31 and \$3324.93, respectively. The average percentile estimates for RN were: 15th percentile = \$17,749; 50th percentile = \$22,792; 85th percentile = \$26,483. The estimates for LPN were: 15th percentile = \$12,211; 50th percentile = \$16,223; 85th percentile = \$18,860.

#### Tests of Hypotheses

Convergence. It was hypothesized (1A.1) that the three conditions would yield similar estimates at T4. Several analyses were conducted to

test this convergence hypothesis.

A condition (S & H, B & F, Delphi) x job (RN, LPN) x percentile (15, 85) analysis was conducted using the percentile data collected at T4. The 50th percentile estimates were not included because the B & F procedure does not require these estimates at T4. A significant condition main effect or condition interaction would indicate that the estimation procedures yielded different point estimates at T4. As seen in Table 8, the main effect for condition and the condition interactions were non-significant. This supports the convergence hypothesis (1A.1) with regard to percentile estimates. A similar analysis was conducted to assess the hypothesis with regard to SDy estimates.

As seen in Table 9, all condition effects for the SDy estimates at T4 were non-significant. This supports hypothesis 1A.1 with regard to SDy estimates. In sum, the three estimation procedures yielded final point estimates and SDy estimates which were not statistically different.

All post-questionnaire items were evaluated with one-way ANOVAs. Item 10 pertained to the use of salary in generating estimates. It was hypothesized (1A.2) that the Delphi condition and to some extent, the B & F condition would reduce managers' reliance on salary. As seen in Table 10, there were no differences between the conditions ( $F(2,55) = .84; p > .05$ ). Thus, managers in the Delphi condition and the B & F condition did not report less reliance on salary than S & H managers in generating their estimates.

Sensitivity. It was hypothesized (1B.1) that each of the three conditions should be sensitive to differences between the jobs. In particular, the more critical position (RN) was hypothesized to

demonstrate greater mean percentile estimates than the less critical (LPN) position. A job effect and a job x percentile interaction would be an indication of this sensitivity to jobs.

A repeated measures analysis which included all three percentile estimates was required to allow for the best test of hypothesis 1B.1. Since managers in the B & F condition did not provide 50th percentile estimates at T4, T3 estimates were used for the B & F condition along with T4 estimates for the other conditions.

A condition x job x percentile ANOVA was conducted to test the sensitivity hypothesis. This analysis is susceptible to violations of the assumption of sphericity, a common problem for effects with more than one degree of freedom in repeated measures designs (O'Brien & Kaiser, 1985). This problem is compounded because no useful method for testing for sphericity violations is available (Rogan & Mendoza, 1978). Therefore, the percentile effects were broken down into linear and quadratic components, each having one degree of freedom to evaluate the hypothesis and to avoid violating the sphericity assumptions (see O'Brien & Kaiser, 1985). Specifically, the job effect and the job by linear percentile effect were tested to address hypothesis 1B.1.

Table 11 presents the results of this analysis. As hypothesized, the job effect ( $F(1,55) = 746.06$ ;  $p < .01$ ) and the job x percentile linear effect ( $F(1,55) = 38.55$ ;  $p < .01$ ) were both significant.

A contrast was evaluated for the significant job x percentile linear effect to ensure that the differences between jobs were in fact due to differences in slope. The (85 - 15 RN job) vs. (85 - 15 LPN job) contrast was significant ( $p < .05$ ). Thus, as hypothesized (1B.1) the three conditions were sensitive to differences between the jobs.

Normality. It was hypothesized (2A.1) that the three methods would meet the underlying assumption of normality. Normality was tested by assessing differences between the lower (50 - 15) and upper (85 - 50) estimates of SDy. If these differences were non-significant, the hypothesis was supported. Table 9 presents data which address this hypothesis. The non-significant SDy effect ( $F(1,55) = 2.84; p > .05$ ) suggests that overall, the normality assumption was not violated. Furthermore, the non-significant SDy x condition effect ( $F(2,55) = .00; p > .05$ ) indicates that none of the conditions separately violated the normality assumption.

Estimator Variability. It was hypothesized (2B.1) that the Delphi and the B & F conditions would yield final SDy estimates with lower estimator variability than the S & H condition. Karren and Bobko (1984) and Burke and Frederick (1984) examined estimator variability. However, they did not report any inferential statistics but merely inspected the data to reach conclusions. Wroten (1984) reported ratios of variances (apparently Hartley's F-max tests) to address the estimator variability issue.

Consistent with Wroten's analysis, Hartley's F-max tests were conducted on each pair of SDy total variances (See Table 12). These variance tests indicated that for both jobs, the Delphi condition yielded estimates with significantly smaller variances than either the B & F or S & H conditions. The B & F condition did not exhibit lower variability than the S & H condition.

Acceptability. It was hypothesized (3) that for the Delphi condition, and to a lesser extent for the B & F condition, managers would report greater acceptability than managers in the S & H condition.

Table 10 presents the means, standard deviations, and one-way ANOVAs that were conducted to test these hypotheses. Two of the post-questionnaire items were significant. Managers in the Delphi condition reported that they felt more confident that they had completed the task properly than did managers in the S & H condition ( $F(2,55) = 3.95$ ;  $p < .05$ ). Also managers in the B & F condition were more likely to agree that their final estimates were more accurate than managers in the S & H condition ( $p < .05$ ). Although an examination of Table 10 reveals that for most items managers in the Delphi condition provided more favorable responses than those in the S & H condition, only the two items mentioned were significant. Thus, hypothesis 3 regarding manager acceptance of the procedures was only partially supported.



#### IV. DISCUSSION

It is important that I/O psychologists clearly communicate their findings to organizational decision-makers. Utility analyses convert personnel decisions into a dollar metric; this facilitates communication and allows managers to make informed decisions regarding prospective interventions. Unfortunately, an obstacle to the effective use of utility analysis has been the estimation of SDy. Until a valid, psychometrically sound, and acceptable method of estimating SDy is available utility concepts will not be applied to practical problems. The S & H procedure for estimating SDy had been hailed as a breakthrough, but some skepticism remained. Clearly, the S & H procedure needed to be evaluated with consideration given to both scientific standards (e.g., psychometric properties) as well as manager acceptability. Thus, the current research attempted to address two questions. First, is the S & H procedure scientifically sound and acceptable to managers? Second, are the B & F and Delphi modifications of the S & H procedure improvements over that procedure?

This study's findings with regard to the convergence, sensitivity, and normality hypotheses suggest that the S & H procedure does yield useful estimates. Several additional findings suggest that the Delphi modification was an improvement over the S & H procedure. Specifically, it was found that: (1) The Delphi procedure reduced estimator variability relative to the S & H and B & F procedures; (2) Despite a greater time requirement, managers in the Delphi condition reported

slightly higher acceptability than managers in the S & H condition; and (3) The critical activity list was a valuable by-product of the Delphi estimation procedure.

The discussion section examines these results in detail and looks at each of the proposed hypotheses: Validity (convergence and sensitivity); Psychometric properties (normality and estimator variability); and, Acceptability.

As hypothesized (1A.1), the three procedures yielded convergent estimates. Since each procedure attempted to measure the same construct this is an encouraging finding. As noted earlier (see Table 2) the S & H procedure has converged with some methods (e.g., archival sales data) but not with others (e.g., CREPID). In the current study, the three procedures yielded estimates that were not different statistically. However, this convergence does not imply that the estimates were identical. SDy estimates for the RN position differed as much as 38% across procedures (i.e., \$4733 vs. \$3488).

Although non-significant statistically, this difference could have practical implications. If the different SDy estimates lead to different human resource decisions, then a problem exists. At the hospital, the estimates were used to determine the utility of the performance appraisal system. Regardless of which SDy estimate was used (e.g., \$4733 vs. \$3488), the utility of the system was demonstrated. At least in this instance, the difference between procedures was non-significant from both a statistical and a practical perspective.

Convergence across procedures is desirable. However, a close convergence of percentile estimates with actual salary may be an indication that estimators relied heavily on salary in generating their

estimates. Hypothesis 1A.2 was not confirmed. Managers in the Delphi condition did not report less reliance on salary than managers in the B & F condition, nor did B & F managers report less reliance than managers in the S & H condition. While S & H managers did report the greatest reliance on salary the differences were non-significant.

The data suggest that the managers in all conditions may have relied heavily on their knowledge of nurses' salary when they made their estimates. The minimum, average, and maximum salaries for the LPN position were: \$13,553, \$16,711, and \$17,270. For the RN position, the salaries were: \$17,826, \$21,407, and \$23,223. A comparison of these salaries with the data contained in Tables 6 and 7 reveals a close, though not identical, correspondence between the nurses' salaries and the mean percentile estimates provided by managers. This hospital had a well developed job evaluation system so it is possible that the similarity between the estimates and the nurses' salaries is an indication of accuracy. On the other hand, since the jobs had no production or sales data for managers to refer to when they made their estimates this convergence may simply indicate that managers relied on salary. Unfortunately, the data do not allow for a comparison of these interpretations. Future research should address the relationship of salary and percentile estimates, since a strong correspondence suggests an overly simplistic estimation strategy.

The jobs that were chosen for this study were highly similar service jobs. This was done to allow for a rigorous test of the procedures' sensitivity to differences across jobs. The more similar the jobs and the less quantifiable the jobs' performance criteria the more difficult it should be to differentiate between jobs.

All three procedures were sensitive to the differences between the jobs; this supported hypothesis 1B.1. This finding is critical because utility analyses may compare personnel decisions across jobs. If SDy estimates are not sensitive to job differences, comparative utility analyses are meaningless. Unfortunately, the optimism associated with the sensitivity results must be tempered by the concern that emerged regarding the use of salaries in generating estimates. If the differences in the estimates across jobs merely reflect salary differences, then any company that has a salary structure that does not reflect the actual value of performance cannot use utility analysis. This would be a serious limitation.

Overall, the convergence and sensitivity findings provide supporting evidence for the validity of SDy estimation procedures. However, because of the possible contamination with salary information, additional data are needed to confirm the validity of these procedures. For example, research which determined the sensitivity of these procedures to organizational changes (e.g., a layoff of 20% of the workforce on the basis of performance should reduce SDy) would be a valuable addition to the construct validation effort (Landy, et al., 1982).

Normality has been operationalized as a non-significant difference between upper and lower SDy estimates. All three procedures demonstrated non-significant differences, and thus, the assumption of normality was not violated.

While the normality findings were encouraging, estimator variability is probably the more critical of the psychometric properties. It was hypothesized (2B.1) that the Delphi condition

managers would demonstrate less variability in their estimates than managers in the B & F condition who would demonstrate less variability than the S & H condition managers.

As hypothesized, managers in the Delphi condition did demonstrate lower estimator variability than managers in the S & H and B & F conditions. This finding is extremely encouraging and demonstrates that the Delphi procedure addresses the concerns raised regarding variability.

The Delphi procedure incorporated both the critical incident and Delphi techniques. The critical activity list, which was based on the critical incident technique, provided a behaviorally based, common frame of reference for Delphi managers. In addition, the iterations of the Delphi technique provided group feedback which managers could use to revise their previous estimates. These features of the critical incident and Delphi techniques should have helped reduce estimator variability. However, the current research was not designed to assess the relative contributions of each component. In light of the success of the Delphi condition in the current study, future research should seek to identify the degree to which each component was responsible for reduced estimator variability.

While the Delphi procedure demonstrated lower estimator variability than the S & H procedure, the B & F procedure did not. This finding is surprising since the B & F condition was essentially a replication of Burke and Frederick's (1984) procedure, which did demonstrate lower variability. In fact, two replications were built into the current study. One was T3 versus T4 within the B & F condition; this was an exact replication of Burke and Frederick's original study. The second

was a comparison of the B & F and S & H results at T4. This was a similar comparison but between independent groups. Neither comparison replicated Burke and Frederick's original findings. Why were their findings not replicated in the current research?

One reason why the current study did not replicate Burke and Frederick's (1984) results is due to the variability of estimates before feedback (i.e., S & H procedure). Tables 3 and 4 provide data on the variability of estimates (ratio of standard deviations to means) in all of the previous studies that employed the S & H technique. In the current study, the S & H procedure exhibited estimator variability well below the average of the previous studies. This was true for both percentile and SDy estimates and for both the RN and LPN positions. In other words, there was relatively high agreement among estimators at the beginning of the current study. In contrast, the S & H condition in Burke and Frederick's original study exhibited above average estimator variability in all cells. Thus, in Burke and Frederick's study there was greater room for improvement and the structured feedback process was able to reduce variability. The same phenomenon seems to have affected Karren and Bobko's (1984) unsuccessful attempt to replicate Burke and Frederick's study. An examination of Table 4 reveals that in Karren and Bobko's study, estimator variability in the S & H condition was also below average. In addition, the only other study which reported reduced variability (Wroten, 1984) exhibited above average estimator variability in the S & H condition.

It becomes clear then, that in those studies where initial agreement was high (e.g., Karen and Bobko; the current study) the B & F procedure was unsuccessful in reducing estimator variability.

There are several factors which may affect initial variability. First, it may be difficult for managers to agree on the value of performance for certain jobs. Logically, generating estimates for jobs where performance can be quantified would seem to be easier. However, in those studies which examined jobs with quantifiable performance indices (e.g., sales managers, insurance counselors, and bank tellers) initial variability tended to be high. In contrast, it would appear more difficult to generate estimates for service jobs (e.g., park rangers, enforcement specialists, secretaries, and nurses), yet estimates for these jobs have demonstrated lower initial variability. One possible explanation for this paradox is that for those jobs without a quantifiable criterion, managers focused on salary. As long as estimators were all familiar with salary data, agreement could be high. For the jobs with quantifiable criteria, some estimators may have focused on salary while others focused on the criteria itself. This would have increased variability.

A second factor which could affect estimator variability is the degree to which unit or departmental performance is homogeneous within an organization. If performance varies dramatically across units, then managers would be basing their estimates on different samples of employee performance. Under these circumstances an 85th percentile performance in one unit may in fact be higher than an 85th percentile performance in another unit. This would increase initial estimator variability.

In addition to differences in jobs or in employee performance, the motivational level of the estimators could also influence variability. If managers are motivated to provide accurate estimates and if they

understand the task, then variability should be lower. In the current study, managers demonstrated high motivation (e.g., they provided more critical incidents than they were required to provide) and were given a detailed explanation of utility concepts and the purpose of the study. High estimator motivation may have minimized the number of hasty responses thereby reducing initial variability.

Regardless of the reason, it seems logical that low initial variability minimizes the amount of eventual reduction in variability that is possible. This could explain why the B & F condition did not demonstrate the reduction in variability that it had in the previous research. In light of this, it is particularly encouraging that the Delphi procedure demonstrated the reductions that it did. It would be interesting to see how well the Delphi procedure reduces estimator variability when initial variability is higher.

The revised procedures were also hypothesized to improve estimator acceptability (hypothesis 3). Of the ten items that specifically addressed acceptability, five items favored the Delphi condition and five favored the B & F condition. None favored the S & H condition. However, only two of the differences were significant. Estimators who used the Delphi procedure were more confident that they completed the task properly than estimators who used the S & H procedure. In addition, managers who used the B & F procedure were more likely than S & H managers to believe that their final estimates were accurate.

It appears that the modified procedures were more acceptable than the S & H procedure but the effect was not particularly strong. However, acceptability did not appear to be a severe problem in any of the conditions in this study. In contrast with some previous studies (e.g.,



Bobko et al., 1983), there were few complaints or dropouts and only one manager provided inconsistent estimates (i.e., 50th percentile lower than 15th percentile). In addition, there were no major acceptability problems noted on the post-questionnaire (i.e., most means were above the scale mid-point in all conditions).

The high level of acceptability for all procedures may be the result of several factors: (1) a thorough orientation was provided to all participants on utility concepts and the purpose of the study; (2) participation was voluntary; and (3) managers at this hospital regularly participated in personnel research and thus, were accustomed to completing questionnaires.

In summary, the modified procedures were only slightly more acceptable than the S & H procedure. However, even this is encouraging since the B & F and Delphi procedures were more time consuming than the S & H procedure. Apparently, the greater time requirements of the modified procedures did not elicit resistance.

Finally, there is a unique advantage associated with the Delphi procedure. The critical activity lists that were generated as part of the Delphi procedure are valuable by-products of the estimation process. These lists identified activities that contribute to or detract from a nurse's value to the hospital. Interestingly, the human resources department felt that these lists could also be used to help identify high payoff training needs. In addition, the lists could also be used to facilitate performance counseling. By examining and discussing the content of the lists, employees could be informed that some of their activities have a greater influence on the organization. That is, discussing the list in a performance appraisal interview should focus

employees' attention on activities which managers perceive to be critical. Managers could compare an employee's past performance with activities noted on the critical activity list. This comparison should enable managers and employees to identify performance goals. In sum, the critical activity list must be considered a valuable contribution of the Delphi procedure independent of other considerations.

#### Selecting a SDy Estimation Procedure

The results of the current research are useful in identifying when to use each SDy estimation procedure. With the caveat that additional research is needed addressing the role of salary in estimate generation, several recommendations can be made.

The Delphi procedure demonstrated some clear advantages over the S & H and B & F procedures. If the necessary time is available, then in most instances the Delphi procedure is recommended. This is particularly true if the organization plans to use utility analyses on a continuing basis. The educational value of the critical activity list and the slight improvement in acceptability should facilitate the programmatic use of utility analysis. In addition, when a limited number of supervisors are available as estimators (i.e., less than 20) then the Delphi procedure should be used to control estimator variability.

While the Delphi procedure is an improvement over the S & H procedure, its advantages are not overwhelming. The results of this study suggest that the S & H procedure is a useful method for estimating SDy. If an estimation procedure is needed that is not time consuming and a large number of supervisors are available, then it is appropriate to use the S & H procedure. This is particularly true if low estimator

variability is anticipated.

On the basis of the current results, the B & F procedure cannot be recommended. However, in Burke and Frederick's (1984) original study their procedure did reduce variability. Perhaps when time is unavailable to conduct the Delphi, but high estimator variability is anticipated, then the B & F procedure may be useful. However, this recommendation is based on Burke and Frederick's findings and not the current study.

Regardless which procedure is selected, it is suggested that managers be provided with a thorough orientation, including a presentation on utility concepts. A contact person should be made available to answer any questions about the procedure. In addition, it is probably best to select as estimators, only those managers who are intimately familiar with the job in question and then, to solicit volunteers. These suggestions may help minimize the problems of estimator acceptability and hasty responses which can undermine the application of utility analysis.

### Conclusions

This study continued the line of utility research which began over 50 years ago. It focused on the standard deviation of performance in dollars, the parameter which has been the achilles heel of the modern utility model. The study contributed to the research on SDy estimation in several ways: (1) A modification of the S & H procedure was presented that incorporated the Delphi and critical incident methodologies and which exhibited several improvements over the S & H procedure; (2) For the first time, the relative acceptability of several SDy procedures was explicitly examined; and (3) A rigorous test of the procedures' ability

to discriminate between jobs was conducted by collecting data from two highly similar jobs within the health care industry.

This study provided some additional support for the scientific soundness of the S & H estimation procedure. Specifically, the findings regarding the convergence, sensitivity, and normality of estimates were encouraging. However, a serious concern emerged. There was a close correspondence between employee salary and manager's percentile estimates. This suggested that managers may rely too heavily on employee salary when making their estimates. The optimism associated with the positive findings must be tempered by this concern.

There was evidence that the Delphi procedure was an improvement over the S & H procedure. The Delphi procedure was slightly more acceptable to managers than the S & H procedure. This was true even though the Delphi procedure required a greater time commitment. In addition, the critical activity list was a valuable by-product of the Delphi estimation process. Lastly, the Delphi procedure demonstrated less estimator variability than the B & F and S & H procedures.

Overall, this study provided additional support for the use of utility analyses in organizational settings. The Delphi procedure was recommended for many situations, but the S & H procedure may also be appropriate under certain circumstances.

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Table 1 (continued)

Study	Jobs	Sample Size
Wroten (1984)	Petroleum & Chemical Industry	
	Operations Jobs	34
	Head Operator	
	Outside Operator	
	Pump Operator	
	Maintenance Jobs	29
	Instrument Technician	
	Outside Mechanic	
Mathieu & Leonard (1984)	Welder	
	Head Bank Teller	19
	Operations Manager	25
	Branch Manager	18

Note. 11 studies contained 117 independent samples that provided 39 estimates of SDy. The arithmetic mean of the sample sizes was 40.2, and their median was 26.

Table 2

Convergence of SDy Estimates Based on the S & H Technique With  
Alternative Methods

Study	Alternative Method(s)
<u>Convergent</u>	
Wroten (1984)	Anchored 50th percentile estimation procedure
Bobko, Karren & Parkington (1983)	Archival sales data
Burke & Frederick (1984)	Consensual feedback of 50th percentile
Mayer (1982)	Value added accounting procedure
Janz & Etherington (1983)	Behavior rating method (rated frequency of performance outcomes for one effective, two average, and one ineffective individual and used "market-value" of outcomes to get SDy)
<u>Nonconvergent</u>	
Mayer (1982)	Estimates generated by non-managers
Janz & Etherington (1983)	Behavior trisection method (rated frequency of outcomes for lower, middle, and upper one-third performers and used "market-value" of outcomes to get SDy)
Weekly, Frank, O'Connor & Peters (1985)	CREPID
Wroten (1984)	Estimating dollar value of individuals and computing standard deviation directly

Table 3

Ratio and Percentage of Standard Deviation to Mean for 15th, 50th, and  
85th Percentile Estimates from Previous S & H SDy Studies

Study	15th Percentile		50th Percentile		85th Percentile	
	Ratio	%	Ratio	%	Ratio	%
Weekly et al. (1985) Store Managers	$\frac{13,148}{14,837}$	= 88.6	$\frac{23,399}{27,537}$	= 85.0	$\frac{43,799}{42,772}$	= 102.4
Burke & Frederick (1984) District Sales Managers	$\frac{64,000}{40,300}$	= 158.8	$\frac{101,900}{75,200}$	= 135.5	$\frac{148,400}{108,200}$	= 137.2
Schmidt, Mack, & Hunter (1984) Park Rangers	$\frac{2,869}{8,347}$	= 34.4	$\frac{3,836}{13,531}$	= 28.4	$\frac{5,437}{17,317}$	= 31.4
Bobko et al. (1983) Insurance Counselors	$\frac{2,200}{11,200}$	= 19.6	$\frac{7,800}{16,000}$	= 48.8	$\frac{18,000}{22,400}$	= 80.4
Mayer (1982) Bank Tellers	$\frac{4,380}{8,576}$	= 51.1	$\frac{29,889}{22,129}$	= 135.1	$\frac{130,646}{52,441}$	= 249.1
MEANS		70.5%		86.6%		120.1%

Table 4

Ratio and Percentage of Standard Deviation to Mean for SDy lower, SDy upper, and SDy total from Previous S & H SDy Studies

Study/Job(s)	SDy lower (50-15)		SDy upper (85-50)		SDy total	
	Ratio	%	Ratio	%	Ratio	%
Janz & Etherington (1983) Staff Accountants					$\frac{4,814}{8,786} = 54.8$	
Burke & Frederick (1984) District Sales Managers	$\frac{58,000}{37,400} = 155.1$		$\frac{52,100}{33,000} = 157.9$		$\frac{53,102}{36,163} = 146.8$	
Schmidt et al. (1984) Park Rangers	$\frac{3,813}{5,101} = 74.8$		$\frac{2,546}{3,801} = 67.0$			
Bobko et al. (1983) Insurance Counselors	$\frac{7,000}{4,700} = 148.9$		$\frac{10,400}{6,400} = 162.5$			
Karren & Bobko (1984) Enforcement Specialist	$\frac{4,700}{7,800} = 60.3$		$\frac{4,300}{5,800} = 74.1$			
Witness Security Specialist	$\frac{3,900}{7,400} = 52.7$		$\frac{3,300}{4,300} = 76.7$			
Supervisory Deputies	$\frac{5,200}{7,400} = 70.3$		$\frac{3,100}{6,900} = 44.9$			
Schmidt et al. (1979) Budget Analysts					$\frac{8,819}{11,327} = 77.9$	
Computer Programmers	$\frac{10,606}{9,955} = 106.5$		$\frac{17,143}{10,871} = 157.7$			
Mayer (1982) Bank Tellers	$\frac{29,640}{13,553} = 218.7$		$\frac{101,927}{30,312} = 336.3$		$\frac{65,222}{21,932} = 297.4$	

Table 4 (continued)

Study/Job(s)	SDy lower (50-15)		SDy upper (85-50)		SDy total	
	Ratio	%	Ratio	%	Ratio	%
Brandon & Jacobs (1985) Service Organization					$\frac{1,787}{4,647} = 38.5$	
Processing Clerk					$\frac{1,163}{3,294} = 35.3$	
Data Entry					$\frac{784}{2,898} = 27.1$	
File Clerk					$\frac{708}{2,112} = 33.5$	
Processing Specialist					$\frac{1,140}{3,418} = 33.4$	
Mail Clerk					$\frac{982}{1,949} = 50.4$	
Secretary					$\frac{1,239}{3,569} = 34.7$	
Manufacturing Organization A First Line Supervisor					$\frac{6,026}{12,857} = 46.9$	
General Foreman					$\frac{11,404}{24,643} = 46.3$	
Industrial Engineer					$\frac{14,059}{18,214} = 77.2$	
Purchasing Manager					$\frac{24,398}{44,286} = 55.1$	
Production Controller					$\frac{16,947}{26,071} = 65.0$	



Table 4 (continued)

Study/Job(s)	SDy lower (50-15)		SDy upper (85-50)		SDy total	
	Ratio	%	Ratio	%	Ratio	%
Manufacturing Organization B Buyer					$\frac{47,314}{50,500} = 93.7$	
Industrial Nurse					$\frac{17,111}{13,750} = 124.4$	
Laborer/Cleaner					$\frac{5,165}{5,250} = 98.4$	
Machine Attendant					$\frac{10,442}{14,050} = 74.3$	
Screen Operator					$\frac{7,070}{8,100} = 87.3$	
Secretary					$\frac{18,926}{25,200} = 75.1$	
Technician					$\frac{18,277}{18,900} = 96.7$	
Wroten (1984) Operations Jobs Head Operator					$\frac{28,684}{25,036} = 114.6$	
Outside Operator					$\frac{17,449}{19,830} = 88.0$	
Pump Operator					$\frac{11,533}{14,595} = 79.0$	
Maintenance Jobs Instrument Technician					$\frac{31,266}{34,502} = 90.6$	
Outside Mechanic					$\frac{21,828}{23,980} = 91.0$	
Welder					$\frac{18,177}{21,805} = 83.4$	

Table 4 (continued)

Study/Job(s)	SDy lower (50-15)		SDy upper (85-50)		SDy total	
	Ratio	%	Ratio	%	Ratio	%
Mathieu & Leonard (1984)						
Head Tellers	$\frac{3,775}{3,987}$	= 94.7	$\frac{1,016}{2,424}$	= 41.9	$\frac{2,166}{3,206}$	= 67.6
Operations Managers	$\frac{45,080}{19,386}$	= 232.5	$\frac{28,725}{13,467}$	= 213.3	$\frac{36,885}{16,427}$	= 224.5
Branch Managers	$\frac{40,042}{21,777}$	= 183.9	$\frac{8,570}{11,683}$	= 73.4	$\frac{23,767}{16,730}$	= 142.1
Means		127.13%		127.79%		85.97%

Table 5

a

Means and Standard Deviations of Demographic Data for Study

Participants

	Complete Sample (N = 64)	Reduced Sample (N = 58)
Tenure (years)	10.5 (6.4)	11.2 (6.4)
Number of RN's in unit	17.3 (28.7)	17.1 (29.5)
Number of LPN's in unit	8.0 (11.6)	7.6 (11.1)
Number of RN's-regular contact outside unit	30.8 (51.1)	30.6 (52.1)
Number of LPN's-regular contact outside unit	11.0 (17.6)	11.1 (17.9)
Familiarity with budget (1 = low, 5 = high)	3.4 (1.2)	3.5 (1.2)
Years involved in the budgeting process	2.7 (3.1)	2.7 (3.0)

a

Standard deviations are in parentheses.

Table 6

a

Means and Standard Deviations for Percentile and SDy Estimates: Time 3

	Percentiles			SDy		
	15%	50%	85%	SDy lower	SDy upper	SDy total
<u>B &amp; F</u>						
RN	16,960 (5,118)	22,004 (2,416)	25,929 (3,077)	5,044 (4,656)	3,924 (974)	4,484 (2,524)
LPN	10,784 (3,593)	14,729 (1,732)	17,716 (1,714)	3,944 (3,375)	2,987 (1,119)	3,465 (1,836)
<u>Delphi</u>						
RN	19,962 (3,538)	23,888 (4,529)	17,716 (5,155)	3,926 (1,649)	3,151 (1,153)	3,539 (1,116)
LPN	13,675 (3,803)	16,681 (4,095)	19,321 (4,874)	3,006 (1,528)	2,641 (1,343)	2,823 (1,147)

Note. Delphi T2 50th percentile estimates: RN = \$24,238 (6096);  
LPN = \$17,549 (5292).

a

Standard deviations are in parentheses.

Table 7

<sup>a</sup>  
Means and Standard Deviations for Percentile and SDy Estimates: Time 4

	Percentiles			SDy		
	15%	50%	85%	SDy lower	SDy upper	SDy total
<u>S &amp; H</u>						
RN	17,215 (4,524)	22,223 (3,317)	26,428 (4,449)	5,008 (5,700)	4,205 (1,875)	4,607 (3,297)
LPN	12,083 (3,132)	15,858 (2,134)	18,875 (3,212)	3,774 (3,822)	3,016 (1,758)	3,396 (2,367)
<u>B &amp; F</u>						
RN	16,615 (5,004)	22,004 <sup>b</sup>	26,161 (2,602)	5,389 (5,004)	4,157 (2,602)	4,773 (3,316)
LPN	10,856 (3,559)	14,729 <sup>b</sup>	18,129 (2,326)	3,873 (3,559)	3,400 (2,326)	3,636 (2,438)
<u>Delphi</u>						
RN	20,029 (3,307)	24,012 (4,223)	26,924 (5,063)	3,983 (1,456)	2,912 (1,300)	3,448 (1,224)
LPN	13,839 (3,574)	17,006 (3,860)	19,560 (4,586)	3,167 (1,233)	2,555 (1,273)	2,860 (1,051)

<sup>a</sup>

Standard deviations are in parentheses.

<sup>b</sup>

Denotes fixed value from time 3, no standard deviation.

Table 8

Summary of the ANOVA Performed on the T4 Percentile Estimates: Condition  
(S & H, B & F, Delphi) x Jobs (RN, LPN) x Percentile (15, 85)

Source	df	MS	<u>F</u>
<u>Between S's</u>	57		
Condition (C)	2	68,417,530.91	2.23
S/Condition	55	30,696,423.66	
<u>Within S's</u>	174		
Jobs (J)	1	2,511,868,985.73	849.95**
J x C	2	1,812,943.91	.61
J x S/C	55	2,955,298.29	
Percentile (P)	1	3,431,362,747.25	137.64**
P x C	2	18,452,321.10	.74
P x S/C	55	24,929,415.45	
J x P	1	63,021,210.73	37.52**
J x P x C	2	1,941,587.82	1.16
J x P x S/C	55	1,679,837.33	

\*\* $p < .01$ .

Table 9

Summary of the ANOVA Performed on the T4 SDy Estimates: Condition  
(S & H, B & F, Delphi) x Jobs (RN, LPN) x SDy (upper, lower)

Source	df	MS	<u>F</u>
<u>Between S's</u>	57		
Condition (C)	2	18,452,321.10	.74
S/Condition	55	24,929,415.45	
<u>Within S's</u>	174		
Jobs (J)	1	63,021,210.73	37.52**
J x C	2	1,941,587.82	1.16
J x S/C	55	1,679,837.33	
SDy	1	38,285,715.08	2.84
SDy x C	2	32,924.39	.00
SDy x S/C	55	13,486,365.05	
J x SDy	1	1,462,821.15	.88
J x SDy x C	2	651,800.68	.39
J x SDy x S/C	55	1,653,155.94	

\*\*p < .01.

Table 10

Summary of ANOVAs on the Post-Questionnaire Items

Item	Delphi	B & F	S & H	<u>F</u>
1. Understood what to do	4.07 (.62)	3.71 (.61)	3.73 (.98)	.92
2. Sufficient information to make estimates	3.21 (.80)	3.00 (.96)	2.70 (.88)	1.76
3. Task was ambiguous	3.07 (.73)	3.36 (.75)	3.07 (.94)	.61
4. Project took too much time	2.21 (.58)	2.14 (.66)	2.16 (.70)	.04
5. Critical activity list helped	3.64 (.17)	N/A	N/A	
6. Group averages helped	3.14 <sup>a</sup>	3.29	N/A <sup>b</sup>	.10
7. Confident completed task properly	3.78 (.70)	3.64 (.50)	3.13 (.94)	3.95*
8. My final estimates are accurate	3.86 (.36)	4.00 <sup>a</sup> (.55)	3.43 <sup>b</sup> (.73)	4.82*
9. My group's estimates are accurate	3.71 (.73)	3.43 (.65)	3.31 (.66)	1.70
10. My estimates based pre-dominantly on salary	3.00 (1.24)	2.86 (1.03)	3.30 (1.12)	.84
11. Acceptable to use estimates for utility of training	3.36 (.93)	3.50 (.85)	3.43 (.86)	.09
12. Acceptable to use estimates to choose between training programs	3.07 (1.00)	3.57 (.94)	3.47 (.82)	1.29



Table 10 (continued)

	Item	Delphi	B & F	S & H	<u>F</u>
13.	Acceptable to use estimates to determine selection utility	3.07 (1.00)	3.50 (.94)	3.47 (.82)	1.10
14.	Most RN's perform at a similar level	2.86 (1.17)	2.64 (1.08)	2.72 (.92)	.16
15.	Most LPN's perform at a similar level	2.86 (1.17)	2.93 (1.00)	2.80 (.90)	.09

Note: Entries in parentheses are standard deviations. Different superscripts denote significant mean differences as determined by Newman-Keuls analysis ( $p < .05$ ).

\* $p < .05$ .

Table 11

Summary of the ANOVA Performed on the Percentile Estimates: Condition  
(S & H at T4, B & F at T3, Delphi at T4) x Job (RN, LPN) x Percentile  
(15, 50, 85)

Source	df	MS	F
<u>Between S's</u>	57		
Condition (C)	2	107,521,518.44	2.38
S/Condition	55	45,231,797.03	
<u>Within S's</u>	290		
Jobs (J)	1	3,884,334,552.38	746.06**
J x C	2	5,836,764.68	1.12
J x S/C	55	5,206,485.32	
Percentile linear (Pl)	1	3,333,085,208.28	153.89**
Pl x C	2	14,953,939.69	.69
Pl x S/C	55	21,658,824.12	
Percentile quadratic (Pq)	1	14,211,656.52	3.09
Pq x C	2	107,124.79	.02
Pq x S/C	55	4,596,566.44	
J x Pl	1	59,618,131.25	38.55**
J x Pl x C	2	1,859,569.52	1.20
J x Pl x S/C	55	1,546,337.16	
J x Pq	1	146,430.28	.34
J x Pq x C	2	68,334.14	.16
P x Pq x S/C	55	433,371.99	

\*\* $p < .01$ .

Table 12

Hartley F-max Values for SDy Total Variances

	S & H vs. B & F	B & F vs. Delphi	S & H vs. Delphi
RN	1.01	7.34*	7.26*
LPN	1.06	5.38*	5.07*

\* $p < .05$ .

Figure 1

## Research Design

<u>CONDITION</u>	<u>TIME</u>			
	T1	T2	T3	T4
S & H ( <u>N</u> = 32)				Collect 15th, 50th and 85th percentile estimates. Collect Post-Questionnaire.
B & F ( <u>N</u> = 16)			Collect 15th, 50th and 85th percentile estimates.	Feed back 50th percentile average. Collect 15th, 85th percentile estimates. Collect Post-Questionnaire.
Delphi ( <u>N</u> = 16)	Collect behavioral examples	Feed back critical activity list. Collect 50th percentile estimates.	Feed back 50th percentile average. Collect 15th, 50th, and 85th percentile estimates.	Feed back 15th 50th, and 85th percentile averages. Collect 15th, 50th, and 85th percentile estimates. Collect Post-Questionnaire.

Note: Predata collected prior to random assignment to research conditions.

VI. APPENDIX A:  
Pre-Questionnaire

HUMAN RESOURCES UTILITY PROJECT  
PRE-QUESTIONNAIRE

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This information is necessary to assign you to groups and will be used strictly for the purpose of the project.

Name \_\_\_\_\_

Position \_\_\_\_\_ Phone ext. \_\_\_\_\_

Unit \_\_\_\_\_

check one:    med-surg    \_\_\_\_\_  
                  crit-care    \_\_\_\_\_  
                  other        \_\_\_\_\_

How long have you worked for MCH? \_\_\_\_\_

Approximately how many RN's are there in your unit? \_\_\_\_\_

Approximately how many LPN's are there in your unit? \_\_\_\_\_

Approximately how many RN's do you come into contact with from outside your unit, as part of your normal duties? That is, how many of these RN's do you see performing work related activities? This should not include those you see during lunch, meetings, etc. \_\_\_\_\_

Approximately how many LPN's do you come into contact with from outside your unit, as part of your normal duties? \_\_\_\_\_

How familiar are you with budgetary information related to the RN and LPN positions? For example, salaries, cost of supplies, billing rates for services, etc. \_\_\_\_\_

1	2	3	4	5
I am not at all familiar with budgetary info related to the RN & LPN positions.		I am somewhat familiar with budgetary info related to the RN & LPN positions		I am very familiar with budgetary info related to the RN & LPN positions

How many years have you been involved in the budgeting process? \_\_\_\_\_

VII. APPENDIX B:  
Job Descriptions for RN and LPN Positions

DATE REVIS<sup>ED</sup> 10/21/82  
5/14/82  
DATE \_\_\_\_\_

# MEDICAL CENTER HOSPITALS JOB DESCRIPTION

POSITION: REGISTERED NURSE (RN)

OCC. CODE 884

## POSITION SUMMARY:

SALARY GRADE 13A

EXEMPT No

P.A.L. CODE 24

Develops and implements nursing care plan for patient care based on assessment of patient's needs for nursing. Exercises judgment in determining abnormal conditions and values and determining basis for care. May implement any necessary variations from routine procedures. Documents all observations and procedures performed. Plans, implements, evaluates, and documents patient teaching. Supervises associate personnel. In absence of Head Nurse, acts as Charge Nurse, being able to make any decisions necessary.

## ILLUSTRATIVE DUTIES:

1. Assesses patient upon admission, and develops nursing care plan to meet the needs of individual patients. Reviews patient care plan with Head Nurse/Charge Nurse or Clinical Coordinator and patient's physician to ensure continuity of care. Implements nursing care plan.
2. Acts as Charge Nurse of unit in absence of Head Nurse. Instructs, supervises, and evaluates quality of work performed by other personnel under her charge and ensures the patient care is implemented and completed.
3. Assists with the orientation and guidance of new personnel and nursing students on a nursing unit.
4. Plans discharge in collaboration with physician, patient, patient's family, and other disciplines. Discharges patient. Reviews nurse's progress notes on discharged patients and prepares discharge summary. May refer patient to various community resources utilizing Social Service Department where indicated.
5. Teaches patient, patient's family or those responsible for his care.
6. Monitors and evaluates patient's condition and implements appropriate care. Documents and reports assessments and actions. Utilizes charting policies as set forth in the Policy Book to document all nursing care plans, activities and reports.
7. Administers medications according to hospital procedures. Makes observations for tolerance/response to medication.
8. May administer IV fluids, blood and blood derivatives, according to hospital policy.
9. Collects specimens such as urine, stool and sputum. Prepares laboratory slips, labels and forwards specimen to laboratory for analysis. Measures and records food and fluid intake and output. Evaluates lab values on patient. Notifies



# JOB SPECIFICATIONS

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POSITION: REGISTERED NURSE (RN)

## MENTAL AND EDUCATIONAL DEVELOPMENT:

- ☐ GRAMMAR SCHOOL EQUIVALENCE
- ☐ HIGH SCHOOL EQUIVALENCE
- ☒ 1 TO 2 YEARS OF COLLEGE OR POST HIGH SCHOOL VOCATIONAL TRAINING
- ☐ 3 OR 4 YEARS OF COLLEGE, NON-DEGREE
- ☐ COLLEGE GRADUATE; MAJOR OR SPECIALTY IF REQUIRED:
- ☐ GRADUATE WORK OR DEGREE; MAJOR OR SPECIALTY IF REQUIRED:

## CERTIFICATION, AND/OR DEGREE REQUIREMENT:

Graduation from an accredited School of Nursing. Must be registered by the Virginia State Board of Nursing (RN).

## EXPERIENCE — RELATED REQUIREMENTS:

MONTHS OR YEARS

NATURE OR WORK

N/A

## SPECIAL SKILL/KNOWLEDGE REQUIREMENTS

Must be able to recognize the state of wellness in order to relate the underlying illness and to take appropriate action. Must be able to supervise and instruct others. Knowledge of sterile techniques. Comprehensive and verbal abilities necessary to understand patient's chart, doctor's orders, nursing care plan, medications, treatments, and to communicate with patients and staff.

## EQUIPMENT, INSTRUMENTS, AND TOOLS USED:

Emerson pump, suction machine, wheelchairs, stretchers, blood pressure apparatus, catheters, IVAC, aqua pads, heat lamps, traction equipment, ice mattress, peritoneal dialysis machines, addressograph, Hemovac, stethoscope, ultrasonic nebulizers, intercom, Hon monitor, bovie machine, sterilizing equipment, I.V. pole, irrigating solutions, casting material, syringe and needles, Doppler, ECT machine.

## JUDGEMENT AND COMPLEXITY OF DECISIONS:

Coordinates patient care received from all disciplines including medicine. Non-routine work. Must use good judgment in treating patients and making observations as to tolerance/response to treatments. Develops patient's treatment plan based on an assessment of patient's condition. Recognizes abnormal condition in patient and takes appropriate action to alleviate unfavorable conditions. Makes report on patient's condition to oncoming shift. Must be able to work under emergency conditions.

## ACCOUNTABILITY FOR FUNDS, PROPERTY, and ALLOCATION OF RESOURCES:

Responsible for cost effectiveness through appropriate usage of personnel, supplies and equipment.

**INDEPENDENCE OF ACTION**

**SUPERVISED BY:** Head Nurse

80

**NATURE OF SUPERVISION RECEIVED:**

General supervision from Head/Charge Nurse. Frequently makes independent decisions.

**RESPONSIBILITY FOR WORK and/or INSTRUCTION OF OTHERS:**

Supervises work of LPN's, Nurses Aides, Patient or Nursing Attendants, Ward Secretary, and students on units.

**RESPONSIBILITY FOR THE SAFETY OF OTHERS:**

Must follow prescribed safety/quality control standards. Must accurately report on patient's condition and any other pertinent information occurring on unit. Error could result in harm to patient.

**CONTACTS and INTERPERSONAL SKILL REQUIREMENTS:**

Constant contact with patients in varying degrees of stress; patient's family, physicians and other hospital personnel in the performance of duties. Must exercise courtesy, patience and tact. Must maintain the confidentiality of patient's chart and condition.

**WORK ENVIRONMENT and HAZARDS:**

Works in patient-care area. Requires constant standing and walking. Assists in lifting and moving patients. Constant exposure to disease carrying organisms. Must take isolation and sterile precautions. Must use caution in handling equipment. May be exposed to confused, abusive, and combative patients, electrical hazards, radiation, etc.

**SPECIAL PHYSICAL DEMANDS:**

Assists in lifting and moving patients.

**OTHER SPECIAL REQUIREMENTS:**

RN's assigned to Psychiatric Unit may be required to participate in programs supporting a therapeutic milieu during working and non-working hours such as on and off ward activities and their related duties.

**POSITION NORMALLY FILLED FROM:** No formal line of promotion.

**USUALLY PROMOTED TO:** Head Nurse

Shirley G. Wharton / Shirley R. Francis  
APPROVAL/DEPARTMENT HEAD

10/21/82

7/16/82  
DATE

[Signature]  
[Signature]

7/29/82  
DATE

POSITION: REGISTERED NURSE (RN)

**ILLUSTRATIVE DUTIES CONTINUED:**

10. Executes physician's orders, referring where appropriate, to other departments through established systems.
11. Assists physician in performing various diagnostic tests and examinations. Assists in positioning patient, sets up equipment and supplies.
12. Coordinates the assembling of all supplies necessary for the care of the patient.
13. Arranges for transportation of patients to other departments such as X-ray, OR, Physical Therapy, etc., and to other health care facilities for diagnostic therapeutic or medical services. May assist in transporting patient via wheelchair or stretcher.
14. Participates in the growth and development of other nursing personnel rendering care for the patient.
15. Attends in-service meetings, professional meetings, staff development meetings, and workshops to develop an awareness of new techniques, procedures, and for general information.
16. Participates in the formulation and maintenance of nursing and hospital policies, procedures, standards and audits as designated.
17. Gives report on patient status. Change of shift report is verbal from care-giver to care-giver.
18. Gives relevant, objective report of patient's reaction to illness and/or therapy to nursing staff, Head Nurse, medical and interdepartmental staff as indicated.
19. Performs related duties as required.

**PRIMARY NURSE ADDITIONAL DUTIES**

1. The primary nurse admits the patient, if possible, and performs the initial clinical assessment. The associate nurse will admit the patient and write the admission note if it is not possible for the primary nurse to do so.
2. Solely responsible for completing initial Nursing Assessment within 24 hours of patient's admission to floor and including it in the chart.
3. Collects data from assessment, interviews with patient, family and significant other, and other appropriate sources to be used in initiating a nursing care plan to be recorded on the Care Plan within 24 hours of patient's admission to floor.

(CONTINUED ON SUPPLEMENTAL PAGE)

**COMMENTS:**

PRIMARY NURSE ADDITIONAL DUTIES (CONTINUED)

4. Identifies herself/himself with specifically assigned patients verbally as well as by documentation on: Nursing Assessment, Nursing Care Plan, Nurses' Notes, and by label on the patients' charts.
5. Reviews entries on nursing care plan of primary patients for relevance and completion.
6. Includes discharge goals in nursing care planning.
7. Indicates discharge goals on Care Plan and documents implementation in Nurse's Notes of Nursing Care Summary. States family and community resources available and contacted to assist patient after discharge from hospital.
8. Whenever possible, includes patients and/or their families or significant others in the planning, implementation, and documentation of the patient's care.
9. Completes "Nursing Care Summary" upon the discharge of her/his primary patient whether or not she is on duty at the time of discharge.
10. Is responsible for delivering direct, total nursing care to patient during a tour of duty.
11. Carries out nursing actions with regard for patient's safety.

ADDITIONAL DUTIES FOR RN'S ASSIGNED TO CRITICAL CARE

1. Monitors patient's EKG pattern. Interprets EKG rhythms and arrhythmias. Notifies supervisor/physician of unusual heart patterns. May defibrillate patient.
2. May set up, flush and maintain arterial, venous swan ganz, left atrial and pulmonary artery catheters.
3. Removes arterial and venous lines.
4. Titrates and maintains anti-arrhythmic drips.
5. Cares for patient on mechanical ventilators and adjusts settings as ordered.
6. May draw blood gases per arterial stick. (NGH only)
7. Changes tracheotomy tubes as required. (NGH only)
8. Extubates patients. (NGH only)
9. Adjusts external pacemaker according to patient's condition and changes batteries as necessary.
10. May start infusions of blood and blood derivatives per physician's orders.
11. Draws blood from AV shunt or pressure lines.

5/14/82

# **MEDICAL CENTER HOSPITALS** **JOB DESCRIPTION**

POSITION: LICENSED PRACTICAL NURSE

OCC. CODE 874

**POSITION SUMMARY:**

SALARY GRADE 2A

EXEMPT No

P.A.L. CODE 24

Performs assigned nursing procedures for the comfort and well-being of patients under the direction and supervision of an RN. Assists in admission, bathing, feeding, etc. Takes and records patient's vital signs and collects specimens for analysis. May administer medications. Documents all procedures performed. Takes part in formulation of care plan. May be assigned as sub-team leader under direction of RN.

**ILLUSTRATIVE DUTIES:**

1. Admits patients. Reviews chart for identification. Under the direction of an RN ensures that all necessary forms are complete.
2. Observes patient and charts symptoms/reactions on observations and nursing procedures performed for patient. Alerts RN when a change in patient's condition occurs.
3. Weighs patient and takes and records appropriate vital signs as needed. Measures and records food and fluid intake and emission.
4. May administer medication according to hospital policy and procedure.
5. Assists physicians in performing various diagnostic tests and examinations.
6. Assists in positioning patient, sets up equipment and supplies, etc.
7. Administers treatments to patient such as eye irrigations, warm wet soaks, changing dressings, bandages, binders, colostomy bags and drainage bottles, applies hot and cold compresses, gives baths, preps patient.
8. Provides direct patient care such as back rubs and bedpans for patient. Checks patient's dressings, bandages, tubing, IV's, for abnormal conditions.
9. Collects specimens such as urine, stool, and sputum. Prepares laboratory slips, labels and forwards specimen to laboratory for analysis.
10. At NGH, may hang IV solutions without medications under supervision of an RN. At NGH and LMH; may regulate and discontinue IV's.
11. Assembles and uses equipment such as suctioning apparatus, O<sub>2</sub>, infusion pumps. Checks equipment at regular intervals for proper functioning.

(CONTINUED)

**MENTAL AND EDUCATIONAL DEVELOPMENT:**

- ☐ GRAMMAR SCHOOL EQUIVALENCE  
☐ HIGH SCHOOL EQUIVALENCE  
☒ 1 TO 2 YEARS OF COLLEGE OR POST HIGH SCHOOL VOCATIONAL TRAINING  
☐ 3 OR 4 YEARS OF COLLEGE, NON-DEGREE  
☐ COLLEGE GRADUATE; MAJOR OR SPECIALTY IF REQUIRED:  
☐ GRADUATE WORK OR DEGREE; MAJOR OR SPECIALTY IF REQUIRED:

**CERTIFICATION, AND/OR DEGREE REQUIREMENT:**

Must be licensed by the Virginia Board of Nursing (LPN). Graduate of a state approved school of practical nursing.

**EXPERIENCE — RELATED REQUIREMENTS:**

MONTHS OR YEARS

NATURE OR WORK

N/A

**SPECIAL SKILL/KNOWLEDGE REQUIREMENTS**

Must have a working knowledge of Cardio-pulmonary Resuscitation. Requires the ability to deal with patients under any condition. Must acquire special skills as necessary according to unit assignment. Must be familiar with equipment and supplies used in unit.

**EQUIPMENT, INSTRUMENTS, AND TOOLS USED:**

Suction machines, wheelchairs, stretchers, blood pressure apparatus, catheters, IVAC, aqua pads, heat lamps, traction equipment, ice mattress, peritoneal dialysis machines, addressograph, Hemovac, stethoscope, ultrasonic nebulizers, intercom, HON monitor, bovie machine, sterilizing equipment, syringe and needle, autoclave and washer sterilizer, I-MED, Harvard Pump, Kreissleman, CVP lines, various instruments used in surgery for specified procedures.

**JUDGEMENT AND COMPLEXITY OF DECISIONS:**

Reports any significant change in vital signs or condition to Head Nurse or Charge Nurse. Makes report of patient's condition to oncoming shift. Established procedures apply to most duties. Refers unusual conditions to Head Nurse/Charge Nurse. Performs all duties according to hospital policies and procedures. Must be able to work under emergency conditions.

**ACCOUNTABILITY FOR FUNDS, PROPERTY, and ALLOCATION OF RESOURCES:**

Cost incurred would result from misuse of supplies and equipment. Responsible for maintaining records of narcotics and keeping them secure.

**INDEPENDENCE OF ACTION**

**SUPERVISED BY:** Head Nurse

**NATURE OF SUPERVISION RECEIVED:**

85

General supervision. Work assignments are provided. Established procedures apply to all routine duties. Refers unusual cases to supervisor. Receives detailed work instructions for anything other than routine duties.

**RESPONSIBILITY FOR WORK and/or INSTRUCTION OF OTHERS:**

Responsible for LPN's and Nursing Assistants when acting as Team Leader.

**RESPONSIBILITY FOR THE SAFETY OF OTHERS:**

Must follow prescribed safety/quality control standards. Must accurately report on patient's condition. Error could result in harm to patient.

**CONTACTS and INTERPERSONAL SKILL REQUIREMENTS:**

Constant contact with patient in varying degrees of stress, patient's family physician and other hospital personnel. Must be able to accurately communicate patient's condition to physician, supervisor, etc. Must exercise courtesy and tact in the performance of duties. Must maintain the confidentiality of patient's chart.

**WORK ENVIRONMENT and HAZARDS:**

Works in patient care area. Requires constant standing and walking. Assists in lifting and moving patients; frequently exposed to patients with contagious diseases. Must take isolation and sterile precautions. Must use caution in handling equipment. May be exposed to confused and combative patients.

**SPECIAL PHYSICAL DEMANDS:**

N/A

**OTHER SPECIAL REQUIREMENTS:**

N/A

**POSITION NORMALLY FILLED FROM:** Entry level position

**USUALLY PROMOTED TO:** No formal line of promotion

Shirley G. Wharton  
APPROVAL/DEPARTMENT HEAD

Shirley Jones  
10-21-82

6/30/82  
DATE

Shirley G. Wharton  
APPROVAL/PERSONNEL

7-15-82  
DATE

POSITION: LICENSED PRACTICAL NURSE

**ILLUSTRATIVE DUTIES CONTINUED:**

12. Maintains narcotics and medication records. Prepares nursing order sheets for medication and supplies used.
13. Arranges for transportation of patients to other departments such as X-ray, OR, Physical Therapy and other units for diagnostic, therapeutic or medical services. May assist in transporting patient via wheelchair or stretcher.
14. Performs related duties as required.

ICU/CCU at LMH only:

1. May hang plain and premixed I.V. solutions under supervision of a Registered Nurse.

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**COMMENTS:**



VIII. APPENDIX C:

Forms and Cover Letter for S & H Condition

HUMAN RESOURCES UTILITY PROJECT

Norfolk General Hospital

January 7, 1985

HUMAN RESOURCES UTILITY PROJECT  
Norfolk General Hospital  
January 7, 1985

This is the January administration of the human resources utility project we are conducting at NGH. Please accept our thanks, in advance, for helping us with this project. As I mentioned during our meetings some of you will be receiving different forms of questions. All questions relate to the same goal of determining the dollar value of different levels of nurses' performance. This information is being collected so that in the future we can try to determine the utility (benefit minus cost) of various human resource programs. It will not be applied to individuals. I will remind you please do not share your form or discuss its contents with the other managers, otherwise, we will not be able to tell which questionnaire works best.

The contents of this package should include:

- \* An instruction sheet for the estimation task
- \* Six worksheets - three for the RN estimations and three for the LPN estimations
- \* A sheet with questions pertaining to the utility project. We need this information to determine which method of collecting utility information works best at NGH.

If you have any questions please give me a call. I can be reached at 440-4236 during the day and 489-3615 at night. You can also leave a message for me at Personnel x-3883.

You have until January 11th to finish this part of the project. After I receive all the packages I will summarize the results and we will meet to discuss them. If you anticipate any delays please call me. When you are finished use the envelope marked: Scott Tannenbaum, c/o Glenn DeBiasi, Dept. of Human Resources (Personnel); and forward it by interoffice mail. If you are running late, call me, and I will stop by and pick it up. Once again, thank you for your cooperation.

Scott I. Tannenbaum



NGH Dept. of Human Resources

### INSTRUCTIONS -- Dollar Estimates

On the pages that follow we will be asking you to provide estimates of the dollar value of various levels of RN and LPN performance at Norfolk General Hospital.

The dollar estimates that you provide are critical for determining the utility of the programs that the Human Resource Department offers at the Hospital. In providing these estimates, you are required to make some difficult decisions. You will have to ponder for some time before making each estimate. Although there is no way you can be absolutely certain your estimate is accurate, keep in mind these three things:

- (1) The alternative to estimates of this kind is the application of cost accounting procedures to the evaluation of job performance. Such applications are usually prohibitively expensive, and in the end, they produce only imperfect estimates, like this estimation procedure.
- (2) Your estimates will be averaged in with those of other managers. Thus, errors produced by too high and too low estimates will tend to be averaged out, providing more accurate final estimates.
- (3) The decisions about human resources programs do not require that estimates be accurate to the last dollar. Substantially accurate estimates will lead to the same decisions as perfectly accurate estimates.

On the following pages you will be asked first, to estimate the dollar value of the average RN. Next you will be asked to estimate the dollar value of the performance of a superior (85th percentile) and low performing (15th percentile) RN. Following the RN estimation questions you will be asked to provide similar estimates for the LPN position.

Name:

WORKSHEET -- dollar estimate for average RN

Based on your experience with RNs, we would like you to estimate the yearly dollar value to Norfolk General Hospital of the overall performance of the 50th percentile, or average RN. Let us define an average performer as an RN who is at the 50th percentile. That is, of 100 RNs this RN performs better than 50 RNs. Consider the quality and quantity of performance typical of the average RN and the dollar value of this performance. In estimating a dollar value for this performance, it may help to consider what the cost would be of having someone from an outside firm provide this service.

Based on my experience, I estimate the value to Norfolk General Hospital of the average RN to be \_\_\_\_\_ dollars per year.

WORKSHEET -- dollar estimate for superior performing RN

Based on your experience with RNs, we would now like you to estimate the yearly dollar value to Norfolk General Hospital of the overall performance of the superior performing RN. Let us define a superior performing RN as a RN who is at the 85th percentile. That is, of 100 RNs this RN performs better than 85 RNs and only 15 RNs turn in better performances. Consider the quality and quantity of performance typical of the average RN and the dollar value of this performance. In estimating a dollar value for this performance, it may help to consider what the cost would be of having someone from an outside firm provide this service.

Based on my experience, I estimate the value to Norfolk General Hospital of the superior RN to be \_\_\_\_\_ dollars per year.

WORKSHEET -- dollar estimate for low performing RN

Based on your experience with RNs, we would now like you to estimate the yearly dollar value to Norfolk General Hospital of the overall performance of the low performing RN. Let us define a low performing RN as a RN who is at the 15th percentile. That is, of 100 RNs this RN performs better than only 15 RNs and 85 RNs turn in better performances. Consider the quality and quantity of performance typical of the average RN and the dollar value of this performance. In estimating a dollar value for this performance, it may help to consider what the cost would be of having someone from an outside firm provide this service.

Based on my experience, I estimate the value to Norfolk General Hospital of the low performing RN to be \_\_\_\_\_ dollars per year.

Name:

Please describe the factors that you considered in making your estimates for the RN position:



Name:

WORKSHEET -- dollar estimate for average LPN

Based on your experience with LPNs, we would like you to re-estimate the yearly dollar value to Norfolk General Hospital of the overall performance of the 50th percentile, or average LPN. Let us define an average performer as an LPN who is at the 50th percentile. That is, of 100 LPNs this LPN performs better than 50 LPNs. Consider the quality and quantity of performance typical of the average LPN and the dollar value of this performance. In estimating a dollar value for this performance, it may help to consider what the cost would be of having someone from an outside firm provide this service.

Based on my experience, I estimate the value to Norfolk General Hospital of the average LPN to be \_\_\_\_\_ dollars per year.

WORKSHEET -- dollar estimate for superior performing LPN

Based on your experience with LPNs, we would now like you to estimate the yearly dollar value to Norfolk General Hospital of the overall performance of the superior performing LPN. Let us define a superior performing LPN as a LPN who is at the 85th percentile. That is, of 100 LPNs this LPN performs better than 85 LPNs and only 15 LPNs turn in better performances. Consider the quality and quantity of performance typical of the average LPN and the dollar value of this performance. In estimating a dollar value for this performance, it may help to consider what the cost would be of having someone from an outside firm provide this service.

Based on my experience, I estimate the value to Norfolk General Hospital of the superior LPN to be \_\_\_\_\_ dollars per year.

WORKSHEET -- dollar estimate for low performing LPN

Based on your experience with LPNs, we would now like you to estimate the yearly dollar value to Norfolk General Hospital of the overall performance of the low performing LPN. Let us define a low performing LPN as a LPN who is at the 15th percentile. That is, of 100 LPNs this LPN performs better than only 15 LPNs and 85 LPNs turn in better performances. Consider the quality and quantity of performance typical of the average LPN and the dollar value of this performance. In estimating a dollar value for this performance, it may help to consider what the cost would be of having someone from an outside firm provide this service.

Based on my experience, I estimate the value to Norfolk General Hospital of the low performing LPN to be \_\_\_\_\_ dollars per year.

Name:

Please describe the factors that you considered in making your estimates for the LPN position:

IX. APPENDIX D:

Forms and Cover Letters for B & F Condition

HUMAN RESOURCES UTILITY PROJECT

Norfolk General Hospital

Part I

December 17, 1984

HUMAN RESOURCES UTILITY PROJECT  
Norfolk General Hospital  
Part I  
December 17, 1984

This is the first part of the human resources utility project we are conducting at NGH. Please accept our thanks, in advance, for helping us with this project. As I mentioned during our meetings some of you will be receiving different forms of questions. All questionnaires relate to the same goal of determining the dollar value of different levels of nurses' performance. I will remind you please do not share your form or discuss its contents with the other managers, otherwise, we will not be able to tell which questionnaire works best. We will meet to discuss the findings after the project is completed.

The contents of this package should include:

- \* An instruction sheet for the estimation task
- \* Six worksheets - three for estimations for the RN position and three for estimations for the LPN position

If you have any questions please give me a call. I can be reached at 440-4236 during the day and 489-3615 at night. You can also leave a message for me at Personnel x-3883.

You have until December 21st to finish this part of the project. If you anticipate any delays please call me. The next package will arrive January 7th and will include information collected in this package, so please complete this questionnaire promptly. When you are finished use the envelope marked: Scott Tannenbaum, c/o Glenn DeBiasi, Dept. of Human Resources (Personnel); and forward it by interoffice mail. Once again, thank you for your cooperation.

Scott I. Tannenbaum

NGH Dept. of Human Resources

INSTRUCTIONS -- Dollar Estimates

On the pages that follow, and once again in the final part of the project, we will be asking you to provide estimates of the dollar value of various levels of LPN and RN performance at Norfolk General Hospital.

The dollar estimates that you provide are critical for determining the utility of the programs that the Human Resource Department offers at the Hospital. In providing these estimates, you are required to make some difficult decisions. You will have to ponder for some time before making each estimate. Although there is no way you can be absolutely certain your estimate is accurate, keep in mind these three things:

- (1) The alternative to estimates of this kind is the application of cost accounting procedures to the evaluation of job performance. Such applications are usually prohibitively expensive, and in the end, they produce only imperfect estimates, like this estimation procedure.
- (2) Your estimates will be averaged in with those of other managers. Thus, errors produced by too high and too low estimates will tend to be averaged out, providing more accurate final estimates.
- (3) The decisions about human resources programs do not require that estimates be accurate to the last dollar. Substantially accurate estimates will lead to the same decisions as perfectly accurate estimates.

On the following pages you will be asked first, to estimate the dollar value of the average LPN. Next you will be asked to estimate the dollar value of the performance of a superior (85th percentile) and low performing (15th percentile) LPN. Following the LPN estimation questions you will be asked to provide similar estimates for the RN position.



HUMAN RESOURCES UTILITY PROJECT

Norfolk General Hospital

Part II

January 7, 1985

HUMAN RESOURCES UTILITY PROJECT  
Norfolk General Hospital  
Part II  
January 7, 1985

This is the second and final part of the human resources utility project we are conducting at NGH. Thank you for completing and returning part I. As you will recall, this information is being collected so that in the future we can try to determine the utility (benefit minus cost) of various human resource programs. In this part of the project you are provided with the average from your group's 50th percentile estimates. We ask you to consider this average and, then, to re-estimate the yearly value to the Hospital of 15th and 85th percentile nurses' performance. I will remind you please do not share your form or discuss its contents with the other managers, otherwise, we will not be able to tell which questionnaire works best.

The contents of this package should include:

- \* A summary of the project to date, including your previous estimates and your group's average
- \* An instruction sheet for the estimation task
- \* Four worksheets - two for estimations for the RN position and two for estimations for the LPN position
- \* Questions pertaining to the utility project. We need this information to determine which method of collecting utility information works best at NGH.

If you have any questions please give me a call. I can be reached at 440-4236 during the day and 489-3615 at night. You can also leave a message for me at Personnel x-3883.

You have until January 7th to finish this part of the project. After I receive all the packages I will summarize the results and we will meet to discuss them. If you anticipate any delays please call me. When you are finished use the envelope marked: Scott Tannenbaum, c/o Glenn DeBiasi, Dept. of Human Resources (Personnel); and forward it by interoffice mail. Once again, thank you for your cooperation.

Scott I. Tannenbaum



NGH Dept. of Human Resources

INSTRUCTIONS -- Dollar Estimates

On the pages that follow we will be asking you to provide estimates of the dollar value of various levels of LPN and RN performance at Norfolk General Hospital.

The dollar estimates that you provide are critical for determining the utility of the programs that the Human Resource Department offers at the Hospital. In providing these estimates, you are required to make some difficult decisions. You will have to ponder for some time before making each estimate. Although there is no way you can be absolutely certain your estimate is accurate, keep in mind these three things:

- (1) The alternative to estimates of this kind is the application of cost accounting procedures to the evaluation of job performance. Such applications are usually prohibitively expensive, and in the end, they produce only imperfect estimates, like this estimation procedure.
- (2) Your estimates will be averaged in with those of other managers. Thus, errors produced by too high and too low estimates will tend to be averaged out, providing more accurate final estimates.
- (3) The decisions about human resources programs do not require that estimates be accurate to the last dollar. Substantially accurate estimates will lead to the same decisions as perfectly accurate estimates.

On the following pages you will be asked to re-estimate the dollar value of 85th (superior) and 15th (low performing) percentile nurses using your group's 50th percentile averages as a reference point. You will want to refer back to your previous estimates and to your group's averages. These are listed on the project summary page.

Name:

WORKSHEET -- dollar estimate for superior performing RN

Based on your experience with RNs, we would now like you to re-estimate the yearly dollar value to Norfolk General Hospital of the overall performance of the superior performing RN. Let us define a superior performing RN as a RN who is at the 85th percentile. That is, of 100 RNs this RN performs better than 85 RNs and only 15 RNs turn in better performances. Consider the quality and quantity of performance typical of the average RN and the dollar value of this performance. In estimating a dollar value for this performance, it may help to consider what the cost would be of having someone from an outside firm provide this service.

Based on my experience, I estimate the value to Norfolk General Hospital of the superior RN to be \_\_\_\_\_ dollars per year.

WORKSHEET -- dollar estimate for low performing RN

Based on your experience with RNs, we would now like you to re-estimate the yearly dollar value to Norfolk General Hospital of the overall performance of the low performing RN. Let us define a low performing RN as a RN who is at the 15th percentile. That is, of 100 RNs this RN performs better than only 15 RNs and 85 RNs turn in better performances. Consider the quality and quantity of performance typical of the average RN and the dollar value of this performance. In estimating a dollar value for this performance, it may help to consider what the cost would be of having someone from an outside firm provide this service.

Based on my experience, I estimate the value to Norfolk General Hospital of the low performing RN to be \_\_\_\_\_ dollars per year.

WORKSHEET -- dollar estimate for superior performing LPN

Based on your experience with LPNs, we would now like you to re-estimate the yearly dollar value to Norfolk General Hospital of the overall performance of the superior performing LPN. Let us define a superior performing LPN as a LPN who is at the 85th percentile. That is, of 100 LPNs this LPN performs better than 85 LPNs and only 15 LPNs turn in better performances. Consider the quality and quantity of performance typical of the average LPN and the dollar value of this performance. In estimating a dollar value for this performance, it may help to consider what the cost would be of having someone from an outside firm provide this service.

Based on my experience, I estimate the value to Norfolk General Hospital of the superior LPN to be \_\_\_\_\_ dollars per year.

WORKSHEET -- dollar estimate for low performing LPN

Based on your experience with LPNs, we would now like you to re-estimate the yearly dollar value to Norfolk General Hospital of the overall performance of the low performing LPN. Let us define a low performing LPN as a LPN who is at the 15th percentile. That is, of 100 LPNs this LPN performs better than only 15 LPNs and 85 LPNs turn in better performances. Consider the quality and quantity of performance typical of the average LPN and the dollar value of this performance. In estimating a dollar value for this performance, it may help to consider what the cost would be of having someone from an outside firm provide this service.

Based on my experience, I estimate the value to Norfolk General Hospital of the low performing LPN to be \_\_\_\_\_ dollars per year.

SUMMARY: PROJECT TO DATE

In part I of the project we asked you and other managers to estimate the dollar value of the various levels of LPN and RN performance.

The estimates you provided were:      Your group's averages were:

LPN:    superior \_\_\_\_\_  
          85%

          average \_\_\_\_\_  
          50%

          low \_\_\_\_\_  
          15%

          average \$14,729  
          50%

RN :    superior \_\_\_\_\_  
          85%

          average \_\_\_\_\_  
          50%

          low \_\_\_\_\_  
          15%

          average \$22,004  
          50%

During this part of the project we ask you to use your group's 50th percentile average and to re-estimate your 15th and 85th percentile estimates. This does not mean that you are required to change your previous estimates. You can give your group's average estimate as much weight as you see fit. Bear in mind that there may be differences from unit to unit.



X. APPENDIX E:  
Summary List of Critical Activities

SUMMARY LIST OF CRITICAL ACTIVITIES

Categories and examples of Licensed Practical Nurse (LPN)  
activities that can affect their dollar value  
to the Hospital

Note: LPNs will perform activities like these at different levels of proficiency and/or frequency. That is, superior LPNs may demonstrate some cost-saving or revenue-generating activities better, or more often (or cost-generating activities less often), than average LPNs, who in turn will do better than below average LPNs.

- (1) Better Image - activities that result in maintaining or improving the Hospital's image, encouraging more business.

Examples

- \* recommends social service and other alternatives to improve care of patient after leaving the Hospital.
- \* overlooks the patient's family's needs, adversely affecting the Hospital's image.
- \* notifies the charge nurse that patient is having difficulty after surgery, which results in proper medical attention and improves patient perception of nurses as caring and competent.

- (2) Efficiency - activities that allow for more efficient use of resources (people, supplies, equipment), reducing costs or generating revenue for the Hospital.

Examples

- \* while unable to provide total patient care (i.e., an RN must give some of their medications), provides technical care releasing the RN for responsibilities the LPN is not prepared to handle.
- \* stamps charge vouchers from exchange cart items, helping to maintain non-salary budget.
- \* completes assignments promptly, saving money through efficient utilization of time.

- (3) Treatment/Nursing of Patients - activities that reduce LOS, improving payoffs based on DRGs, or avert lawsuits/problems that can cost the Hospital.

Examples

- \* recognizes significant changes in patient conditions and reports them to appropriate people, allowing the complications to be treated early on, which reduces costs with respect to DRGs.
- \* forgets to follow infection control procedures for patient with hepatitis, exposing the entire unit, which increases cost to Hospital due to screening of all people exposed.
- \* provides careful attention to the turning and skin care of the patients, which reduces costs by shortening LOS.

Categories and examples of Registered Nurse (RN) activities  
that can affect their dollar value to the Hospital

Note: RNs will perform activities like these at different levels of proficiency and/or frequency. That is, superior RNs may demonstrate some cost-saving or revenue-generating activities better, or more often (or cost-generating activities less often), than average RNs, who in turn will do better than below average RNs.

- (1) Better Image - activities that result in maintaining or improving the Hospital's image, encouraging more business.

Examples

- \* provides pre- and post-operative teaching to patients, answers questions and reassures patients which decreases patient and family anxieties.
- \* exhibits uncaring or callous attitude to patient, damaging image and reducing the probability of patient recommending Hospital to others.
- \* contacts some patients after they move from the unit, improving the image of Hospital with patient and family.

- (2) Efficiency - activities that allow for more efficient use of resources (people, supplies, equipment), reducing costs or generating revenue for the Hospital.

Examples

- \* acts as charge nurse in absence of head nurse which allows unit activities to continue in an efficient manner.
- \* failure to properly charge items and indicate on chart that items were used -- affects reimbursement from insurance auditors.
- \* opens supplies needed for a particular case after checking physician's preference card to assure that everything needed is available, and checks equipment for proper functioning, allowing for optimum efficiency.

- (3) Development - activities that lead to the development of other members of the Hospital, increasing their value to the organization.

Examples

- \* functions as a resource person, using expertise in specific areas to develop and increase the knowledge of less experienced RNs.
- \* assists head nurse in the training of new staff nurses.
- \* orients new members of the unit (RNs, LPNs, NAs, secretaries) regarding unit functioning and organization.

- (4) Treatment/Nursing of Patients - activities that reduce LOS, improving payoffs based on DRGs, or avert lawsuits/problems that can cost the Hospital.

Examples

- \* monitors patients conditions and takes appropriate action to alleviate deteriorating condition, enhancing business and averting costs from possible negligence suits.
- \* fails to monitor IV insertion site as per policy, inducing possible infection (phlebitis, etc.), which increases hospital stay and adversely affects DRG payoff.
- \* efficiently and effectively carries out physicians orders so that tests, X-rays, etc. are performed as ordered, thereby decreasing the patients length of stay.

XI. APPENDIX F:

Forms and Cover Letters for Delphi Condition

HUMAN RESOURCES UTILITY PROJECT

Norfolk General Hospital

Part I

November 19, 1984



HUMAN RESOURCES UTILITY PROJECT  
Norfolk General Hospital  
Part I  
November 19, 1984

This is the first part of the human resources utility project we are conducting at NGH. Please accept our thanks, in advance, for helping us in this project. As I mentioned during our meetings some of you will be receiving different forms of questions. All questionnaires relate to the same goal of determining the dollar value of different levels of nurses' performance. I will remind you, please do not share your form or discuss its contents with the other managers, otherwise, we will not be able to tell which questionnaire works best. We will meet to discuss the findings after the project is completed.

The contents of this package should include:

- \* Job descriptions and job specifications for the RN & LPN positions
- \* An instruction sheet
- \* Two activity sheets - One for the RN position and one for the LPN position. Please record your responses on these and make sure your name is on the top of each.

If you have any questions please give me a call. I can be reached at 440-4236 during the day and 489-3615 at night. You can also leave a message for me at Personnel x-3833 and I will get back to you.

You have until November 23rd to finish this part of the project. The next package will arrive December 3rd and will include information collected in this package, so please complete this questionnaire promptly. When you are finished use the envelope marked: Scott Tannenbaum, c/o Glenn DeBiasi, Dept of Human Resources (Personnel); and forward it by interoffice mail. Once again, thank you for your cooperation.

Scott I. Tannenbaum

NGH Dept of Human Resources

### INSTRUCTIONS

In this part of the project we are asking you to provide examples of staff nurses activities that influence the total yearly value of their services. We want to know what RN's and LPN's do that may affect the dollar value of their performance. These can be activities that generate revenue, save costs, or on the negative side, activities that cost the hospital. You are not restricted to activities that you observe after reading this, that is, we are not asking you to "observe and record". You should reflect on activities that you have seen occur in the past.

Examples: Forgot to shut off oxygen valve on wall outlet after suctioning which causes wasting of oxygen and increase cost of use.

Courteous to patients' families enhancing the hospital's image and encouraging further business.

Unless it is self explanatory, please include the consequences of the activity (e.g., "which causes wasting of oxygen and increases cost of use"; "enhancing hospital's image and encouraging further business").

We have provided a copy of the job descriptions and specifications for these jobs. Please review these - they may serve as a good starting point.

On the pages that follow please provide at least 3 or 4 examples of these activities for each job. The first page is for RN activities, the second for LPN activities.

Name \_\_\_\_\_

RN ACTIVITY SHEET

Please provide at least 3 or 4 examples of RN's activities that help determine the total yearly value of their services.

1.

2.

3.

4.

5.

6.

Name \_\_\_\_\_

LPN ACTIVITY SHEET

Please provide at least 3 or 4 examples of LPN's activities that help determine the total yearly value of their services.

1.

2.

3.

4.

5.

6.

HUMAN RESOURCES UTILITY PROJECT

Norfolk General Hospital

Part II

December 3, 1984

HUMAN RESOURCES UTILITY PROJECT  
Norfolk General Hospital  
Part II  
December 3, 1984

This is the second part of the human resources utility project we are conducting at NGH. Thank you for completing and returning part I. In this part of the project you are asked to estimate the yearly value to the Hospital of the overall performance of an average RN and LPN. To help you in this task, we compiled a summary list of critical RN and LPN activities. This is based on the information you provided in part I.

The contents of this package should include:

- \* A summary of the project to date
- \* A summary list of critical RN & LPN activities provided by you and other managers in part I
- \* An instruction sheet for the estimation task
- \* Two worksheets - one for the RN estimation and one for the LPN estimation
- \* Job descriptions and job specifications for the RN & LPN positions

Once again, please do not share your form or discuss its contents with the other managers, otherwise, we will not be able to tell which questionnaire works best. If you have any questions about part II please give me a call. I can be reached at 440-4236 during the day and 489-3615 at night. You can also leave a message for me at Personnel x-3883 and I will return your call.

You have until December 7th to finish this part of the project. If you anticipate any delays please call me. The next package will arrive December 17th and will include information collected in this package, so please complete this questionnaire promptly. When you are finished use the envelope marked: Scott Tannenbaum, c/o Glenn DeBiasi, Dept. of Human Resources (Personnel); and forward it by interoffice mail. If you are running late, call me, and I will stop by and pick it up. Once again, thank you for your cooperation.

Scott I. Tannenbaum

NGH Dept. of Human Resources

SUMMARY: PROJECT TO DATE

Any job has a number of critical activities that can generate revenue or save expenses for the organization. In estimating the dollar value of job performance, it is important to consider these activities. You will recall in part I that each of you gave examples of such activities. When we formed these activities into a list, we discovered both unique and common examples. Furthermore, we noted that these activities could be sorted into several categories. These categories provide a useful frame of reference for describing the critical activities performed by LPNs and RNs. We would like you to consider this frame of reference in making your dollar estimates.

The categories that pertain to the LPN and RN jobs are enclosed. For each category, example activities are listed. Some of these examples may not directly pertain to your unit, but they can be viewed as the types of activities to consider when making your dollar estimates.

SUMMARY LIST OF CRITICAL ACTIVITIES



Categories and examples of Registered Nurse (RN) activities  
that can affect their dollar value to the Hospital

Note: RNs will perform activities like these at different levels of proficiency and/or frequency. That is, superior RNs may demonstrate some cost-saving or revenue-generating activities better, or more often (or cost-generating activities less often), than average RNs, who in turn will do better than below average RNs.

- (1) Better Image - activities that result in maintaining or improving the Hospital's image, encouraging more business.

Examples

- \* provides pre- and post-operative teaching to patients, answers questions and reassures patients which decreases patient and family anxieties.
- \* exhibits uncaring or callous attitude to patient, damaging image and reducing the probability of patient recommending Hospital to others.
- \* contacts some patients after they move from the unit, improving the image of Hospital with patient and family.

- (2) Efficiency - activities that allow for more efficient use of resources (people, supplies, equipment), reducing costs or generating revenue for the Hospital.

Examples

- \* acts as charge nurse in absence of head nurse which allows unit activities to continue in an efficient manner.
- \* failure to properly change charge items and indicate on chart that items were used -- affects reimbursement from insurance auditors.
- \* opens supplies needed for a particular case after checking physician's preference card to assure that everything needed is available, and checks equipment for proper functioning, allowing for optimum efficiency.

- (3) Development - activities that lead to the development of other members of the Hospital, increasing their value to the organization.

Examples

- \* functions as a resource person, using expertise in specific areas to develop and increase the knowledge of less experienced RNs.
- \* assists head nurse in the training of new staff nurses.
- \* orients new members of the unit (RNs, LPNs, NAs, secretaries) regarding unit functioning and organization.

- (4) Treatment/Nursing of Patients - activities that reduce LOS, improving payoffs based on DRGs, or avert lawsuits/problems that can cost the Hospital.

Examples

- \* monitors patients conditions and takes appropriate action to alleviate deteriorating condition, enhancing business and averting costs from possible negligence suits.
- \* fails to monitor IV insertion site as per policy, inducing possible infection (phlebitis, etc.), which increases hospital stay and adversely affects DRG payoff.
- \* efficiently and effectively carries out physicians orders so that tests, X-rays, etc. are performed as ordered, thereby decreasing the patients length of stay.

Categories and examples of Licensed Practical Nurse (LPN)  
activities that can affect their dollar value  
to the Hospital

Note: LPNs will perform activities like these at different levels of proficiency and/or frequency. That is, superior LPNs may demonstrate some cost-saving or revenue-generating activities better, or more often (or cost-generating activities less often), than average LPNs, who in turn will do better than below average LPNs.

- (1) Better Image - activities that result in maintaining or improving the Hospital's image, encouraging more business.

Examples

- \* recommends social service and other alternatives to improve care of patient after leaving the Hospital.
- \* overlooks the patient's family's needs, adversely affecting the Hospital's image.
- \* notifies the charge nurse that patient is having difficulty after surgery, which results in proper medical attention and improves patient perception of nurses as caring and competent.

- (2) Efficiency - activities that allow for more efficient use of resources (people, supplies, equipment), reducing costs or generating revenue for the Hospital.

Examples

- \* while unable to provide total patient care (i.e., an RN must give some of their medications), provides technical care releasing the RN for responsibilities the LPN is not prepared to handle.
- \* stamps charge vouchers from exchange cart items, helping to maintain non-salary budget.
- \* completes assignments promptly, saving money through efficient utilization of time.

- (3) Treatment/Nursing of Patients - activities that reduce LOS, improving payoffs based on DRGs, or avert lawsuits/problems that can cost the Hospital.

Examples

- \* recognizes significant changes in patient conditions and reports them to appropriate people, allowing the complications to be treated early on, which reduces costs with respect to DRGs.
- \* forgets to follow infection control procedures for patient with hepatitis, exposing the entire unit, which increases cost to Hospital due to screening of all people exposed.
- \* provides careful attention to the turning and skin care of the patients, which reduces costs by shortening LOS.

INSTRUCTIONS -- Dollar Estimates

Throughout the remainder of the project we will be asking you to provide estimates of the dollar value of various levels of RN and LPN performance at Norfolk General Hospital. In this part of the project we are focusing on the 50th percentile or average performer. In later questionnaires we will ask you to provide estimates for below average and superior performers.

The dollar estimates that you provide are critical for determining the utility of the programs that the Human Resource Department offers at the Hospital. In providing these estimates, you are required to make some difficult decisions. You will have to ponder for some time before making each estimate. Although there is no way you can be absolutely certain your estimate is accurate, keep in mind these three things:

- (1) The alternative to estimates of this kind is the application of cost accounting procedures to the evaluation of job performance. Such applications are usually prohibitively expensive, and in the end, they produce only imperfect estimates, like this estimation procedure.
- (2) Your estimates will be averaged in with those of other managers. Thus, errors produced by too high and too low estimates will tend to be averaged out, providing more accurate final estimates.
- (3) The decisions about human resources programs do not require that estimates be accurate to the last dollar. Substantially accurate estimates will lead to the same decisions as perfectly accurate estimates.

For both the RN and LPN positions a separate worksheet follows. Please complete each separately.

Name:

WORKSHEET -- dollar estimate for average RN

Based on your experience with RNs, we would like you to estimate the yearly dollar value to the Norfolk General Hospital of the overall performance of the 50th percentile, or average RN. Consider the quality and quantity of performance typical of the average RN and the dollar value of this performance. In estimating a dollar value for this performance, it may help to consider what the cost would be of having someone from an outside firm provide this service.

You should refer to the RN job description and the RN categories and example activities. Remember that employees will perform these activities at differing levels of proficiency and/or frequency. That is, superior RNs will demonstrate some cost-saving or revenue generating activities more often (or cost-producing activities less often) than average RNs, who in turn will do better than below average RNs.

Based on my experience, I estimate the value to Norfolk General Hospital of the average RN to be \_\_\_\_\_ dollars per year.

Name:

WORKSHEET -- dollar estimate for average LPN

Based on your experience with LPNs, we would like you to estimate the yearly dollar value to Norfolk General Hospital of the overall performance of the 50th percentile, or average LPN. Consider the quality and quantity of performance typical of the average LPN and the dollar value of this performance. In estimating a dollar value for this performance, it may help to consider what the cost would be of having someone from an outside firm provide this service.

You should refer to the LPN job description and the LPN categories and example activities. Remember that employees will perform these activities at differing levels of proficiency and/or frequency. That is, superior LPNs will demonstrate some cost-saving or revenue generating behaviors more often (or cost-producing behaviors less often) than average LPNs, who in turn will do better than below average LPNs.

Based on my experience, I estimate the value to Norfolk General Hospital of the average LPN to be \_\_\_\_\_ dollars per year.

HUMAN RESOURCES UTILITY PROJECT

Norfolk General Hospital

Part III

December 17, 1984

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HUMAN RESOURCES UTILITY PROJECT  
Norfolk General Hospital  
Part III  
December 17, 1984

This is the third part of the human resources utility project we are conducting at NGH. Thank you for completing and returning part II. In this part of the project you are provided with the average from your group's previous estimates. We ask you to consider this average and, then, to re-estimate the yearly value to the Hospital of an average RN & LPNs performance. In addition, you are asked to estimate the yearly value to the Hospital of the overall performance of a superior performing and low performing RN and LPN. To help you with this task, we have once again provided a summary list of critical RN and LPN activities. This list is based on the information you provided in part I.

The contents of this package should include:

- \* A summary of the project to date, including your previous estimate and your group's average
- \* A summary list of critical RN & LPN activities
- \* An instruction sheet for the estimation task
- \* Six worksheets - three for your RN estimates and three for your LPN estimations
- \* Job descriptions and job specifications for the RN & LPN positions

Once again, please do not share your form or discuss its contents with the other managers, otherwise; we will not be able to tell which questionnaire works best. If you have any questions about part III please give me a call. I can be reached at 440-4236 during the day and 489-3615 at night. You can also leave a message for me at Personnel x-3883.

You have until December 21st to finish this part of the project. If you anticipate any delays please call me. The next package will arrive January 7th and will include information collected in this package, so please complete this questionnaire promptly. When you are finished use the envelope marked: Scott Tannenbaum, c/o Glenn DeBiasi, Dept. of Human Resources (Personnel); and forward it by interoffice mail. Once again, thank you for your cooperation.

Scott I. Tannenbaum

NGH Dept. of Human Resources

SUMMARY: PROJECT TO DATE

In part I of the project you and other managers provided examples of activities that affect the overall dollar value of staff nurses performance. These were formed into a list and provided to you in part II. At that time we asked you and other managers to estimate the dollar value of the average LPN and RN.

The estimates you provided were:

Average LPN: \_\_\_\_\_

Average RN : \_\_\_\_\_

The averages of your group's estimates were:

Average LPN: \$15,982.80

Average RN : \$22,716.60

During this part of the project we ask you to reconsider your 50th percentile, or average performance estimates, in light of your group's estimates. This does not mean that you are required to change your previous estimates. You can give your group's average estimate as much weight as you see fit. Bear in mind that there may be differences from unit to unit. However, we would like you to consider this information when re-estimating the value of the average performer.

The categories that pertain to the LPN and RN jobs are once again enclosed. As you will recall, for each category, example activities are listed. Some of these examples may not directly pertain to your unit, but they may be viewed as the types of activities to consider when making your dollar estimates. These categories provide a useful frame of reference for describing the critical activities performed by LPN's and RN's. We would like you to once again consider this frame of reference in making your dollar estimates. You may find this frame of reference particularly helpful when making estimates of the low performing and superior performing RN and LPNs.

### INSTRUCTIONS -- Dollar Estimates

On the pages that follow, and once again in the final part of the project, we will be asking you to provide estimates of the dollar value of various levels of LPN and RN performance at Norfolk General Hospital.

The dollar estimates that you provide are critical for determining the utility of the programs that the Human Resource Department offers at the Hospital. In providing these estimates, you are required to make some difficult decisions. You will have to ponder for some time before making each estimate. Although there is no way you can be absolutely certain your estimate is accurate, keep in mind these three things:

- (1) The alternative to estimates of this kind is the application of cost accounting procedures to the evaluation of job performance. Such applications are usually prohibitively expensive, and in the end, they produce only imperfect estimates, like this estimation procedure.
- (2) Your estimates will be averaged in with those of other managers. Thus, errors produced by too high and too low estimates will tend to be averaged out, providing more accurate final estimates.
- (3) The decisions about human resources programs do not require that estimates be accurate to the last dollar. Substantially accurate estimates will lead to the same decisions as perfectly accurate estimates.

On the following pages you will be asked first, to re-estimate the dollar value of the average LPN. You will want to refer back to your previous estimate and your group's average when you make this estimate. As we stated before, you are not required to change your estimate. You should however, consider this information when making your estimate. Next, you will be asked to estimate the dollar value of the performance of a superior (85th percentile) and low performing (15th percentile) LPN. The critical activity list should be considered as a frame of reference when making these estimates. Following the LPN estimation questions you will be asked to provide similar estimates for the RN position.

Name:

WORKSHEET -- dollar estimate for average LPN

Based on your experience with LPNs. we would like you to re-estimate the yearly dollar value to Norfolk General Hospital of the overall performance of the 50th percentile, or average LPN. Let us define an average performer as an LPN who is at the 50th percentile. That is, of 100 LPNs this LPN performs better than 50 LPNs. Consider the quality and quantity of performance typical of the average LPN and the dollar value of this performance. In estimating a dollar value for this performance, it may help to consider what the cost would be of having someone from an outside firm provide this service.

You should refer to the LPN job description and the LPN categories and example activities. Remember that employees will perform these activities at differing levels of proficiency and/or frequency. That is, superior LPNs will demonstrate some cost-saving or revenue generating behaviors more often (or cost-producing behaviors less often) than average LPNs, who in turn will do better than below average LPNs. You should also refer back to your previous estimate and to your group's average.

Based on my experience, I estimate the value to Norfolk General Hospital of the average LPN to be \_\_\_\_\_ dollars per year.

WORKSHEET -- dollar estimate for superior performing LPN

Based on your experience with LPNs, we would now like you to estimate the yearly dollar value to Norfolk General Hospital of the overall performance of the superior performing LPN. Let us define a superior performing LPN as a LPN who is at the 85th percentile. That is, of 100 LPNs this LPN performs better than 85 LPNs and only 15 LPNs turn in better performances. Consider the quality and quantity of performance typical of the average LPN and the dollar value of this performance. In estimating a dollar value for this performance, it may help to consider what the cost would be of having someone from an outside firm provide this service.

You should refer to the LPN job description and the LPN categories and example activities. Remember that employees will perform these activities at differing levels of proficiency and/or frequency. That is, superior LPNs will demonstrate some cost-saving or revenue generating behaviors more often (or cost-producing behaviors less often) than average LPNs, who in turn will do better than low performing LPNs.

Based on my experience, I estimate the value to Norfolk General Hospital of the superior LPN to be \_\_\_\_\_ dollars per year.

WORKSHEET -- dollar estimate for low performing LPN

Based on your experience with LPNs, we would now like you to estimate the yearly dollar value to Norfolk General Hospital of the overall performance of the low performing LPN. Let us define a low performing LPN as a LPN who is at the 15th percentile. That is, of 100 LPNs this LPN performs better than only 15 LPNs and 85 LPNs turn in better performances. Consider the quality and quantity of performance typical of the average LPN and the dollar value of this performance. In estimating a dollar value for this performance, it may help to consider what the cost would be of having someone from an outside firm provide this service.

You should refer to the LPN job description and the LPN categories and example activities. Remember that employees will perform these activities at differing levels of proficiency and/or frequency. That is, superior LPNs will demonstrate some cost-saving or revenue generating behaviors more often (or cost-producing behaviors less often) than average LPNs, who in turn will do better than low performing LPNs.

Based on my experience, I estimate the value to Norfolk General Hospital of the low performing LPN to be \_\_\_\_\_ dollars per year.

Name:

Please describe the factors that you considered in making your estimates for the LPN position:

Name:

WORKSHEET -- dollar estimate for average RN

Based on your experience with RNs, we would like you to re-estimate the yearly dollar value to Norfolk General Hospital of the overall performance of the 50th percentile, or average RN. Let us define an average performer as an RN who is at the 50th percentile. That is, of 100 RNs this RN performs better than 50 RNs. Consider the quality and quantity of performance typical of the average RN and the dollar value of this performance. In estimating a dollar value for this performance, it may help to consider what the cost would be of having someone from an outside firm provide this service.

You should refer to the RN job description and the RN categories and example activities. Remember that employees will perform these activities at differing levels of proficiency and/or frequency. That is, superior RNs will demonstrate some cost-saving or revenue generating behaviors more often (or cost-producing behaviors less often) than average RNs, who in turn will do better than below average RNs. You should also refer back to your previous estimate and to your group's average.

Based on my experience, I estimate the value to Norfolk General Hospital of the average RN to be \_\_\_\_\_ dollars per year.



WORKSHEET -- dollar estimate for superior performing RN

Based on your experience with RNs, we would now like you to estimate the yearly dollar value to Norfolk General Hospital of the overall performance of the superior performing RN. Let us define a superior performing RN as a RN who is at the 85th percentile. That is, of 100 RNs this RN performs better than 85 RNs and only 15 RNs turn in better performances. Consider the quality and quantity of performance typical of the average RN and the dollar value of this performance. In estimating a dollar value for this performance, it may help to consider what the cost would be of having someone from an outside firm provide this service.

You should refer to the RN job description and the RN categories and example activities. Remember that employees will perform these activities at differing levels of proficiency and/or frequency. That is, superior RNs will demonstrate some cost-saving or revenue generating behaviors more often (or cost-producing behaviors less often) than average RNs, who in turn will do better than low performing RNs.

Based on my experience, I estimate the value to Norfolk General Hospital of the superior RN to be \_\_\_\_\_ dollars per year.

WORKSHEET -- dollar estimate for low performing RN

Based on your experience with RNs, we would now like you to estimate the yearly dollar value to Norfolk General Hospital of the overall performance of the low performing RN. Let us define a low performing RN as a RN who is at the 15th percentile. That is, of 100 RNs this RN performs better than only 15 RNs and 85 RNs turn in better performances. Consider the quality and quantity of performance typical of the average RN and the dollar value of this performance. In estimating a dollar value for this performance, it may help to consider what the cost would be of having someone from an outside firm provide this service.

You should refer to the RN job description and the RN categories and example activities. Remember that employees will perform these activities at differing levels of proficiency and/or frequency. That is, superior RNs will demonstrate some cost-saving or revenue generating behaviors more often (or cost-producing behaviors less often) than average RNs, who in turn will do better than low performing RNs.

Based on my experience, I estimate the value to Norfolk General Hospital of the low performing RN to be \_\_\_\_\_ dollars per year.

Name:

Please describe the factors that you considered in making your estimates for the RN position:

HUMAN RESOURCES UTILITY PROJECT

Norfolk General Hospital

Part IV

January 7, 1985

HUMAN RESOURCES UTILITY PROJECT  
Norfolk General Hospital  
Part IV  
January 7, 1985

This is the fourth and final part of the human resources utility project we are conducting at NGH. Thank you for your help throughout this project. As you will recall, this information is being collected so that in the future we can try to determine the utility (benefit minus cost) of various human resource programs. In this part of the project you are provided with the averages from your group's previous estimates. We ask you to consider these averages and, then, to re-estimate the yearly value to the Hospital of various levels of RNs & LPNs performance. To help you with this task, we have once again provided a summary list of critical RN and LPN activities. I will remind you please do not share your form or discuss its contents with the other managers, otherwise, we will be unable to tell which questionnaire works best.

The contents of this package should include:

- \* A summary of the project to date, including your previous estimates and your group's averages
- \* A summary list of critical RN & LPN activities
- \* An instruction sheet for the estimation task
- \* Six worksheets - three for your RN estimates and three for your LPN estimations
- \* Job descriptions and job specifications for the RN & LPN positions
- \* Questions pertaining to the utility project. We need this information to determine which method of collecting utility information works best at NGH.

If you have any questions please give me a call. I can be reached at 440-4236 during the day and 489-3615 at night. You can also leave a message for me at Personnel x-3883.

You have until January 11th to finish this part of the project. After I receive all the packages I will summarize the results and we will meet to discuss them. If you anticipate any delays please call me. When you are finished use the envelope marked: Scott Tannenbaum, c/o Glenn DeBiasi, Dept. of Human Resources (Personnel); and forward it by interoffice mail. Once again, thank you for your cooperation.

Scott I. Tannenbaum

NGH Dept. of Human Resources

. Name:

WORKSHEET -- dollar estimate for average RN

Based on your experience with RNs, we would like you to re-estimate the yearly dollar value to Norfolk General Hospital of the overall performance of the 50th percentile, or average RN. Let us define an average performer as an RN who is at the 50th percentile. That is, of 100 RNs this RN performs better than 50 RNs. Consider the quality and quantity of performance typical of the average RN and the dollar value of this performance. In estimating a dollar value for this performance, it may help to consider what the cost would be of having someone from an outside firm provide this service.

You should refer to the RN job description and the RN categories and example activities. Remember that employees will perform these activities at differing levels of proficiency and/or frequency. That is, superior RNs will demonstrate some cost-saving or revenue generating behaviors more often (or cost-producing behaviors less often) than average RNs, who in turn will do better than below average RNs. You should also refer back to your previous estimates and to your group's averages.

Based on my experience, I estimate the value to Norfolk General Hospital of the average RN to be \_\_\_\_\_ dollars per year.

### SUMMARY: PROJECT TO DATE

In part I of the project you and other managers provided examples of activities that affect the overall dollar value of staff nurses performance. These were formed into a list and provided to you in part II. At that time we asked you and other managers to estimate the dollar value of the average LPN and RN. In part III you were provided with the average of your group's 50th percentile estimates and asked to estimate the value of 15th and 85th percentile performance.

The estimates you provided were:

LPN: superior \_\_\_\_\_  
85%

average \_\_\_\_\_  
50%

low \_\_\_\_\_  
15%

RN : superior \_\_\_\_\_  
85%

average \_\_\_\_\_  
50%

low \_\_\_\_\_  
15%

Your group's averages were:

LPN: superior \$18,000  
85%

average \$15,650  
50%

low \$13,300  
15%

RN: superior \$25,250  
85%

average \$22,250  
50%

low \$18,000  
15%

During this part of the project we ask you to reconsider your estimates in light of your group's estimates. Once again, this does not mean that you are required to change your previous estimates. You can give your group's average estimate as much weight as you see fit. Bear in mind that there may be differences from unit to unit. However, we would like you to consider this information when re-estimating the value of the low, average, and superior performing nurses.

The categories that pertain to the LPN and RN jobs are once again enclosed. As you will recall, for each category, example activities are listed. Some of these examples may not directly pertain to your unit, but they may be viewed as the types of activities to consider when making your dollar estimates. These categories provide a useful frame of reference for describing the critical activities performed by LPN's and RN's. We would like you to once again consider this frame of reference.

INSTRUCTIONS -- Dollar Estimates

On the pages that follow we will be asking you to provide estimates of the dollar value of various levels of LPN and RN performance at Norfolk General Hospital.

The dollar estimates that you provide are critical for determining the utility of the programs that the Human Resource Department offers at the Hospital. In providing these estimates, you are required to make some difficult decisions. You will have to ponder for some time before making each estimate. Although there is no way you can be absolutely certain your estimate is accurate, keep in mind these three things:

- (1) The alternative to estimates of this kind is the application of cost accounting procedures to the evaluation of job performance. Such applications are usually prohibitively expensive, and in the end, they produce only imperfect estimates, like this estimation procedure.
- (2) Your estimates will be averaged in with those of other managers. Thus, errors produced by too high and too low estimates will tend to be averaged out, providing more accurate final estimates.
- (3) The decisions about human resources programs do not require that estimates be accurate to the last dollar. Substantially accurate estimates will lead to the same decisions as perfectly accurate estimates.

On the following pages you will be asked to re-estimate the dollar value of 50th (average), 85th (superior), and 15th (low performing) percentile nurses using your group's average estimates as reference points. You will want to refer back to your previous estimates and to your group's averages. These are listed on the project summary page.



WORKSHEET -- dollar estimate for superior performing RN

Based on your experience with RNs, we would now like you to re-estimate the yearly dollar value to Norfolk General Hospital of the overall performance of the superior performing RN. Let us define a superior performing RN as a RN who is at the 85th percentile. That is, of 100 RNs this RN performs better than 85 RNs and only 15 RNs turn in better performances. Consider the quality and quantity of performance typical of the average RN and the dollar value of this performance. In estimating a dollar value for this performance, it may help to consider what the cost would be of having someone from an outside firm provide this service.

You should refer to the RN job description and the RN categories and example activities. Remember that employees will perform these activities at differing levels of proficiency and/or frequency. That is, superior RNs will demonstrate some cost-saving or revenue generating behaviors more often (or cost-producing behaviors less often) than average RNs, who in turn will do better than low performing RNs. You should also refer back to your previous estimates and to your group's averages.

Based on my experience, I estimate the value to Norfolk General Hospital of the superior RN to be \_\_\_\_\_ dollars per year.

WORKSHEET -- dollar estimate for low performing RN

Based on your experience with RNs, we would now like you to re-estimate the yearly dollar value to Norfolk General Hospital of the overall performance of the low performing RN. Let us define a low performing RN as a RN who is at the 15th percentile. That is, of 100 RNs this RN performs better than only 15 RNs and 85 RNs turn in better performances. Consider the quality and quantity of performance typical of the average RN and the dollar value of this performance. In estimating a dollar value for this performance, it may help to consider what the cost would be of having someone from an outside firm provide this service.

You should refer to the RN job description and the RN categories and example activities. Remember that employees will perform these activities at differing levels of proficiency and/or frequency. That is, superior RNs will demonstrate some cost-saving or revenue generating behaviors more often (or cost-producing behaviors less often) than average RNs, who in turn will do better than low performing RNs. You should also refer back to your previous estimates and to your group's averages.

Based on my experience, I estimate the value to Norfolk General Hospital of the low performing RN to be \_\_\_\_\_ dollars per year.

. Name:

WORKSHEET -- dollar estimate for average LPN

Based on your experience with LPNs. we would like you to re-estimate the yearly dollar value to Norfolk General Hospital of the overall performance of the 50th percentile, or average LPN. Let us define an average performer as an LPN who is at the 50th percentile. That is, of 100 LPNs this LPN performs better than 50 LPNs. Consider the quality and quantity of performance typical of the average LPN and the dollar value of this performance. In estimating a dollar value for this performance, it may help to consider what the cost would be of having someone from an outside firm provide this service.

You should refer to the LPN job description and the LPN categories and example activities. Remember that employees will perform these activities at differing levels of proficiency and/or frequency. That is, superior LPNs will demonstrate some cost-saving or revenue generating behaviors more often (or cost-producing behaviors less often) than average LPNs, who in turn will do better than below average LPNs. You should also refer back to your previous estimates and to your group's averages.

Based on my experience, I estimate the value to Norfolk General Hospital of the average LPN to be \_\_\_\_\_ dollars per year.

WORKSHEET -- dollar estimate for superior performing LPN

Based on your experience with LPNs, we would now like you to re-estimate the yearly dollar value to Norfolk General Hospital of the overall performance of the superior performing LPN. Let us define a superior performing LPN as a LPN who is at the 85th percentile. That is, of 100 LPNs this LPN performs better than 85 LPNs and only 15 LPNs turn in better performances. Consider the quality and quantity of performance typical of the average LPN and the dollar value of this performance. In estimating a dollar value for this performance, it may help to consider what the cost would be of having someone from an outside firm provide this service.

You should refer to the LPN job description and the LPN categories and example activities. Remember that employees will perform these activities at differing levels of proficiency and/or frequency. That is, superior LPNs will demonstrate some cost-saving or revenue generating behaviors more often (or cost-producing behaviors less often) than average LPNs, who in turn will do better than low performing LPNs. You should also refer back to your previous estimates and to your group's averages.

Based on my experience, I estimate the value to Norfolk General Hospital of the superior LPN to be \_\_\_\_\_ dollars per year.

WORKSHEET -- dollar estimate for low performing LPN

Based on your experience with LPNs, we would now like you to re-estimate the yearly dollar value to Norfolk General Hospital of the overall performance of the low performing LPN. Let us define a low performing LPN as a LPN who is at the 15th percentile. That is, of 100 LPNs this LPN performs better than only 15 LPNs and 85 LPNs turn in better performances. Consider the quality and quantity of performance typical of the average LPN and the dollar value of this performance. In estimating a dollar value for this performance, it may help to consider what the cost would be of having someone from an outside firm provide this service.

You should refer to the LPN job description and the LPN categories and example activities. Remember that employees will perform these activities at differing levels of proficiency and/or frequency. That is, superior LPNs will demonstrate some cost-saving or revenue generating behaviors more often (or cost-producing behaviors less often) than average LPNs, who in turn will do better than low performing LPNs. You should also refer back to your previous estimates and to your group's averages.

Based on my experience, I estimate the value to Norfolk General Hospital of the low performing LPN to be \_\_\_\_\_ dollars per year.

XII. APPENDIX G:  
Post-Questionnaire

Name:

OPINION QUESTIONNAIRE

The primary purpose of this project is to collect information that can be used, along with other information, to assess the utility of various human resources programs. We are also interested in determining which of three methods of collecting utility information work best at NGH. For this reason we are asking you to answer some questions regarding the estimation method that you experienced. There are no right or wrong answers to these questions; we are asking for your opinion. However, it is important that you complete all of the items so that we can determine which method works best.

This questionnaire contains a number of statements that pertain to the current process. After reading each statement you are asked to answer using a number from 1 to 5 to indicate the degree of your agreement or disagreement with the statement. If you strongly agree with a statement you would answer "5". If you are unsure how you feel about a statement, you would answer "3". You may use any number from 1 to 5 in the following scale.

!-----!	!-----!	!-----!	!-----!	!
1	2	3	4	5
strongly disagree	disagree	neither agree nor disagree	agree	strongly agree

1	2	3	4	5
strongly	disagree	neither	agree	strongly
disagree		agree nor		agree
		disagree		

PLEASE REMEMBER TO RESPOND TO EVERY STATEMENT

The estimation task: Listed below are several items that pertain to the task of estimating the dollar value of various levels of nurses performance.

- \_\_\_\_\_ 1. I understood what I was supposed to do in this project.
- \_\_\_\_\_ 2. The information I received during the project was sufficient for me to know how to make estimates.
- \_\_\_\_\_ 3. The estimation task was ambiguous.
- \_\_\_\_\_ 4. The project took too much time to complete.
- \_\_\_\_\_ 5. The "critical activity list" helped me understand what to consider when making estimates.
- \_\_\_\_\_ 6. The averages of my group's estimates helped me make subsequent estimates.
- \_\_\_\_\_ 7. I feel confident I completed the task properly.

The estimates: Listed below are several items that pertain to the estimates that you gave in this project.

- \_\_\_\_\_ 8. My final estimates are reasonably accurate.
- \_\_\_\_\_ 9. When my final estimates are averaged in with my group's final estimates the resulting estimates will be reasonably accurate.
- \_\_\_\_\_ 10. My estimates were based predominantly on nurse's salary.

Using the results: Listed below are several items that pertain to using your estimates in subsequent projects to make human resources decisions at NGH.

- \_\_\_\_\_ 11. It would be acceptable to me if my group's estimates were used to determine the utility (benefit minus cost) of a training program.



1	2	3	4	5
strongly disagree	disagree	neither agree nor disagree	agree	strongly agree

PLEASE REMEMBER TO RESPOND TO EVERY STATEMENT

- \_\_\_\_\_ 12. It would be acceptable to me if my group's estimates were used to choose between two training programs.
- \_\_\_\_\_ 13. It would be acceptable to me if my group's estimates were used to determine the utility (benefit minus cost) of new ways of selecting nurses for employment at NGH.

Nurses at NGH: Listed below are several items that pertain to the performance of nurses at NGH.

- \_\_\_\_\_ 14. Most RNs at NGH perform at a similiar level of performance.
- \_\_\_\_\_ 15. Most LPNs at NGH perform at a similiar level of performance.

Please write any comments that you have about this project:

THANK YOU

We will meet to discuss the results  
and how they can be used