ABSTRACT

UNINSURED COSTS OF WORK ACCIDENTS: REPLICATION AND NEW APPLICATIONS OF SIMONDS METHOD

By

John J. Imre

The Simonds method of estimating the uninsured costs of work accidents makes use of average uninsured cost figures for four categories of accidents. This is necessary since the usual accounting methods do not separate and distinguish the uninsured costs incurred as a result of work accidents.

Organizations seeking to find the costs attributable to their work accidents may make pilot studies to develop these uninsured average costs per case or, avoiding this effort, they may simply use the suggested Simonds averages and multiply these times the respective numbers of the four categories of accidents they have experienced. The Simonds averages have been based on extensive studies begun in 1947 and adjusted for wage level changes and checked by smaller, more recent observations.

The purposes of this study were to:

1. Replicate the Simonds study by using his instruments and methodology and thus generate a body of data which could be compared directly to the early Simonds findings and thus either

support them or differ with them. This data was to be generated by the study of the manufacturing organizations.

2. Generate data in hospitals and utilities, types of organizations that Simonds had not investigated in his study.

3. Gather data, if possible, to support or differ with the suggested Simonds 1:1 ratio between lost-time cases and no-injury cases.

The samples for the research project were two hospitals, two utilities and three manufacturing concerns. The organizations were consciously selected so that there would be a significant difference in size and number of employees between the two or three organizations in each category. Most of the organizations chosen are located in the Chicago, Illinois and Gary, Indiana industrial belt area. For the collection of data, Imre used the same instruments that Simonds had used, which may be obtained from the National Safety Council. These were distributed to key personnel in the cooperating organizations, who recorded on the instruments data about accidents occurring during the study period. After the recording of accident data, the researcher checked the recording work and calculations. He held evaluation sessions with the cooperating personnel to make certain that all the cost factors involved in the accidents were recorded as accurately as possible. The researcher visited the organizations and had personal interviews to familiarize the cooperating personnel with the technique and instruments and to elicit information that could best be secured by the in-person, one-to-one communication method.

The major findings and conclusions of the study are as follows:

1. While there were some differences between the findings of the Simonds and Imre studies, perhaps the most significant finding of the researcher is that the total average costs per case of the two studies were roughly comparable. With one or two exceptions the same cost elements provided the major portion of the costs.

2. It is not unlikely that a considerable portion of the differences between the two bodies of data is due to variations in samples and inaccuracies in data gathering more than any other factors.

3. The relative closeness of the Simonds and Imre studies is best illustrated by the following table which summarizes their cost findings in the four categories of accidents:

Average Total Costs of the Simonds and Imre Studies

(The Imre figures do not include the Hospital data. These were excluded because the data of the Utilities and the Manufacturing concerns of the Imre study were more directly comparable to the Simonds study.)

Types of Accidents	Simonds	Imre
First-aid cases	$ 10.33	$ 12.43
Lost-time cases	223.90	189.74
Doctors' cases	54.61	39.00
No-injury cases	442.59	350.50

4. The Imre study, in general, supports the Simonds suggestion of a 1:1 ratio between lost-time cases and no-injury cases,

a ratio which was offered as a very rough rule of thumb in lieu of a costly and time consuming pilot study every time a working cost figure was needed. This researcher's data actually showed a 3/4 to 1 ratio, but it is believed that the probability is that some no-injury accidents were overlooked in both the Simonds and Imre studies.

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CHAPTER I

THE PROBLEM

This study is a replication of the pioneering work on the uninsured costs of accidents begun by Rollin H. Simonds in 1947.[1] The thrust of its task is to establish average cost figures for those elements of accidents which are not reported and recorded by the generally accepted standard accounting procedures of employing organizations. In conducting this study the writer attempted to learn whether his uninsured cost figures were similar to or different from those found by Simonds and to explain such differences or similarities. The study is also an attempt to extend the basic matrix of uninsured cost figures revealed by Simonds in that the writer studied two industries that Simonds did not include in his original study.

Whenever the term "accident" is utilized, the mind poses the question: What is an accident? Even among those people who are directly concerned with the study of the costs of accidents and people involved with safety in general, of which accident cost analysis is a subset, there is a lack of agreement as to the precise meaning of the term. This does not mean that arriving at a workable

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[1]Rollin H. Simonds, Estimating Costs of Industrial Accidents, U.S. Department of Labor (Washington, D.C.: U.S. Government Printing Office, 1955).

definition is impossible. While a number of good definitions of an "accident" could be used as a basis for clear understanding, this study has operationally adopted the definition developed by Simonds. The definition is:[2]

> An occupation or work accident (excluding agriculture), for purposes of accident prevention and cost analysis, may well be defined as an unintended occurrence arising out of the employment in any kind of business and industry that either causes personal injury or causes property damage or interference with production or other business activity under such circumstances that personal injury might have resulted. This definition, it may be noted, requires first the element of personal danger. This distinguishes an "industrial accident" from such unplanned occurrences as a lathe operator's inadvertently cutting a part too small, or a crack appearing in the cement floor. Second, it excludes mere unsafe acts which have been hazardous but have not actually resulted in anything detrimental.

From a humanitarian point of view a zero incidence of accidents in any organization would be ideal, thus precluding the possibility of injury being inflicted on any human beings. However, from a practical managerial point of view this is impossible to achieve and prohibitively costly to attempt. But some minimum degree of safety of operations is vital to any organization. If there does not exist at least a minimum degree of safety then the situation is out of control and the formalized productive factors cannot be used in a predictable manner. Since the humanitarian ideal of zero accidents is impossible to achieve for all practical purposes, it becomes a matter of judgment as to what degree of accident occurrence is allowable and what would constitute a good safety record in the eyes of any given organization. The writer suggests an overall rule

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[2]Rollin H. Simonds and John V. Grimaldi, Safety Management, Revised Edition, Richard D. Irwin, Inc., Homewood, Illinois, 1963, p.9.

that a good safety program must prevent the loss of production and the increased costs resulting from accidents while also striving to achieve the humanitarian ideal of zero occurrence to meet individual and societal needs. In the end the rule of measure will be a dynamic balance of these factors, changing somewhat from situation to situation and from one mix to another mix of variables and constants that can serve to cause accidents.

Management personnel, aside from their assumed concern for the optimal welfare of their employees, are interested in the costs of accidents since they affect efficiency of operations which could be used as a measure of their relative managerial abilities. They would naturally strive to reduce the costs of accidents to practical levels where the humanistic ideal of near-zero occurrence is approached and the relation of costs to safety efforts is balanced so that it would not be prohibitively costly and thus not worth the effort from any point of view. Calculating accident costs for analysis and as a basis of preventive action is not a straight forward matter and can be confusing and elusive. The apparent cost of a given accident is as deceptive as an iceberg floating in water. Like the iceberg, only small portions of an accident's costs are readily visible. It is not generally accepted accounting practice to record these data. That is, there is usually no account in the books of an organization entitled "accident costs." Such costs have to be calculated from labor costs, medical costs, material costs, and other costs that are recorded in the accounts of typical organizations. Managers generally use cost data that are frequently generated and

pertain to the greatest portion of their operational costs and which can be routinized as to their mode of recording without a great deal of time consumption. They try to avoid having to deal with data that are buried among various categories of expense and have to be rooted out one at a time. From the point of view of the accountants, money and time should be expended on record keeping only up to the point at which the marginal cost of the work begins to equal the useful value of the marginal results. The knowledge of the precise costs of all accidents is not vital to an organization. The managements of organizations instead need a guide for their decision making that is sufficiently accurate and reliable to facilitate decision making and is based on a method of estimating total accident costs.

An organization usually incurs two general kinds of costs as a consequence of industrial accidents. They are the insurance cost and the uninsured cost. The insurance cost is the easiest to establish because such a cost is recorded in the accounting books of the organization. The present study utilizes the Simonds method of classifying accident costs into the two categories of insurance costs and uninsured costs. These are not the most widely used expressions to classify accident costs. Safety men have historically utilized the terms direct and indirect costs. Simonds intends the old concept of indirect costs to be identical with what is meant by the uninsured costs. The two expressions may be used interchangeably. As Simonds points out:[3]

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[3]Ibid., p. 85.

> Direct cost in accident-prevention work has meant payments under workmen's compensation laws and medical expenses of the type usually covered by insurance. The overhead cost of insurance, i.e., the difference between the money paid out by an insurance company in settlement of claims from employees of a concern and the total insurance premiums paid by that company for this workmen's compensation coverage, has not been included in either the direct or the indirect cost. It is a substantial factor but has often been overlooked.

Hidden costs must be searched out and added to the insurance costs before a reasonably accurate assessment of damage can be done. To examine the portion hidden below the surface requires extensive investigation, but the effort frequently shows management that many seemingly minor accidents are, in fact, having a major impact on the efficiency of the operation. There is a point of diminishing returns in this detailed investigation of costs, however, and care should be exercised in determining how far to go for optimum evaluation. The Simonds method of calculating uninsured costs was adopted by this researcher because it appears to be the most reliable. The National Safety Council[4] recommends it, and it readily lends itself for research in the field of activity. Simonds explains his rationale for the categorization of uninsured costs as:[5]

> In listing the valid elements of uninsured cost, only those have been included that may be clearly shown to result from industrial accidents and that are subject to reasonably accurate measurement. Thus the long-run effect of accidents on employee morale and on the wage rates necessary to attract and retain employees and on public relations has been omitted as unmeasurable and difficult to connect clearly with accidents. This means that accident costs calculated on the basis of the

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[4]Harold E. O'Shell, "Methods of Calculating Uninsured Costs," National Safety Council News, 1969, pp. 10-19.

[5]Simonds and Grimaldi, p. 86.

following cost elements represent specific, demonstrable costs, in addition to which there are various intangible ways in which accidents have an undesirable effect on a business concern.

The valid elements of uninsured costs that Simonds speaks of may be summarized and listed in the following manner:

1. Cost of wages paid for working time lost by workers who were not injured.
2. The net cost to repair, replace, or straighten up material or equipment that was damaged in an accident.
3. Cost of wages paid for working time lost by injured workers, other than workmen's compensation payments.
4. Extra cost due to overtime work necessitated by accident.
5. Cost of wages paid supervisors while their time is required for activities necessitated by the accident.
6. Wage cost due to decreased output of the injured worker after return to work.
7. Cost of learning period of the new worker.
8. Uninsured medical cost borne by the company.
9. Cost of time spent by higher supervision and clerical workers on investigations or in the processing of compensation application forms.
10. Miscellaneous unusual costs.[6]

Simonds explains what he means by miscellaneous unusual costs in the following manner:[7]

> This category includes the less typical costs, the validity of which must be clearly shown by the investigator on individual accident reports. Among such possible costs are public liability claims, cost of renting replacement equipment, loss of profit on contracts canceled or orders lost if the accident causes a net long-run reduction in total sales, loss of

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[6] Simonds and Grimaldi, p. 88.

[7] Ibid., p. 91.

> bonuses by the company, cost of hiring new employees if the additional hiring expenses are significant, cost of excess spoilage (above normal) by new employees, and demurrage.

The factors that comprise the method of estimating the costs of accidents have been identified and operationally defined. How does one synthesize them to arrive at a cost figure or set of cost figures? Since the Simonds methodology was utilized in this study, and his research was replicated in part, his own explanation of the process of what he calls the modern standard method of calculating the cost of accidents will shed the most useful light. The Simonds method is illustrated by his formula:[8]

> Total cost = Insurance cost + [A times (number of lost-time cases)] + [B times (number of doctors' cases)] + [C times (number of first-aid cases)] + [D times (number of no-injury accidents)].

This formula is intended to apply to typical accidents and not to something rare and unusual such as a catastrophe. If such a catastrophe does take place, it is suggested that it be investigated independently and any costs resulting from it be added to the resultant of the total cost formula. Simonds explains his formula thus:[9]

> In the formula, A,B.C, and D are constants indicating respectively the average uninsured cost for each of the categories of cases. As for the multipliers, it has been good standard safety practice to keep a record of the number of each type of cases except the no-injury class. The number of no-injury accidents may be estimated by applying a ratio to the number of lost-time cases. Even if this ratio should actually vary markedly from time to time, the distortion in total estimated cost would be small.

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[8] Ibid., p. 112.

[9] Ibid.

Simonds explains that the most desirable ratio in any given case would be the resultant of a pilot study in the organization in question. If such a measuring device was not available for some reason, he then suggests the usage of the less than perfect one-to-one ratio found by him in his studies as a workable but rough rule of thumb.

In further reasoning in defense of his method, Simonds points out that his method of estimating the uninsured costs of accidents is not subject to the pitfalls of depending on one ratio. Thus he avoids having an inherent error carried through various calculations predicated on a faulty ratio. His method is a resultant of precisely known numbers of cases, with the exception of the no-injury category. Simonds concludes:[10]

> Therefore, if one or two of the four averages and the one ratio are far from correct, that will not affect the others and is not likely to result in very serious distortions of the total.

The formula incorporates three terms widely used by experts in the field of safety. These are "lost-time," "doctors," and "first-aid." Simonds added a fourth term which he calls "no-injury," an additional accident categorization class. He defines these terms and the classes of accidents they describe in the following manner:[11]

1. Lost-time cases: (a) permanent partial disabilities and (b) temporary total disabilities.

2. Doctors' cases: (a) temporary partial disabilities and (b) medical treatment cases requiring the attention of a physician.

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[10] Ibid.

[11] Ibid.

3. First-aid cases: medical treatment cases (a) requiring only first aid and (b) resulting in property damage of less than $20 and in loss of less than eight hours of working time.

4. No-injury accidents: accidents that (a) either cause no injury or cause minor injury not requiring the attention of a physician and (b) result in property damage of $20 or more or in loss of eight or more man-hours.

Permanent disabilities and fatalities have been omitted from the lost-time cases. That was done because deaths and permanent disabilities in most organizations are very rare. When they do occur, they are placed in the category of a catastrophe. Thus they are investigated separately as individual cases instead of being included in a category whose uninsured costs are estimated by averages.

Calculating the actual average uninsured costs of an organization can be done in two ways by utilizing the Simonds method. The safety or medical department of a given organization should have a record of the number of cases of the different types of accidents with the exception of the no-injury accidents. This eliminates having to generate part of the necessary data. The remaining work would be to calculate the total uninsured costs to find the average uninsured cost per case for each of the four types of accidents described. To eliminate substantial costs in terms of money and time, an organization could apply the average costs and the ratio of no-injury to lost-time cases found in the Simonds study. The other alternative would be to conduct a thorough pilot study in the organization. The latter method is more costly and time consuming, but it is also more accurate and gives a truer picture of the average costs of the organization.

This report is on such a pilot project conducted in seven organizations selected from three separate industries. The bulk of the cooperating organizations are located in the Chicago, Illinois and Gary, Indiana industrial belt area. One organization is located in Wisconsin and one in Michigan. The organizations in which the pilot projects were conducted are the following:

1. (2) Hospitals--Each of the hospitals employ over 2,000 people.

2. (2) Utility Companies--One employs over 30,000 people, the other approximately 400.

3. (3) Manufacturing Companies--One employs approximately 4,000 people, the second employs 2,000 and the third 400.

This set of organizations was deliberately chosen in order to generate data in organizations selected from industries that Simonds had not studied during his 1947 work (with the exception of the manufacturing category). It was planned to study at least two organizations within each industry in order to be able to make intra-industry comparisons of accident cost averages.

The study was designed with three basic aims in mind. These were to:

1. Replicate the Simonds study by using his instruments and methodology and thus generate a body of data which could be compared directly to the 1947 Simonds findings and thus either support it or differ with it. This data was to be generated by the study of the manufacturing organizations.

2. Generate data in organizations selected from industries that Simonds had not investigated in his study.

3. Generate data, if possible, to clarify the suggested Simonds one-to-one ratio between lost-time cases and no-injury cases.

The instruments that were used to gather and record data, which in turn would be analyzed by insertion into the Simonds formula previously described, are illustrated in Appendix A.

CHAPTER II

REVIEW AND CRITIQUE OF THE LITERATURE

The first significant legislation in America related to accidents and their costs and prevention was passed by the state of Massachusetts in 1867. The same state passed legislation again in 1877. These laws provided for factory inspectors and the safeguarding of workers against dangerous machinery. Employers' liability laws were passed by Alabama in 1885 and by Massachusetts in 1887, but the financial burden placed on the employer by these laws was not great enough to serve to motivate him to do anything very extensive about the prevention of personal injuries. Similar laws were passed by other states. This prompted a number of insurance companies to employ engineers to inspect insured facilities and evaluate the accident hazards in order to arrive at proper insurance rates. While making their inspections the engineers realized that many hazards could be eliminated. These engineers were able to reduce injuries and effect savings on the premiums paid by the insured.

The preceding legislation was recognized as being inadequate by many important social groups, and they pressed for more effective legislation. Organized labor, the churches, and the press joined forces to improve the existing liability laws. The first state compensation law was passed by New Jersey in 1911. All states,

except Mississippi, had passed workmen's compensation laws by 1943.

The effect of these early compensation laws was to so increase the costs of occupational injuries that employers were forced to find ways of reducing the number of injuries. With insurance rates based on costs and injury rates, the newly introduced safety man directed his efforts to the resolutions of the problems connected with injury type accidents.

There are recorded safety measures as early as the middle 1800s in the U.S.A. As Bird points out:[12]

> ...explosive powder mills were built with exceedingly heavy masonry walls on three sides, a light wooden roof, and a light fourth wall facing a river. In case of an accidental explosion, the force would then be directed toward the river, with less chance of injury to employees from debris that would otherwise have blown about promiscuously.

Organized efforts to eliminate unsafe conditions and practices and prevent accidents that could result in property damage or personal injury are at least as old as the safety movement itself.

H.W. Heinrich was probably the first safety expert to focus attention on the various types of accidents and the nature of their costs and occurrences. He drew national attention to the subject in his book Industrial Accident Prevention. He directed attention not only to the causes of the accidents but also to the types of accidents that could result in property damage but did not cause personal injury. His studies suggested the following relationship:

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[12]Frank E. Bird, Jr., and George L. Germain, Damage Control, American Management Association, 1966, p. 15.

one disabling injury type to 29 of the minor injury type to 300 of the non-injury type. Heinrich also revealed another relationship that has had widespread usage in the field of safety. While employed by the Travelers Insurance Company, he took cases from the insurance company files starting in 1926 and went to the organizations where the accidents had occurred. He tried to establish from the conversations with officials and from information in the organizations' records what costs had been incurred in addition to those covered by workmen's compensation insurance. He called the costs of the insurance the direct costs of accidents; the losses incurred due to property damage and production interruption he called indirect costs of accidents. The difference between the insurance premiums and the money expended on claims by the insured organization, the so-called overhead cost of insurance, was not included in either the direct or the indirect cost. Heinrich's indirect cost corresponds to Simonds' uninsured cost. Heinrich[13] concluded from his studies that the indirect costs were about four times as great as the direct costs for industry as a whole, although he never claimed that the 4:1 ratio would apply to all individual organizations.

Even though Heinrich warned that his 4:1 ratio was not universally applicable, people directly involved with safety had no reliable accident cost data and readily adopted this ratio. Many books and articles on the subject of safety still utilize this 4:1 ratio. The National Safety Council, however, has replaced the 4:1

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[13]H.W. Heinrich, Industrial Accident Prevention (4th Edition), New York: McGraw-Hill Book Co., Inc., 1959, p. 50.

ratio with the Simonds method of finding an organization's accident cost as described in Chapter I. One has to view skeptically any ratio that is offered as holding true for all accident cost analyses. The Simonds study, analyzing more than 2,000 accidents, indicated that such a cost relationship would be extremely unusual. Although using the arbitrary 4:1 ratio does not seem satisfactory in finding a company's accident costs, the idea of using some type of ratio or average is valid. It is too tedious and involved a process to record all the indirect or uninsured costs of accidents of an organization in its account books. A workable alternative is to develop averages or ratios that may be applied to the data that is already a part of the organization's record keeping process.

It has been suggested that individualized indirect-direct cost ratios be utilized instead of the universal 4:1 ratio. This seems plausible and would probably yield more accurate figures than the 4:1 ratio. But would it be the most useful and accurate method of analysis available? Simonds pursued this possibility during the period that he developed his modern standard method of calculating the total costs of accidents. If one utilizes a ratio to be applied to the direct cost, one must assume that there is a fairly constant relationship between it and the indirect costs of accidents. Such an assumption might be made for two reasons. One, there might be a high correlation between the direct and the indirect cost in each accident. Two, there might be a high correlation between direct and indirect cost within each category of accidents. Simonds tested

these assumptions. In testing the idea of high correlation between the direct and the indirect cost in individual accidents he concluded:[14]

> This relationship was tested, and shown to be completely unfounded, by examination of 215 lost-time accidents, 278 doctors' cases, and 926 no-lost-time cases--a total sample of well over 1,000 cases. There are ordinarily no "direct" costs in the first-aid cases or no-injury accidents.

In testing the hypothesis about a high correlation between direct and indirect cost within each category of accidents, Simonds found:[15]

> It is true that some definite patterns emerged--for instance, to the effect that doctors' cases and no-lost-time cases, as might be expected, do have lower average indirect, as well as direct, costs, generally (but not invariably) than the lost-time cases. To be specific, the average indirect cost for 273 doctors' cases was found to be 35 percent of the average indirect cost of 137 lost-time cases, but the average direct cost of the same doctors' cases was only 2 percent of the average direct cost of the lost-time cases. On this basis, however, even if the average of both indirect and direct costs per case held constant, we could not calculate the relationship of the total indirect costs of doctors' and lost-time cases from the total direct cost alone. We should have to take account of the way the total direct cost was divided between lost-time and doctors' cases and of the number of each type of case.

Simonds, still not satisfied that he had laid the constant ratio between indirect-direct cost argument to rest, developed further arguments:[16]

> Actually, we could not assume a constant ratio between total direct and total indirect costs in the individual company or plant unless the following six averages and three ratios held

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[14] Simonds and Grimaldi, p. 109.

[15] Ibid.

[16] Ibid.

constant for the company or plant:

Average direct cost per lost-time case
Average direct cost per doctors' case
Average indirect cost per lost-time case
Average indirect cost per doctor's case
Average indirect cost per first-aid case
Average indirect cost per no-injury accident
Ratio of doctors' cases to lost-time cases
Ratio of first-aid cases to lost-time cases
Ratio of no-injury accidents to lost-time cases

Perhaps some compensating adjustments might make up for constant ratios, but it is difficult to look to anything but coincidence to hold the total indirect-direct cost ratio constant if these averages and ratios do not themselves remain relatively constant.

A number of arguments against the approach described above come to mind. The greater the number of averages utilized, the greater the margin of error. The three ratios indicated lend the estimate to a high degree of error. The ratio method of analysis is bound excessively to single averages and ratios. Thus if the initial figure contains an error or inaccuracy it is multiplied in all the following operations. As a remedy to cure the shortcomings of the approaches described, Simonds suggests the adoption of his modern standard method for calculating the total costs of accidents:[17]

> In contrast, an approach which cuts down on the range of averages required and which puts primary dependence on the number of various kinds of accident cases rather than on ratios of cost would seem to be preferable. A figure for number of accidents is easier to get from regular company records, and besides it is more dependable than anything based on cost relationship, the latter fluctuating as it does in proportion to the severity of accidents.
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> Obviously, any estimate must run the risk of some inaccuracy. The modern method is less exposed to the errors just mentioned above than is the use of "indirect-direct" cost ratios. This new method provides a means of ascertaining accident cost

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[17] Simonds and Grimaldi, p. 10.

> figures with sufficient validity and reliability, the authors believe, to warrant executives' using the data in formulating safety policy as well as in evaluating departmental efficiency with respect to safety performance.

Simonds offers the adoption of his modern standard method of calculating the total cost of accidents for general usage by those involved with the field of safety. The National Safety Council, having surveyed the amount of repetitive material available on the ways to calculate the costs of accidents, has adopted the Simonds method of categorizing the elements of accidents and has thus endorsed his method of calculating the total cost of accidents. The National Safety Council uses the department supervisor's cost report and the investigator's cost data sheet forms for gathering data in calculating the total cost of accidents. These instruments were developed by Simonds in his pioneering study in 1947 of over 2,000 accidents. The National Safety Council recommends the Simonds method of accident cost analysis. In a historic publication it announced its decision to adopt the Simonds method:[18]

> The traditional concepts of indirect and direct costs have never been entirely satisfactory because they are not sufficiently definitive. The term "direct cost" has usually meant costs representing definite outlays of money, commonly compensation payments and medical expense. "Indirect" costs have meant those which do not represent definite outlays of money, but rather which are reflected in increased costs of doing business. Since these distinctions are impossible to maintain, they have been abandoned here in favor of the more precise terms "insured" and "uninsured" costs.

Most of the writers on the subject of accident costs agree that the Heinrich suggested 4:1 ratio is inadequate. This type of

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[18]National Safety Council, Accident Prevention Manual for Industrial Operations (4th Edition, Chicago, Illinois, 1959), pp. 9-10.

universal ratio is not generally acceptable to management personnel. There always exists the possibility of a wide variance in applicability and accuracy. Line management personnel are skeptical of any cost calculations that are based on ratios not directly related to studies of their own operations. Labor-management negotiations on incentive programs invariably indicate the desire of both parties to accept only calculations based on current studies of local operations. There is a general agreement among scholars in the field that probably the biggest obstacle to successful practical application of the direct-indirect cost concept is the fact that these costs cannot be clearly discerned from the company's business records. It is also agreed that the method of analysis developed by Simonds is a very significant improvement over the Heinrich method of analysis. A thorough review of the literature reveals only one substantive critique of the Simonds technique that warrants a review. In discussing the Simonds method, Frank E. Bird says:[19]

> The concept of insured-uninsured costs evolved as a logical attempt of the academic safety philosopher to wrap the unacceptable direct-indirect concept in a new package with some slight, but rather complicated, changes in the product. With this method, accident classification costs are established by conducting local studies of all costs associated with four accident types: disabling injuries, doctor care cases, first-aid cases, and no-injury accidents.

Bird goes on to list the cost factors that Simonds generally recommends for inclusion in the studies. In effect he enumerates the items described on pages 5 and 6 of Chapter I. Bird explains that

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[19]Bird and Germain, p. 66.

the costs established by these studies are applied to the totals for each of the four accident types and compiled into a total cost figure. Bird continues:[20]

> Essentially, this method took the indirect cost categories--used earlier in the broad industrial sampling to establish the 4:1 ratio--and applied them, with refinements, to establish local costs.

As the review of the Simonds technique indicates, there is much more involved in the logical establishment of the method than Bird indicates in his criticism of Simonds. Bird never explains what he means by "direct-indirect concept in a new package" or "applied them with certain refinements" and other characterizations. He never goes into concrete detail as to why he rejects the Simonds method. Bird contends that while the Simonds method is somewhat more accurate than the direct-indirect cost concept, this method apparently has failed to gain practical application to any significant effect. Again, he does not explain what he means and he does not go on to document his contention. He does not define practical application or the phrase "significant effect." Nor does he pursue the possibility that perhaps any lack of use is due to an ignorance of the existence of the technique rather than a reflection of its shortcomings. Bird does offer some specific criticisms of the technique. He points out:[21]

> The insured-uninsured concept is widely referred to these days, but it has not proved to be an effective tool in safety motivation. Here are some of the reasons for its lack of effectiveness in practice:

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[20] Ibid.

[21] Ibid.

1. The information necessary to reveal the hidden costs of accidents is very difficult to dig out.

2. The size of the study required to determine mathematically valid cost figures for each accident classification makes the task one of tremendous magnitude.

3. Periodic restudies of hidden costs are necessary for maintenance of program accuracy.

4. Since it has not been general practice to charge insured or direct costs of injuries "directly against specific operating divisions," it is even more difficult to institute a similar practice for uninsured costs which the typical operating manager doesn't consider valid business costs.

While the above criticisms may be valid objections to the ease of conducting research, they do not refute the validity of the research.

Instead of offering a more accurate way of calculating total costs of accidents, Bird suggests that organizations should emphasize prevention of accidents especially those potentially and actually resulting in property damage. Thus the concept does not include all the costs associated with accidents but it does develop a body of costs recorded directly in the company records that could be many times greater than the insured costs. Since these costs primarily involve property damage accidents, Bird termed the methodology "damage control." This method's general analysis of costs includes a breakdown by the department paying the bill, ownership of agency most closely related, items damaged, and agency of act. The suggested aim of this technique is to generate data by which key executives could quickly focus their attention on specific areas needing attention. It is suggested that this form of cost analysis is only

one portion of the total safety analysis program and that it should form part of the regularly established monthly or other periodic accident analysis reports. The value of this technique according to Bird is:[22]

> Integrating the cost data with the established injury analysis keeps management attention clearly focused on the fact that the primary goal of all-accident control is the reduction of injury type accidents.

The focus of this method is more narrow than that of the Simonds method and does not give a comprehensive picture of the costs of accidents. It has to be utilized in conjunction with "other portions of a total safety analysis program" and thus concedes its limited value. It apparently serves well as a warning system to focus attention on the most frequently occurring accidents. However, as a tool to elicit the total costs of any given organization, as this research is designed to do, it is inadequate.

Another technique of analysis that has some currency in the field of safety analysis is the one referred to as "elements of production" or "ledger costs" concept, most clearly explained by Morris B. Wallach:[23]

> In this concept, we are not concerned with such terminology as "direct cost," "indirect cost," "insured costs," or "uninsured costs." Instead we use the elements of production. They include: Manpower, machinery, material, equipment, time. Every accident damages at least one or more of the elements of production. A decrease in the number of accidents should eventually affect the unit cost of production.

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[22]Bird and Germain, p. 70.

[23]Morris B. Wallach, "Accident Costs-A New Concept!" Industrial Supervisor, January 1965, p. 25.

When using the "elements of production" concept, Wallach is not concerned with such terminology as "direct cost," or "indirect cost." He is concerned with accident costs that he says have an effect on production. It should be recognized that this concept does not include those costs which are easily recognizable and "more acceptable" to management.

While useful for the purpose intended, this technique is one with limited scope and is incomplete as a tool in the calculation of the total costs of accidents. No discernable reason is given as to why this method should yield more easily recognizable cost elements than that of an organization using the properly understood Simonds method. As to the argument that the "elements of production" method of analysis is more acceptable to management, it depends on how clearly the two contrasting techniques are understood and what the scope of the analysis and the needs of management are. If the total picture is not needed, perhaps the Simonds method is a little more involved. However, ease of data gathering is then achieved at the cost of diminished comprehensive accuracy. The writer continues:[24]

> There are two key groups which can make this procedure successful or result in failure. They are the supervisors and the accounting office. It is therefore essential that top management impress on them the importance of this procedure and its values to the plant.

The line supervisor is in the best position to discover and make an immediate investigation of the accident, both for cause and damage. This method suggests he should be instructed to notify the

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[24] Ibid., p. 26.

safety department as soon after the accident as possible about its extent and severity. The accounting office would have to set up a separate record system for determining the cost of repairs and replacement of damage machinery, material and equipment and the cost of lost production time. This would enable them to complete the form originally started by the supervisor. The form would then be submitted to the safety department for final and cumulative tabulation.

There have been suggestions to use graphic cost curves to draw managerial attention to the costs of accidents and to analytically calculate from the curves needed data. There have been various suggestions as to how to convert cost figures into a dollars and cents language so that management would easily understand the matter and be more receptive to cost control. Formulas for developing an estimated loss ratio have been developed. However, an extensive review of the literature of the field does not reveal any additions to the methods of analysis summarized in this chapter. Many articles, books and speech excerpts dealing with the subject of accident cost calculation were reviewed. They all follow a definite pattern. Older materials are take-offs and variants of Heinrich's work. Newer works deal with material similar to Simonds, Bird, and Wallach. Since none of the approaches studied was as comprehensive and accurate in calculating the costs of accidents as the Simonds method, the researcher adopted the Simonds method in his study. The Simonds studies have generated a large body of data which the researcher could utilize for guidance and comparison. This is another valuable reason for adopting the Simonds technique.

CHAPTER III

DISCUSSION OF METHODOLOGY

The method of analysis used in this study was that of conducting a pilot study of the uninsured costs of accidents in a given organization. This research technique was developed by Simonds in the late 1940s and periodically refined and revised. The first step of the research was to secure permission from Simonds to utilize his concepts. Once Simonds' permission was secured, the next step was to request the endorsement of the National Safety Council. This was thought necessary because the safety personnel in sophisticated organizations are familiar with and respect the work of the National Safety Council. An endorsement from the Council might make it easier to get cooperation in conducting research in organizations. The National Safety Council agreed to endorse the study allowing its name to be used in contact letters and interviews, and offered to furnish a list of contacts in organizations, drawn from various industries, who might be receptive to the proposed study. However, the National Safety Council did not lend any financial support to the study.

The next step was to develop the most effective and the least costly method of contacting prospective organizations to request

permission to conduct research in them. Due to the large number of organizations of various sizes that exist in the Chicago, Illinois and Gary, Indiana industrial and urban area, it was decided to focus the study on this area.

To help explain the nature and extent of the proposed research, the researcher reasoned that it would be very effective to send a copy of the department supervisor's accident cost report form and the investigator's cost data sheet form along with the contact letter. These are the same forms that both Simonds and the National Safety Council used. Thus the personnel of the contacted organizations could get some idea of the time and amount of work the forms would demand, for the study was designed to record raw data on these forms. A copy of the department supervisor's accident cost report form and the investigator's cost data sheet form, as actually used in the study, are included and illustrated in Appendix A.

Since the nature of the study was to establish cost figures unique to a given organization generated from a pilot study program, it was not necessary, from a research design point of view, to select prospective organizations to be researched by any random technique.

The specific organizations to be contacted were selected from the researcher's acquaintance with the organizations in the Chicago-Gary area, a list generated by the National Safety Council, and from various directories such as Standard and Poor's "Directory of Organizations" and Moody's directory of industrial concerns.

If an organization's key person indicated enough interest in the proposed research to invite the researcher to the corporate offices to further explain the proposal briefly described in the contact communication, the researcher met the responding person or persons and further explained the nature of the study and assured the organization's personnel that most of the work of gathering and interpreting data would be done by the researcher. It was further explained that the only work the research required of the personnel of the organization was to make its files available to the researcher and to follow up the lost-time accidents, a practice utilized by most organizations anyhow. During this meeting the researcher assured the personnel of the cooperating organizations that he would furnish all the necessary forms and explanatory literature. Also during this meeting it was explained that the study was to have a duration of five months in order to allow major as well as minor accidents time to occur and to make the sample statistically valid for the organizations. Based on the Simonds experience, it was pointed out that after 60 first-aid cases had been recorded, the most numerous kinds, this phase of the research could be stopped and then the research could concentrate on the remaining types of accidents. Thus enough samples would be generated to yield typical accident costs of first-aid cases and at the same time unnecessary gathering of redundant material would be eliminated.

Once the researcher was granted permission to conduct a study in an organization, he then asked to be shown the organization's method of recording facts about accidents. This was done in order

to determine what historical data was available and to be able to design a specific research process to generate new data most effectively.

During this personal visit to the organization it was determined, with the cooperation of the organization's personnel, how many instruments would be needed to record the anticipated data. This was done on the basis of analyzing the historical records of the organization, estimates by the organization's personnel and reference to nationally typical figures when they were available.

The nature of the proposed study thoroughly explained to the personnel of the cooperating organizations and the research instruments delivered so that they could be distributed to foremen, supervisors and other personnel who were in a position to record information on accidents as they occurred, the researcher then allowed a month to elapse before revisiting the studied organizations. He did this in order to allow enough time for a significant number of accidents to occur and be recorded.

Since four of the cooperating organizations, the two utilities, one of the hospitals and one of the manufacturing organizations, had insisted on doing all of the data gathering and calculations themselves so as to gain experience with the method, the researcher decided to write up and print a brochure describing the reasoning on which accident cost analysis was predicated and attaching a step-by-step explanation of the method of calculating the cost factors that the research instruments called for. This explanation of the method of calculation was copied verbatim from Simonds. The descriptive

material was bound and given the title "Accident Cost Analysis Guidelines." A number of these brochures were supplied to each cooperating organization so that its personnel could have a constant source of guidance. Although the material contained in the booklet was explained to the cooperating personnel orally, it was felt that due to the large volume of information it would be helpful to furnish written instructions and explanations that could be quickly checked in time of need. A sample copy of the booklet is included in Appendix A.

Five months after the granting of permission from the last organization to conduct research in it the research project was terminated. The data was collected in person by the researcher. During these visits to collect the data the researcher held an analysis meeting with the personnel of the cooperating organizations. The meetings were devoted to the explanation of the methods of analysis that would be utilized in assessing the data, evaluations of the problems that the personnel may have had with understanding the raw data and a discussion of the problems that may have been unique to a given organization.

There were varying degrees of helpfulness among the personnel of the organizations whose top executives had decided to cooperate in the research. This ranged from a willingness to do all the collation and calculations while stating that they had wanted to conduct such a study themselves to minimal cooperation because the research was ordered to be undertaken by top management.

To further explain the research activities in the field of study it is deemed best to do so by each individual organization. In order to do that, to simplify matters, and to help streamline the contents of the tables to be presented in Chapter V, the coding as illustrated in Table 1, p. 31, will be adopted.

Organization I

The key contact person in this organization was a staff specialist in hospital safety and a consultant to a number of hospitals in the Indiana, Illinois, Missouri, Iowa and Wisconsin region. He maintains an office in the hospital and administers the organization's safety program. The safety specialist decided not to give direct access to the files and records of the organization to the researcher. Instead, he established guidelines of operation. Whenever the researcher wanted to check on the progress of the research or retrieve some information from organizational records, he was to make the request to the safety specialist. The specialist in turn would arrange for the preparation of the data which the researcher would pick up in person. If there was any need for clarification and the specialist could not furnish the same, then the entire cycle of information retrieval was repeated.

This organization did not have an accounting procedure for tabulating no-injury type of accidents. For historical information, data had to be collated from various accounting files.

Table 1.--Coding of organizations.

Organization Number	Industry
I	Hospital (Catholic)
II	Hospital (Protestant)
III	Utility (Large)
IV	Utility (Small)
V	Manufacturing (G)
VI	Manufacturing (M)
VII	Manufacturing (B)

Organization II

The researcher worked directly with the personnel manager of the organization. Having thoroughly familiarized this person with the details of the research to be conducted, the researcher provided the research instruments, "Accident Cost Analysis Guidelines" brochures for all supervisory personnel, and helped draft a memorandum which was distributed to all supervisory personnel during an orientation session conducted by the personnel manager. The memorandum is presented as Illustration 1 on page 32. Any problems connected with the research were handled directly by the personnel manager. Whenever information, such as departmental pay averages, had to be secured, the personnel manager went through the files and the records of the organization with the researcher until both were satisfied that the desired information was correct. This direct

Illustration 1

MEMORANDUM

TO: All Division and Department Directors

FROM: (Name) Hospital Administrator

RE: Accident Cost Study

DATE: September 20, 1971

Attached is a supply of forms which are to be used from October 1, 1971 to April 1, 1972 as a part of a study on accident costs.

Each time it becomes necessary for you to fill out an EMPLOYEE ACCIDENT REPORT, please fill out the DEPARTMENT SUPERVISOR'S ACCIDENT COST REPORT simultaneously, clip together and forward as usual.

It is important to understand:

1. This study is for only the above period of time, and is not to be a permanent duty.

2. The purpose is to find out the average cost for each type of accident, not to compare departments or to seek ways of handling accidents at a lower cost.

3. You should not hesitate to make rough estimates as to cost. If some of the estimates are too high and others are too low, the averages may be very satisfactory.

4. You need not be concerned over the possibility of checking the wrong accident classification in making out these reports, but be sure to report all accidents.

Additional forms may be supplied by the Personnel office as needed.

abc

contact and personal involvement in the gathering and analysis of the data continued throughout the research period. If, despite this help, the researcher still needed clarification, he was allowed to speak personally to the person most suited to respond.

No-injury accidents were not recorded as such in the form of a special account. For the purposes of the research a special effort was made to use the supplied instruments. Historical information could be retrieved from various accounts that recorded time expended and cost that could be traced back to an accident. Because these accidents were historically infrequent and because there were no state or federal regulations requiring that they be recorded, the no-injury accidents were not recorded separately.

Organization III

After replying in a letter that he had received the initial missive of the researcher and had taken it under advisement, the president of this utility, which operates and renders its service in the four states of Iowa, Illinois, Indiana, and Wisconsin, passed on the introductory material to two vice-presidents, four division managers and a public relations official. The public relations man arranged an interview for the researcher with a senior administrative assistant in the department of safety. At this meeting details of the research which were not and could not be explained in the initial cover letter and subsequent telephone conversations were thoroughly explained. The senior assistant took the matter under advisement and decided to discuss it further with his superiors. A few days later the researcher was invited back to the headquarters of the organization to discuss the implementation of the study. During this meeting the four categories of accidents were again explained so that the senior assistant could picture in his mind how this matched up

against the unique language that the organization was using. Various alternative ways of gathering the data were discussed. Due to the far flung nature of the organization's operations, the senior assistant decided that it would be most efficient if the researcher addressed his communications only to the headquarters office. The senior assistant was reluctant to allow the researcher to visit field offices. All accident reports in the organization were funneled to the headquarters office, but the researcher was not allowed free access to them. For reasons of security and an unwillingness to take the time to teach the researcher about the nuances of the filing and recording system, the senior assistant decided to assign clerical help to generate the information needed. The researcher was directed to address his requests for information to the senior assistant. The senior assistant would then delegate the task to his staff, the staff would find the information and give it to their superior, and the senior assistant would then either mail the material to the researcher or invite him to the headquarters offices to pick up the material, depending on the material and how much oral explanation it needed.

This organization had a system of recording no-injury accidents that cost over one hundred dollars. The costs of lesser accidents had to be developed from various other accounts. For purposes of the research, no-injury accidents were recorded according to the Simonds categorizations.

Organization IV

Here the researcher worked directly with the safety manager. After a thorough discussion of the proposed research, the researcher and the safety manager worked out the details of implementation. The safety manager was familiar with the Simonds method and wanted to do all of the data gathering and calculations himself so as to gain more experience with it. He agreed, however, to allow the researcher to check the calculations and to use the files and records of the organization. The right to visit the organization was granted the researcher. Visits to field operations were allowed. Every time the researcher visited the organization a secretary was assigned to assist him.

This was the smallest organization studied. Its record keeping procedures and methodology were less involved and complete than that of larger organizations, perhaps because the safety manager could keep a personal eye on accidents with relative ease. There was no formal method of recording no-injury accidents, although the safety manager could readily collect information on such accidents from various cost accounts.

Organization V

This organization is a regional plant of a large corporation whose operations are scattered nationwide. The plant manager indicated an interest in cooperating with the research upon first contact. The task of implementing the research was delegated to a general administrative assistant among whose tasks was the one of keeping safety records. The researcher familiarized this person with the

nature of the research, supplied him with "Accident Cost Analysis Guidelines" brochures and data gathering instruments. Then he secured permission to make repeated visits to the organization to check on the progress and the accuracy of the data gathering. At the conclusion of the research the administrative assistant and the researcher held an evaluation session.

This organization used no specific method of recording no-injury accidents unless such accidents caused obvious, sizable capital expenditures. Then they would be recorded in the capital expenditure account. The feeling of the administrative assistant was that lesser cost no-injury accidents were not worth bothering to record. He stated that most such accidents were hidden and absorbed in general production costs by way of what he termed a "fudge factor." For example, if a pallet of materials were dropped by the tractor carrying it and the materials and the pallet were damaged, this material and pallet would be replaced and the damaged items simply absorbed by the production costs of the department in which the accident occurred.

Organization VI

In this organization the researcher worked directly with the personnel manager. This manager distributed copies of the research instruments and descriptive literature to all supervisory personnel during an orientation session called to explain the nature of the study. Due to sensitivity about outsiders looking through the files and records of the organization, and due to the unique way of recording and retrieving information, the researcher was not allowed direct access to the files and records of the organization. All of

the researcher's requests for information were honored, but every time he did request information he had to contact the personnel manager who in turn arranged to have a secretary or an assistant generate the desired information. Unless the information was voluminous and required oral explanation (in which case the researcher picked up the material in person) the information was mailed to the researcher. At the conclusion of the data gathering session, the personnel manager and the researcher held an evaluation meeting to clarify any irregularities or questions about the data.

This organization did not have a specific method of recording no-injury accidents. As in the case of other organizations, such information was pieced together from various cost and time accounts.

Organization VII

The cooperation of this organization was secured through the efforts of the National Safety Council. The organization is a diversified manufacturer whose operations are scattered throughout several states. The implementation of the research was delegated by top management to the corporate safety manager whose office was in the general offices of the corporation. He was the only executive of the corporation that the researcher ever met. Since the safety and accident data of the corporation was funneled to the general offices, the corporate safety manager felt that there was no need to go through the extra red tape of securing permission and making arrangements for the researcher to visit individual operating plants and regional offices. It was felt, probably correctly, that any questions about

procedure, unclear data, etc., could be cleared up more quickly by the direct action of the corporate safety manager rather than to have the researcher attempt to work with the complexities of the corporation's hierarchy and procedures. Thus the researcher was not allowed direct access to the files of the organization. All his requests for information were honored. However, he had to put every request into written form and submit it to the corporate safety manager. This person would in turn either generate the information himself or have one of his aides, assistants or secretaries do it. Then the information would be passed on to the researcher. At the conclusion of the data gathering period the researcher and the safety manager held the routine evaluation session before submitting the data to analysis.

This organization followed the pattern of the others in that it did not have a direct way of recording no-injury accidents. The primary reason for the practice given was that since there are no strict federal, state or local regulations governing such record keeping, there is no urge to develop a record keeping system for it. Also, since most of such accidents were viewed to be low cost and since the dollar figures of higher cost items could be ferreted out by studying various cost and time accounts, it again was felt that there was no practical need to develop a categorization and formal reporting system for no-injury accidents.

CHAPTER IV

ANALYSIS OF THE DATA

The research period for all organizations ended, the researcher held evaluation sessions with his contacts in each organization. This was done to make certain that everything had been done as designed and that the data and calculations reflected in the research instruments represented as accurately as possible the true nature of the costs of accidents that had occurred and had been recorded. Then the researcher created a master file for each organization in which to collect and store the hundreds of sheets of material that had been generated by the research. The organizations individualized, the next step was to separate the four categories of accidents for each organization according to the Simonds categorization:

A. Class 1--Lost-Time Cases--(Permanent partial or temporary total disability).

B. Class 2--Doctors' Cases--(Temporary partial disability or medical treatment case requiring outside physician's care).

C. Class 3--First-Aid Cases--(Medical treatment case requiring local dispensary care).

D. Class 4--No-Injury Cases--.

Once the accident cases had been separated, each category for each organization was mathematically averaged to derive the arithmetic mean of the cost of a particular type of accident. Then the data were

submitted to a standard error of the mean test (standard error of averages) to test the reliability of the averages. This methodology was utilized because the Imre study was designed to be a replication of the Simonds study and Simonds used the quantitative methodology. To insure replication and make data comparison valid, Imre adopted the Simonds technique exactly. A discussion of the general considerations that influenced both the Simonds and Imre studies and the detailed description of the techniques of analysis used follows.

This study as well as the Simonds study utilized the technique of exhaustively recording data about four types of accident categorizations during a pre-established time period, in a finite number of organizations, within a finite number of consciously selected industries, the organizations exhibiting a preselected difference in size.

The mathematical averaging utilized by the Simonds study was also utilized by the Imre study. Then the data were submitted to a standard error of the mean test (standard error of averages) to test the reliability of the averages, in both the Simonds and Imre studies.

The formula for calculating the standard error is:

$$\text{Standard Error} = \sqrt{\frac{\Sigma X^2 - \Sigma X\overline{X}}{N - 1}}$$

N = number of cases in the sample

X = cost of an individual case

$\overline{X}$ = average cost

Σ = "sum of"

By utilizing this test on the data there is a 95 percent probability that the means of two thirds of the samples would be within two standard errors of this mean and so it can be inferred that it is probable that the mean of the population is within two standard errors to 95 percent of the cases.

If there is a large variance in cost within a given class of accidents, the "Law of Large Numbers" (also referred to by some as Bernoulli's Theorem) should be invoked. That is, a large number of cases should be analyzed in order to be able to develop an acceptable typical pattern of costs. Sufficient data in each categorization should be gathered so that the average costs would realistically reflect historical occurrences. For reasons of statistical accuracy the samples used in each category must be truly representative of past history and typical of the accident history of the organization being studied. Furthermore, data from all cases occurring in a given pilot study period must be recorded to eliminated human bias in the selection of a sample.

Even with the human bias of slanting the data eliminated, there might exist the possibility of a bias creeping into a pilot study of a limited time duration due to seasonal fluctuations in accident experience. Where seasonality might be a real factor, such as in telephone and powerline maintenance in the Midwest or other outdoor work, it would be most accurate to generate data for analysis in such a manner that all seasonal factors are accounted for. And, if possible, longitudinal studies should be conducted to ascertain if there are significant differences in seasonal influences from year

to year. Major blizzards, for example, do not devastate the Midwest every winter and it is rare for extensively damaging storms to strike exactly the same locations repeatedly.

The timing of a given pilot study should be designed with the utmost judiciousness. If for no other reason, at different times during an organization's operations one will encounter varying levels of activity which in turn will have an impact on the elements of cost. This could be achieved by studying an organization while it was undergoing truly representative production activities yielding a typical rate and kind of output through the labors of the typical labor force. The Simonds studies indicate that varying levels of company operation have only a minor effect on the total average uninsured cost per case.[25]

The Simonds study was replicated directly by the general manufacturing portion of the Imre study. Since Simonds did not study hospitals or utilities, in these categories there was not a direct replication in the absolute sense but only in the sense that the same test instruments and the same study methods were used. Imre did not study the same industries that Simonds studied. Since the two studies were essentially of the same kind, a comparative analysis of the two sets of data could be made to ascertain how similar or different the data generated by the two studies were. The initial Simonds study was conducted in 1947. The Imre study was conducted primarily in 1971 and the first two months of 1972. Thus direct comparison of

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[25]Simonds and Grimaldi, p. 130.

this survey with t-e initial Simonds data could not be made without accounting for the factors of change that occurred during the years that separated the studies. The best way to explain how this adjustment to changes over time would be made is to quote Simonds directly:[26]

> Since wage rates, materials, and medical costs usually reflect current general price levels, the average cost figures could be adjusted from time to time by means of a price index such as that of the Bureau of Labor Statistics. The currently growing trend toward wage contracts tied to the Consumers' Price Index prepared by the Bureau of Labor Statistics provides an additional reason for regarding that as a satisfactory index for the purpose.
>
> On the other hand, there are reasons for believing a wage index to be even more accurate for adjusting average costs of earlier years to a current period when substantial changes have occurred in wage levels.

Simonds goes on to say that this position is taken because he found that wage costs were the major factors in uninsured costs. He specifically points out that his study revealed that 85 percent of the total uninsured cost found in the lost-time cases studied was attributable to wage cost while 75 percent was a wage cost in doctors' cases. Thus Simonds recommends an index of relative wage levels as being the most useful method of updating average costs for lost-time and doctors' categories.

In attempting to update the cost elements of first-aid cases Simonds encountered some difficulty in applying a relative wage index. This stemmed from the fact that his studies revealed that approximately 39 percent of the total first-aid cost was attributable to wages and approximately 60 percent attributable to medical cost. Because of this mix of costs Simonds suggests that a medical cost index as well

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[26] Ibid., pp. 563-564.

as a wage index be used in updating first-aid cases. He further recommends that the relative changes in the two indexes be calculated and the two to be averaged.

For no lost-time cases Simonds proposes to use the same index he used for the first-aid cases. He found that in the former there were slightly higher medical and a little lower wage factors. But in his mind the cost splits were similar enough to use the same method of updating. He further argued:[27]

> That average index, weighing medical services and wages equally, is probably sound, because the cost of medical services in industry is likely to be influenced a little more by industrial wage levels than is the cost of medical services in general.

Approximately 80 percent of costs were attributable to property damage in the no-injury cases of the Simonds study. But after an in-depth analysis of the cases Simonds discovered that a great deal of the so-called property damage costs is in reality accountable in terms of wages. He explains this point thus:[28]

> When a building, structure or a piece of equipment is damaged, the property damage cost is often what has to be paid for labor to repair the damaged item plus, perhaps, an added labor cost due to inefficiency resulting from operating temporarily without the use of whatever was broken. . When it is material in process that is damaged, if it was nearing its finished state, it is likely that labor represented a considerable portion of its value. Even if the damaged item was something purchased complete from another concern, it is reasonable to think that wage levels played at least an appreciable part in determining its price. For these reasons, it will probably generally be satisfactory to use the wage index for adjusting no-injury case costs.

After carefully examining possible objections to his reasoning, Simonds takes the position that the most significant possible

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[27] Ibid.

[28] Ibid.

objection to his updating reasoning would be that over the long-run of years production efficiency increases could pose the possibility of wage rates rising more rapidly than the price of manufactured goods. Simonds defends against this possibility:[29]

> If this situation should eventually lead to a slight overenlargement of the average no-injury cost figure, the error would be small and, as a matter of fact, probably not even enough to offset the very minor no-injury accidents (below $20 or eight man-hours) that are omitted entirely in this estimating procedure.

Simonds recommends several reference sources from which to derive the suggested indexes. For example, in the Monthly Labor Review journal published by the U.S. Bureau of Labor Statistics he recommends the index of "average hourly earnings, gross and excluding overtime, of production workers in manufacturing industries." Each issue of the Monthly Labor Review contains and displays the data for the preceding few years and for the most recent months for which it has been compiled. The U.S. Statistical Abstract includes the same table. However, it is not published monthly. Therefore it is not as current and gives yearly figures for many years back. The table gives the wage figures both in index numbers and in actual dollars. The Monthly Labor Review also contains the medical cost index as an index of the cost of medical care. The U.S. Bureau of Labor Statistics' Handbook of Labor Statistics also contains these indexes as well as various other reference works.

To compare the cost figures of a study to the Simonds data, one has to utilize his rationale and the March, 1962 cost indexes he

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[29] Ibid.

used to calculate his most recent cost figures. These indexes are: (a) Wages $2.31 and (b) Medical cost 113.6. These two indexes have to be utilized by means of the following updating and averaging, utilizing the March, 1962 Simonds figures updated to 1971 wage and cost levels to bring it into the period of the Imre study:[30]

$$\text{1971 wage } \$3.55 \text{ / March '62 } 2.31 = 1.54$$ multiplier for lost-time cases, doctors' cases, and no-injury accidents.

$$\text{1971 medical cost index } 122.2 \text{ / March '62 } 113.6 = 1.08$$

$$\frac{1.54 + 1.08}{2} = \frac{2.62}{2} = 1.31$$ multiplier for first-aid cases and no-lost-time cases.

The 1971 wage and cost indexes were taken from the Monthly Labor Review of the U.S. Bureau of Labor Statistics. Simonds uses a rule of thumb as to when data need to be adjusted to the wage and cost levels of any given year following his basic study, suggesting that any change of 5 percent or less is negligible. Since the indexes are reflections of the average changes in wages and costs, the Imre study utilized the same rule in determining whether a given change from year to year was significant enough to warrant updating the entire cost data. A portion of the Imre study extended into the first two months of 1972. The writer debated whether or not to update both the Simonds and Imre figures to reflect the 1972 cost levels. However, he decided against it for two reasons. First, the study covered such a small part of 1972 that the 1972 indexes would not truly bear on it. Second, the wage and medical cost index differences between 1971 and 1972 in the Monthly Labor Review

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[30] Ibid., p. 565.

of the U.S. Bureau of Labor Statistics are both less than 5 percent and thus are considered neglible under the Simonds rationale. Therefore, the 1971 cost figures were used and the Simonds data was updated to the 1971 level to make direct comparison possible. Another reason for adopting the Simonds technique of index updating is that the Imre study results generally support the Simonds findings. Imre agrees when Simonds[31] states that wage costs tend to be the dominant element in uninsured costs. Simonds found that 85 percent of the total uninsured cost found in the lost-time cases studied was a wage cost; Imre found this to be approximately 73 percent. Simonds found that 75 percent was a wage cost in doctors' cases; Imre found this to be approximately 68 percent. In the no-injury category Simonds found that about four firths of the cost were attributable to property damage; Imre found roughly the same pattern. And the same parallelism was true for the first-aid cases. Thus, while the two studies differed somewhat in absolute measure, their general findings were very similar. To aid in further understanding the Simonds study and the Imre study, the relevant data were tabulated and will be presented in the remainder of the main text as well as in Appendix B which will contain tables dealing with supplemental material. The tables contain the tabulation of the data generated by each of the two studies, the updating of the Simonds data and the comparison of the two.

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[31] Ibid., p. 563.

Simonds suggests that perhaps the chief variant is the average wage paid by the different concerns, as mentioned earlier.[32] The Imre study supports the general suggestions, as an examination of the cost element tables will reveal, but also reflects that the nature of the operations seems to have a strong influence also. For example, the large utility appears to have greater average costs than the other organizations studied by Imre. Simonds discovered another pattern of variance in his study:[33]

> Doctors' and first-aid case costs also will vary somewhat in accord with the amount of time typically lost by an injured worker in visiting the medical dispensary or otherwise obtaining first-aid. The governing factors here are the relative distance he has to go, how long he has to wait for attention, adequacy of supervision, wage payment plan, or general morale to get him back to work without unreasonable delay.

This researcher agrees with Simonds. He found much the same variables influencing costs. Two of the small companies studied by Imre tried to standardize their medical costs and provide professional care for all employees but those operating in the field far away from the main plant. They did this by referring all injury cases to local doctors whose offices were within walking distance of the plants. There was an agreement between the organizations and the doctors as to the standard rate to charge for treatment that did not involve significant surgery and other complex medical care. This figure was a minimum charge of $10.00 per visit. Minor scratches, bruises and bumps were not considered serious enough to be referred to the doctors and were treated in the plant, if at all.

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[32] Ibid., p. 569.

[33] Ibid.

The large utility had well staffed and well supplied dispensaries in its various major plants and had a referral relationship with doctors in various cities for the treatment of more serious injuries.

At the hospitals studied the minor injuries were often treated by the staff and registered nurses on duty. More serious cases and cases that the nurses were not certain of being able to treat were attended to by resident doctors, doctors on duty in the emergency room, and in some cases by the family doctor of the injured person because the doctor happened to be in the hospital at the time of the injury. This was made possible by the fact that the two hospitals studied were located only a short distance from each other (approximately seven blocks), serving the same general urban area, drawing upon the same labor pool and being utilized by the same local surgeons, generalists, and specialists. This similarity is also reflected in their wage structures which were very close to one another. The professionals serving both hospitals had the same technical training and were bound by the same professional and ethical standards. They could not very well vary the charges for their services from one hospital to the other, and the insurance industry was a stabilizing influence in equalizing hospital and medical costs. Variances can be explained by such factors as relative differences in seniority, differences in the types of services being offered, the degree of unionization of the employees and the fact that one of the hospitals had religious people such as nuns, orderlies and priests working at very minimal wages. The relative amounts of gifts, grants, endowments

and other donations that the hospitals received would also have an effect on the variances. The researcher could not secure any information on these figures. And, of course, variances in the data of the two hospitals, as well as the other organizations, can be explained by inaccuracies in the collection, calculation, tabulation, recording and other processing procedures as well as the recollections of organizational personnel.

The researcher discovered that people who filled out the research forms tended to round off the figures to the nearest tenth or whole dollar or nearest quarter or half hour. This would not have been unusual except for the fact that the rounding typically occurred toward the higher side. Although each individual item was small, when one cumulated the hundreds of entries of the total figure it became a significant factor. It is impossible to pinpoint or quantify the exact degree of this practice. But its influence is present.

In the case of the large utility it is appropriate to comment about the nature of its operations as it might explain, in part, the characteristics of its costs of accidents. While the corporate headquarters of the organization are in Chicago, its operations are scattered in several states. Thus, in part at least, its cost structures reflect the workmen's compensation laws and other differing regulations of the various states. Its lines, regional and divisional plants, service centers, equipment pools, supply stockpiles, booster stations and related service units are scattered throughout these states with the heaviest concentration clustering around Chicago. It has a large fleet of service vehicles as well as heavy construction

machinery which are generally on the road or on utility right of ways the year round. There are numerous field crews to service the lines, to maintain them in good operating condition, and to operate all the moving machinery. Much of the work is done out of doors, under all climatic conditions. In fact, the field crews generally experience their most trying tests when the weather is extreme and causes physical and electrical damage. Thus the peak periods of field operation are after a heavy snow storm, ice storm, flood, or high wind storm, aside from considering the problems of new installation. During these crisis periods overtime pay mounts up. From a logistical point of view, it is very difficult at these times to give aid and medical attention to people injured under these extreme climatic conditions generally in a rural area or metropolitan region far away from a medical facility. This is to be contrasted with the other organizations that Imre studied. The operations of the hospitals and manufacturing organizations and their employees were generally under one roof or in a tight cluster of interconnected buildings. The small utility, while having a somewhat scattered operation, dealt with a less complicated service and was dwarfed in comparison to the large utility.

The interstate nature of the large utility's operations complicate its attempts to carry its own workmen's compensation insurance. Imre's study of the large utility bears out Simonds' findings:[34]

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[34]Ibid., p. 105.

> Some of the very large companies have found it cheaper to carry their own insurance and large enough to be able to stand the risk. Even such concerns, however, often do not carry their own insurance for all of their operations. For example, one concern that is self-insured for its major activities located in one state pays premiums to an insurance company to cover a relatively small branch in another state. Its management has concluded that compliance with the laws of that second state and administering a small program for that branch would result in a total of administrative costs plus claim payments greater than the cost of the insurance premiums, although it effects substantial savings by carrying its own insurance in its home state.

As Simonds has pointed out to the researcher, it could be that some of the data was not collected by some of the organizations in the Imre study. Imre attempted to follow up on this possible source of deviation from the Simonds studies both during the period of the initial study and during the revisits. There were some small exclusions evidenced, but nothing that would have radically changed the average uninsured cost figures. This has to be analyzed with the knowledge that in three of the organizations key personnel, who had helped conduct the initial study, were gone from the organizations by the time of the revisit and that in other organizations the rechecks were made by the organization's personnel. That is, in the latter cases the researcher was not allowed direct access to the organizational records.

Average costs vary from organization to organization within an industry and between industries due to a wide variety of factors that make each organization unique. Perhaps the most basic factor is the managerial philosophy of an organization as it pertains to the role of safety in operations. That philosophy will determine how the safety program in a given organization will be planned, promoted,

valued, and enforced. This in turn will have an impact on the attitudes and behavior of the workers; these will influence the accident experiences and costs.

CHAPTER V

INTERPRETATION AND CONCLUSIONS

Prior to making an exhaustive comparative analysis of the findings of the Simonds and Imre studies, the researcher feels he should make general comments on these findings. The intention is to give the reader a capsulation of the findings in order to avoid possible confusion as to the main thrust of the many pages of analytical discussions that are to follow. While there were both similarities and differences in the findings of the two studies, the most significant feature perhaps is the degree to which the two samples do compare, particularly as to total costs and as to what factors played significant parts. Since there is this close similarity, the descriptive essay dealing with the comparative analysis of the similarities of the two studies might be less extensive than that dealing with findings of differences. This is so in order not to merely repeat what Simonds has already said about the subject and thus avoid redundancy, although supporting reasoning different from that of Simonds will be included. Due to the fact that Simonds has written extensively on the subject and is quoted many times in this work, perhaps the reader might get the impression that the writer has emphasized the analysis of the differences more than the analysis

of the similarities. In the instances where there were differences between the two studies there was greater opportunity to say something new about the possible causes for the writer and a greater opportunity to speculate. It should be kept in mind that the differences are not very great and therefore their discussion, no matter how extensive or speculative, should not be taken as an attempt to refute or challenge the Simonds findings. In reading the passages dealing with the discussion of the differences one should bear in mind that it is very likely that a very significant portion of these apparent differences is due to variations in samples and inaccuracies in data gathering. For example, this would result in a partial lack of detailed consistency between cost elements between the Simonds and Imre studies.

This study was essentially predicated on a statistical sampling technique. This was also true of the Simonds study. Thus precise accuracy or direct comparability of the two bodies of data should not be expected. For example, when one study shows $35.91 to be the cost of a particular cost element and the other study shows this element to be $33.37, this is essentially the same result. However, the writer has also presented other <u>possible</u> theories in an attempt to explain these differences, knowing full well that the data may be better explained by simple differences in samples or minor differences in recording. He did this in order to pursue as many avenues of explanation as possible.

In the comparative analysis that is to follow the micro-to-macro approach will be used. That is to say, first the various

elements of the different categorizations will be comparatively analyzed. Then broader, overall analyses and discussions will follow. For the sake of consistency, the similarities of the two studies will be analyzed first to be followed by the analysis of the differences.

Elements of Uninsured Cost in First-Aid Cases

Please refer to Tabe 2, page 57 for basic data in following the analysis of this section.

The Imre study supports the Simonds finding that the first-aid cases had three major cost elements:

1. cost of supervisor's time,
2. medical sot to the organization,
3. wage cost of time lost by the injured worker.

For Simonds these three elements totaled 88 percent of the total cost figure, for Imre 70.48 percent. The average total uninsured cost figure for Simonds, in the all industry (except shipyards) categorization, is $9.83, and for Imre the all industry figure is $11.08. This lends close support to the validity of the Simonds research technique. It is interesting to note the total uninsured cost figures by industries as well. For Simonds the general manufacturing figure is $9.17, for Imre $10.06. For Simonds the metalworking manufacturing uninsured cost figure is $7.86. For Imre the hospital cost figure is $8.90 and the utilities cost figure is $16.78. The similarities in the costs continue even in non-related industries,

Table 2.--Composite display of the cost element data generated by the Imre and Simonds studies, utilizing first-aid cases (Simonds 583, Imre 372).

Cost Element	Percentage of Cases in Which This Cost Occurs		Average Cost (for all cases)		Percentage of Total Cost	
	Simonds	Imre	Simonds	Imre	Simonds	Imre
Wage cost for time lost by workers not injured	11%	18.00%	$0.13	$1.64	1%	14.80%
Cost of property damage	Negligible	0.00	Negligible	0.00	Negligible	0.00
Wage cost of time lost by injured worker	99	98.50	2.15	3.75	21	33.84
Cost of supervisor's time required in connection with accident	55	69.75	0.62	1.61	7	14.53
Wage cost due to decreased production by inured worker after return to work	1	0.00	0.26	0.00	1	0.00
Cost of medical attention	96	98.00	6.26	2.45	60	22.11
Workmen's compensation and insured medical expenses	2	0.00	0.17	Not Appl.	2	Not Appl.
Cost of investigation	7	17.00	0.68	1.63	7	14.71
"Other uninsured costs"	1	0.00	0.06	0.00	1	0.00

(The Simonds data was taken from Table C-5, Appendix, p. 577 of his Safety Management, adjusted by means of wage and medical indexes to reflect 1971 costs.)

with the utilities having the most divergent cost figure. In the general manufacturing category, the Simonds and Imre figures come closest in the first-aid cases. The utility data is the most different from the Simonds findings, Table 6, page 73.

The researcher offers the following conjecture, in addition to the previous cautionary comments, in explaining the divergence of the utility data. The people working out in the field for the utility are constantly exposed to high degrees of hazards. Many heavy, expensive, and complicated pieces of equipment and vehicles are used. The wage rates for the workers in this organization are relatively high. High first-aid costs may reflect the difficulty and therefore the high cost of treating people in the field. It certainly is quicker, easier, and more convenient to treat injured hospital employees in the hospital in which the injury occurred. The higher costs in the utility organization may also be a reflection of the "machismo" mentality. That is, in general, based on Imre's observations and discussions with organizational officials, the men in this organization, especially if they worked in the field, have an image of being tough and indestructable. If this mentality does exist, then one could argue that these men do not report scratches and minor injuries for which less rugged individuals might demand immediate treatment. They accept first-aid treatment for injuries where other individuals might require extensive doctor's care.

The above prompts speculation on the hospital data. It could be that a sort of inbreeding in thinking about the treatment of injuries may be operating in the hospitals. Since the facilities,

the personnel, medication and other inputs necessary for the treatment of an injury literally surround the workers of a hospital there might be a tendency to report and process larger numbers of injuries in all categories that would not be reported in other industries. It would be interesting to see if new studies supported this theory.

Imre had fewer cases to analyze than did Simonds. There were 583 cases in the Simonds study and 372 in the Imre study. A useful way to draw some additional conclusions from the two bodies of data is to look at the elements of cost, starting with "wage cost for time lost by workers not injured." In the Imre study the element occurred 7 percent more than in the Simonds study, 11 percent of the cases for Simonds and 18 percent of the cases for Imre. Imre's cases showed a relatively much higher average cost per case. The Simonds cost element is only 1 percent of the total cost while Imre's is 14.80 percent. This relative disparity could be caused by several factors. A clique system could be operating in the Imre data whereas such a social structure may not have existed during the period of the Simonds study. By this is meant the existence of small groups whose members all rush to the aid of the injured worker. It may be that during the Simonds studies the workers were more regimented by management and less apt to devote a great deal of time to responding to another person's injuries. The relative natures of the work involved could have had an influence. It may well be that in the Simonds cases, in general, the injured person was not seen by many fellow workers or if seen they could not leave

their work stations because of the demands of their jobs. The role of unions could have had a contributing influence. Particularly in the large utility and the largest manufacturing plant, of the Imre study, the unions were active and powerful. Unionized members may have felt more at ease to stop work and offer their help to an injured person no matter how minor the injury might appear to be without asking permission from the supervisory personnel. This could also help account for the differences in the "wage cost of time lost by injured worker" and the "cost of supervisor's time required in connection with accident" elements. In both cases the Imre study's costs are higher than those for Simonds. In the former element the average cost figure for Simonds is $2.15 and for Imre $3.75, and in the latter element the Simonds figure is $0.62 and the Imre figure is $1.61. The writer speculates that in a period when workers felt more independent and powerful they may not have been in as much a hurry to return to work as in earlier times when managements were more powerful and jobs were less secure. In such a shift of power the workers can demand attention to their problems from the supervisory personnel, and management personnel might respond to requests that in earlier years they may have dismissed as being trivial. The largest elemental difference between the Simonds and Imre studies occurred in the "cost of medical attention." The Simonds figure is more than twice as great as the Imre figure, $6.26 and $2.45 respectively. There are no readily evident causes for this outside of sample variances and recording inaccuracies. However, one can make some speculations. It is possible that the injuries of the

Imre study were less severe, particularly in pairing the medical cost element with the time lost element. This seems plausible for not only has there been a significant increase in safety legislation and programs since the Simonds studies, but technology has advanced at a rapid pace boosted by the demands of World War II. The equipment used during the period of the Imre study was better and safer than that used during the period of the Simonds study and safety equipment and devices were more numerous in the organizations Imre studied. This could mean that injuries during the Imre study period tended to be relatively less severe and less costly from a treatment point of view. Using the rationale of changed social consciousness again, the higher medical cost of the Simonds study could indicate that at that time workers did not report minor injuries or applied self-remedies, seeking help only when it was very necessary and thus entailing significant medical cost. In the period of the Imre study the workers may have sought care for even slight scratches, knowing full well that medical attention was not really needed. In the process they consumed their time, the time of their fellow workers, and the time of the supervisory personnel. The fact that Imre did not find any figures in his study for the cost elements of "wage cost due to decreased production by the injured worker after returning to work" and "workmen's compensation and insured medical expenses," while Simonds has some very slight figures, $0.26 for the former and $0.17 for the latter, is probably attributable to random factors rather than significant differences between the two studies.

Elements of Uninsured Cost in Lost-Time Cases

Refer to Table 3, page 63 for the basic data used in the analysis of this section. The Imre study supports the Simonds finding that the lost-time cases had five major cost elements:

1. wage cost of workers not injured,
2. cost of property damage,
3. wage cost of time lost by injured worker,
4. cost of investigation and processing of compensation forms,
5. medical cost not insured.

For Simonds these five elements totaled 79 percent of the total cost figure, for Imre 66.21 percent. The average total uninsured cost figure for Simonds, in the all industry (except shipyards) categorization, is $200.20, and for Imre the all industry figure is $176.17. This lends strong support to the Simonds findings and reinforces the validity of his research technique. It is fruitful to examine the total uninsured cost figures by industries as well. For Simonds the general manufacturing figure is $200.20 and for Imre $138.22. For Simonds the metalworking manufacturing and naval shipyeards figures are $200.20 and $161.70 respectively. For Imre the hospital and utility figures are $114.49 and $230.22 respectively. As in the first-aid cases, the similarity of costs continues even in non-related industries for the two studies with the possible exception of the Imre study's hospital results. Here the cost figures differ quite significantly from the Simonds findings. The

Table 3.--Composite display of the cost element data generated by the Imre and Simonds studies of manufacturing organizations, utilizing lost-time cases (Simonds 142, Imre 122).

Cost Element	Percentage of Cases in Which Item Occurs		Average Cost Among All Cases		Percentage of Total (Uninsured Cost)	
	Simonds	Imre	Simonds	Imre	Simonds	Imre
Wage cost of workers not injured	43%	27.00%	$41.15	$ 3.87	20%	2.20%
Cost of property damage	20	26.30	14.52	16.60	7	9.42
Wage cost of time lost by injured worker	83	74.50	55.07	47.08	27	26.73
Extra cost for overtime work	4	11.00	10.09	28.25	5	16.04
Cost of supervisor's time	86	91.75	11.49	13.01	6	7.38
Wage cost due to decreased output from injured worker after return to work	12	18.40	11.90	12.26	6	6.96
Wage cost of learning period of new worker	18	13.00	8.87	6.00	4	3.41
Cost of investigation and processing of compensation forms	92	90.00	34.90	15.72	17	8.92
Medical cost not insured	52	48.75	35.91	33.37	8	18.94
"Other uninsured costs"	0	0.00	0.00	0.00	0	0.00
Total "direct" cost (Compensation and insured medical)	These two categories were not adjusted because the Imre study did not incorporate the categories in its data. Therefore, there cannot be any direct comparison.					
Total cost						

(Simonds data was taken from Table C-3, Appendix, p. 576, Updated to reflect 1971 price levels.)

utility cost figures of the Imre study come the closest to the cost figures of the Simonds study. Figures were taken from Table 6, page 73.

The most striking difference between the Simonds and Imre studies occurred in the "wage cost of workers not injured" cost element category. The average cost figure for Simonds is $41.15, for Imre $3.87. This large difference is very likely due to the failure of the latter study to include data on this, plus perhaps some differences in sampling. In a further attempt to explain this very large difference (in relative terms), the writer refers back to the social milieu hypothesis presented in the section dealing with first-aid cases. It could very likely be that once an accident became so serious and destructive that it threatened lives even an autocratic management could not and would not prevent workers from reacting and rushing to help. The degree of seriousness for the Simonds cases should be greater than for the Imre cases. This appears to be supported by the element "cost of investigation and processing of compensation forms." This category is roughly the equivalent of the "cost of investigation" in the first-aid cases. There is an apparent reversal of these costs in the two studies. This could be interpreted to mean that even though safety programs and recording systems were less sophisticated during the Simonds study than during Imre's, the cost of investigation was higher. This might indicate that the accidents investigated were more serious and more costly. This would tie in with the earlier argument (in the analysis of the first-aid cases) that only the most serious accidents were

reported during the Simonds study. This is further supported by the fact that the Simonds figure for the cost element "wage cost of time lost by injured worker" is significantly higher than the figure yielded by the Imre study. The figure for Simonds is $55.07, for Imre $47.08. Another cost element where the Simonds and Imre studies differ significantly is the "extra cost for overtime work." The cost figure for Simonds is $10.09, for Imre $28.25. This could be due to several factors aside from sample discrepancies and inaccuracies in recording data. It may be that the Imre study recorded more accidents dealing with key personnel and special pieces of equipment whose loss of production could not be absorbed by the other employees or machines during the standard working day. It may also be that a powerful work force refused to absorb extra work by speeding up its own work rate but instead elected to catch up with lost production time at overtime rates. The element dealing with property damage reveals a cost figure of $14.52 for Simonds, $16.60 for Imre. The difference is not significant enough to warrant any special comment except to say that the Imre figure is slightly higher and could have been caused by random factors. This is also true of the cost element category "wage cost due to decreased output from injured worker after return to work." The Simonds cost figure is $11.90 and the Imre cost figure is $12.26. It is interesting to note that the cost element "cost of supervisor's time" is higher for Imre than for Simonds, $11.49 for Simonds and $13.01 for Imre. This is probably due to the fact that in a switch from autocratic leadership to follower-centered leadership the supervisor had to spend relatively more time in

calming down and getting expert aid for the injured worker, getting the other workers to return to work, explaining matters to union officials, and communicating details to the various echelons of higher management. In the "wage cost of learning period of new worker" cost element the relatively greater Simonds figure ($8.87 for Simonds, $6.00 for Imre) might be a result of the fact that the labor force of the Imre study was comparatively more educated and sophisticated and the engineering of the machinery and work processes more in tune with the abilities of a broader population sample. The primary reason for Simonds finding a slightly higher figure for medical costs not insured ($35.91 opposed to $33.37) was probably that the profession of medicine had advanced to the state that for comparable wounds it would have taken less treatment, time and medication in the Imre study and the diagnosis would probably have been more accurate.

Elements of Uninsured Cost in Doctors' Cases

Refer to Table 4, page 67 for the data discussed in this section. The Simonds finding that the Doctors' cases had four major cost elements was supported by the Imre study:

1. wage cost of time lost by injured worker,
2. medical cost not insured,
3. cost of investigation and local processing of compensation forms,
4. other uninsured costs.

For Simonds these four cost elements totaled 81 percent of the total cost figure, for Imre 73.85 percent. The average total

Table 4.--Composite display of the cost element data of doctors' cases in the Simonds (272) and Imre (249) studies.

Cost Element	Percentage of Cases in Which This Occurs		Average Cost Among All Cases		Percentage of Total Uninsured (Indirect Cost)	
	Simonds	Imre	Simonds	Imre	Simonds	Imre
Wage cost of time lost by workers not injured	27%	24.00%	$ 4.94	$ 3.33	9%	8.73%
Cost of property damage	5	0.40	0.31	0.00	Negligible	Neglibible
Wage cost of time lost by injured worker	95	97.00	11.00	9.96	20	26.14
Extra cost for overtime work necessitated	1	0.00	0.31	0.00	Negligible	0.00
Cost of supervisor's time required	73	68.50	2.73	5.63	5	14.77
*Wage cost due to decreased output from injured worker after return to work	9	12.45	2.93	1.02	5	2.68
Wage cost of learning period of new worker necessitated by accident	1	0.00	0.31	0.00	Negligible	0.00
Medical cost not insured	80	86.75	10.29	12.09	19	31.91
Cost of invesitgation and local processing of compensation forms	89	63.40	15.23	6.10	28	16.00
"Other uninsured costs"	1	0.35	6.56	0.00	14	Negligible
Total uninsured cost						

(The Simonds figures are taken from Table C-6, Appendix, p. 577 of his Safety Management, adjusted by means of wage and medical cost indexes to reflect 1971 cost levels.

*The Imre study's wage cost due to decreased output from injured worker after return to work is based on the data of the 31 cases in Organization #6.

uninsured cost figure for Simonds, in the all industry (except shipyards) categorization, is $53.90, and for Imre the all industry cost figure is $38.13. As in the previous two accident classification sections, this cost similarity lends appreciable support for the Simonds findings and the validity of the Simonds methodology. This is particularly true in inter-industry cost comparisons. For Simonds the average uninsured cost figure in the general manufacturing category is $43.12, for Imre $37.11. For Simonds the metalworking manufacturing uninsured cost figure is $46.20. For Imre the cost figures for the hopsitals and the utilities are $37.00 and $40.33 respectively. The Imre cost figures do not range very much from each other. They are closest to the general manufacturing cost figure, although they are lower than any of the Simonds figures. The greatest difference is between the Imre average uninsured cost figures and the Simonds all industry (except shipyards) figure. Figures taken from Table 6, page 73.

The greatest difference between the Simonds and Imre data is in the cost element "cost of investigation and local processing of compensation form." The cost figure for Simonds is $15.23, for Imre $6.10. The writer alludes to his earlier social milieu discussions in the sections dealing with first-aid and lost-time cases to explain this apparent disparity. In the Simonds study (by implication) the injury had to be quite serious before an employee reported it or was allowed to report it. After it was reported it was treated. Medical records had to be highly justified, and the report had to go up the branches of the managerial hierarchy and compensation papers had to

be processed. Of course, significant injuries were treated in the same manner during the period of the Imre study. But frequently minor incidents did not get much attention from any personnel higher than the immediate supervisors in the Imre studies. Thus the workers received the satisfaction of an immediate response from management while top management personnel did not have to be bothered with a myriad of routine paper work in connection with the trivial types of accidents. Only those cases judged to be serious by line supervision had to be given extensive investigation and paper treatment, as well as those that were connected with grievances and union pressures. This would help explain why the immediate supervisor's time cost was higher in the Imre study than in the Simonds study ($2.73 for Simonds, $5.63 for Imre).

The data on the cost elements "cost of property damage" ($0.31 for Simonds, $0.00 for Imre), "other uninsured costs" ($6.56 for Simonds, $0.00 for Imre), and "wage cost of leanring period of new worker ($0.31 for Simonds, $0.00 for Imre) were negligible for the Imre study and thus no meaningful comparison with the Simonds data can be made. In the cost element "wage cost due to decreased output from injured worker after return to work," the average cost figure of the Simonds study is nearly three times as great as the Imre study's cost figure ($2.93 for Simonds, $1.02 for Imre). It is difficult to make definite comparative analyses because the Imre study's data in this category was all generated in one manufacturing organization with only 31 doctors' cases in its records. The writer is left with the impression that since the large utility (in

particular) did not have any such cost elements recorded, the data from the above cases should not be considered as representing the average experience of the entire study. To the extent that it might reflect typical cost experiences in that organization, one can speculate why it differs from the Simonds finding.

Utilizing the social change thesis expressed earlier, it could be argued that in the Simonds study the workers returned to work sooner after the injury than in the Imre study. They probably did this to protect their jobs and as a consequence were not as well healed as the people in the Imre study cases might have been. Their injuries may have been the longer healing type, or they may have been in comparatively poorer health (witness the difference in size and health of the present day Japanese relative to their parents in just one generation due to better nutrition and medicine[35]). The injuries may have been in such a place that they interferred with production to a greater degree than did the injuries of the wounded people in the Imre study. There may not have been any fear of the loss of job on the part of the injured people in the Simonds study. Instead, they could have been highly motivated workers that loved their work and were eager to return to it, not realizing the true extent of their handicap. The Imre study's group may have returned in a more completely healed state. Figures were taken from Table 6, page 73.

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[35]Mike Wallace, CBS Documentary Program, Sixty Minutes, August 1975.

Elements of Uninsured Cost in No-Injury Cases

Simonds analyzed 97 cases, Imre 100 cases. The basic data for this section is in Table 5, page 72. As before, the Imre study supports the simonds finding that a portion of the cost elements represented the major cost data of the cases. The Simonds experience that two cost elements represented the most significant information was borne out by the Imre study as well:

1. property damage,
2. cost of wages for man-hours lost.

For Simonds the two cost elements totaled 94 percent of the total cost figure, for Imre 87 percent. The average total uninsured cost figure for Simonds, in the all industry (except shipyards) categorization, is $446.60, and for Imre the all industry cost figure is $335.57. The figures were taken from Table 6, page 73. In the general manufacturing categorization the average uninsured cost figure for Simonds is $577.50, for Imre $321.54. In the naval shipyards categorization the figure for Simonds is $423.50. In the hospitals and utilities categorizations the Imre figures are $267.64 and $366.32 respectively. Although all of the Imre cost figures are lower in absolute terms than the Simonds figures, the Imre study in general supports the Simonds findings.

The experience of the writer was somewhat different than that of Simonds, who points out:[36]

> Only a very small number (26) of no-injury accidents were analyzed for cost by private industrial companies. This does not

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[36]Simonds and Grimaldi, p. 572.

Table 5.--Composite display of the element data generated by the Imre and Simonds studies, utilizing no-injury accident cases from all organizations, 97 cases for Simonds and 100 cases for Imre. (The Simonds data was taken from his Table C-4, Appendix, p. 576, adjusted to reflect 1971 cost levels.)

Cost Element	Average Cost Per Case		Percentage of Total Cost		Percentage of Cases in Which Item Occurs	
	Simonds	Imre	Simonds	Imre	Simonds	Imre
Property damage	$356.51	$264.78	81%	82.36%	99%	98.00%
Cost of Wages for man-hours lost	57.44	14.85	13	4.62	51	59.00
Cost of investigation of accidents	5.85	16.85	1	5.24	16	24.00
Other costs	22.79	25.00	5	7.80	16	13.00
Total uninsured cost	442.59	321.48				

mean that those concerns did not have many accidents of this type but rather that most of the companies did not choose to participate in this particular part of the study. They were less familiar with the concept of no-injury accidents and in some instances hesitated to make a decision as to what occurrences should come under the classification or doubted their ability to secure sufficient cooperation from foremen to be sure of obtaining records of all or even a reasonably high percentage of non-injury accidents occurring over a given period.

The large utility of the Imre study was introducing a system of keeping records of non-injury types of accidents that cost more than $100.00. This parallels Simonds' suggestions so closely that the researcher asked his contacts if they were not in fact adopting the Simonds idea. They could not say for certain. Nor could they tell who in the organization had instituted the rule. This gives reason to believe that the cost average for the organization is

Table 6.--Composite display of the average uninsured cost of accidents as generated by the Imre and Simonds studies, data gathered by Imre. (The Simonds data was taken from Table C-1, Appendix, p. 569, adjusted by means of wage and medical cost indexes to reflect 1971 cost levels.)

Types of Cases	No. of Cases Averaged		Average Uninsured Cost	
	Simonds	Imre	Simonds	Imre
Lost-Time Cases:				
All industry (except shipyards)	143	122	$200.20	$176.17
Metalworking Mfg.	49		200.20	
General Mfg.	80	44	200.20	138.22
Naval shipyards	72		161.70	
Hospitals		22		144.49
Utilities		56		230.22
Doctors' Cases:				
All industry (except shipyards)	272	249	53.90	38.13
General Mfg.	160	83	43.12	37.11
Metalworking Mfg.	74		46.20	
Hospitals		47		37.00
Utilities		119		40.33
First-Aid Cases:				
All industry (except shipyards)	583	372	9.83	11.08
General Mfg.	400	149	9.17	10.06
Metalworking Mfg.	278		7.86	
Hospitals		142		8.90
Utilities		81		16.78
No-Injury Accidents:				
All industry (including shipyards)	97	100	446.60	335.57
General Mfg.	19	29	577.50	321.54
Naval shipyards	71		423.50	
Hospitals		18		267.64
Utilities		53		366.32
No-Lost-Time Cases:				
Naval shipyards	875		23.58	

reasonably accurate. The other organizations did not have a procedure for recording specific data on no-injury accidents but agreed to compile figures on them from various cost and time accounts. These figures are probably not as reliable as are the figures of the utility.

As Table 7, page 75 indicates, the ratio of no-injury cases to lost-time cases discovered by the researcher is not dramatically different from that which Simonds discovered in his study. Simonds suggested the following rationale for posing the 1:1 ratio:[37]

> Since it has not been customary for safety specialists to keep records of the number of no-injury accidents, an attempt was made to find the ratio between the number of no-injury accidents and the number of lost-time cases. This would make it possible to estimate very roughly the no-injury cost from the typical injury records.

While such a technique is not as effective as a thorough pilot study of all costs, and was never claimed to be, it does appear to have validity. The ratio suggested by Simonds is 1:1. The ratio discovered by Imre is 1: 1.25, no-injury:lost-time. While different than the Simonds figure, the Imre figure does not negate the usefulness of the former as long as it is kept in mind that this ratio is suggested merely as a rough tool of estimation. In fact the Imre findings support Simonds. He readily admits that this ratio is probably the least well established of any of his data. Factors which tend to weaken the absolute value of this ratio are several. Some departments and organizations may not have reported all the accidents that occurred. Some supervisors may not have had

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[37] Ibid., p. 573.

Table 7.--Ratio of no-injury to lost-time cases.

Organization	Ratio	Variance From the Simonds Suggested Ratio of 1:1
(I)-Hospital, Catholic	(NI-10:LT-12)=1.20	+.20
(II)-Hospital, Protestant	(NI-8:LT-10)= 0.80	-.20
(III)-Utility, Large	(NI-50:LT-56)=1.12	+.12
(IV)-Utility, Small	(NI-3:LT - 0)=0.00	0.00
(V)-Manufacturing	(NI-4:LT-5) = 1.25	+.25
(VI)-Manufacturing	(NI-10:LT-14)=1.40	+.40
(VII)-Manufacturing	(NI-15:LT-25)=1.67	+.67
Overall Average	1.25	+.25

a clear idea of exactly what kinds of accidents had to be included in the study. Some supervisors may slant the accident picture of their areas of responsibility to protect their safety records and general managerial image.

This section describes the greatest absolute differences between the Simonds and Imre studies. This might be expected for it is the nature of property damages to be costly in this category of accident cases. There is a $121.11 difference between the two total uninsured cost figures. The figures are $442.59 for the Simonds study and $321.48 for the Imre study. The data is illustrated in Table 5, page 72. Before attempting any conclusions about this

difference the elements contributing to them should be analyzed. The greatest dollar difference in average costs occurs in the "property damage" element. This is $356.51 for the Simonds study and $264.78 for the Imre study, yielding a difference of $91.73. This could, of course, be the nature of accidents in that more extensive and costly damages were incurred during the Simonds study than during the Imre study. It could also be that due to poorer safety programs, equipment and facilities design and protective gear, an accident was bound to cause relatively more property damage in the former study than the latter. It is not known to what extent property damage and other accident cost figures were hidden or masked over by the operatives and supervisors during the Simonds study. It is known that key personnel of at least one of the organizations Imre studied openly stated that a "lot" of damage done by accidents was never recorded and was absorbed in other costs. Thus, even property damage could have been quickly repaired with available materials and operatives and never reported as such in the organization's books. If this situation existed in the other organizations of the Imre study it could explain why the "cost of investigation of accidents" element for the Imre study is nearly three times as great as that for the Simonds study, $5.85 for Simonds and $16.85 for Imre. Once the accident was so extensive that property damage could not be rapidly patched up and hidden, once employees were injured and required attention, and once top management became aware of the accident before appearances or records could be glossed over, a full-fledged investigation occurred. As pointed out earlier and

in previous sections, due to the assumed greater complexity of organizations, safety programs, recording systems, and various governmental and insurance regulations during the Imre study period relative to the Simonds study period much more time was absorbed in investigating an accident. It may also be that in an atmosphere of autocratic leadership and authority, with rigid lines of control and communication and tight supervision at every level of the organizational hierarchy during the Simonds study period more, if not all, accidents of this kind were reported to top management than in the more permissive, informal Imre study period. Thus the recorded property damage cost figures would be higher for the former than for the latter. This would also help explain why the cost element "cost of wages for man-hours lost" is so much higher for the Simonds study than for the Imre study period, $57.44 for Simonds and $14.85 for Imre. It may be then that the cost of operations interrupted by the accidents were more faithfully recorded for the former study and hidden from top management when possible for the latter study. The difference between the Simonds and Imre studies in the cost element "other costs" ($22.79 for Simonds, $25.00 for Imre) is so small that it eludes explanation and even significant speculation. In fact its closeness is the remarkable characteristic. The difference in the two figures was probably caused by random factors rather than intent or by social codes of behavior.

Comparative Analysis of the Simonds and Imre Studies as They Pertain to the Manufacturing Industry

This is the only categorization in which the two studies are directly comparable. Since this is so, it seemed most appropriate to give this industry a special treatment in analysis by going beyond the foregoing analyses. This will be done on both the macro and micro levels. The former includes the comparative analysis of broader findings such as the average uninsured costs of the accidents. By the latter is meant a more detailed and selective analysis of the costs of accidents such as the comparative evaluation of cost elements.

In comparing the average uninsured cost findings in the manufacturing industry, first-aid cases are followed by the lost-time, doctors' and no-injury cases. This is done for ease in following the tables and so that there will be a systematic flow of data, analytic discussions and logic to parallel previous sections.

The reader should refer to Table 6, page 73 for data to clarify the following analysis. Imre's average uninsured cost finding is $0.89 greater than the Simonds study finding in the first-aid cases, $10.06 for Imre and $9.17 for Simonds. This is somewhat of a reversal of the general trend where in the other three categories of accidents Imre's cost findings are generally smaller than that found by Simonds. In comparing actual numbers of cases studied by both researchers one can see that Imre analyzed only 37 percent of the number of cases that Simonds analyzed. Simonds analyzed 400 cases, Imre 149. In the Imre study the number of samples were kept to a workable minimum for each organization to help speed up the

research project. It is doubtful that a larger sample would have resulted in a greater deal of difference in comparative results.

In the lost-time cases Imre's uninsured cost figure is $61.98 less than the Simonds figure, $200.20 for Simonds and $138.22 for Imre. Simonds studied 36 more cases than Imre, 80 for Simonds and 44 for Imre.

In the doctors' cases category Imre's average uninsured cost figure is $6.01 less than Simonds' figure, $43.12 for Simonds and $37.11 for Imre. Simonds studied 77 more cases than Imre, 160 for Simonds and 83 for Imre.

There is a reversal in the no-injury category on the relative numbers of cases the two researchers studied. In the previous three categories Imre consistently studied fewer cases than Simonds. In this category Simonds studied ten less cases than Imre, 19 cases for Simonds and 29 cases for Imre. In the cost comparison, however, Imre's average uninsured cost figure is $255.96 less than that found by Simonds, $577.50 for Simonds and $321.54 for Imre.

For a discussion of the reasons for and speculations on the comparative differences between the Simonds and Imre findings, as they pertain to cost element comparisons, the reader is referred back to the previous four sections of this chapter.

Elements of Uninsured Cost in the First-Aid Cases of the Imre Study

The most striking and readily apparent characteristic is that in all the elements of cost except one the utility industry figures

are higher than those of either the hospital or the manufacturing industry. Tables 8, 9 and 10, on pages 81, 82 and 83 illustrate this. The exceptional element is the "wage cost for time lost by workers not injured." Here the average cost for time lost by workers is $2.30 and for the hospitals $2.41. It is approximately three times as great as the cost element of the manufacturing industry: $2.30 compared to $0.87. There is a relative wide disparity in the percentage of cases in which the item occurs. Again, the utilities are different from the hospitals and the manufacturing firms (which are similar). The fact that the rate of occurrence of this element for the utilities is more than double that of the hospitals and manufacturing plants (54.32 percent for the utilities, 24.76 percent for the hospitals and 19.46 percent for the manufacturing firms) prompts some speculation. The data seems to indicate that while more people not injured in an accident took time out to either watch or help the injured person in the utilities, compared to the hospitals and the manufacturing firms, their times spent in such activities was shorter and thus averaged out to be a comparatively lower cost. This was particularly true of the utilities relative to the hospitals. Many of the injuries in the utility occurred in the field of operation, whereas most of the injuries of the manufacturing plants and the hospitals occurred in the building. In a spirit of comradeship the utility workers may have rushed to the aid of their injured companion or stopped working to watch what happened. The non-involved may have quickly returned to productive work. The injured person may have shrugged off the damage if it were minor or

Table 8.--Cost elements in 142 first-aid cases, utilizing the data from organizations 1 and 2, the Catholic and Protestant hospitals, of the Imre study, weighted averages.

Cost Elements	Percentage of Cases in Which Item Occurs	Average Cost Among All Organization Cases	Percentage of Total Uninsured (Indirect) Cost
Wage cost for time lost by workers not injured	24.76%	$2.41	27.08%
Cost of property damage	0.00	0.00	0.00
Wage cost of time lost by injured worker	55.05	2.10	23.60
Cost of supervisor's time required in connection with accident	83.71	0.99	11.12
Wage cost due to decreased production by injured worker after return to work	0.00	0.00	0.00
Cost of medical attention	92.86	2.29	25.73
Workmen's compensation and insured medical expenses	93.58	1.11	12.47
Cost of investigation	Negligible	Negligible	Negligible
"Other uninsured costs"		0.00	0.00
Total		8.90	

cleaned his own wound. First-aid may have been given by a co-worker or foreman, or in the exceptional case he might have been taken away from the scene of work for medical attention. In the hospitals in particular the cost for this element was comparatively high. Since hospitals are the places in our society where we receive expert treatment for injuries and illnesses, there probably exists a mentality among all hospital employees about the necessity to lend aid to an injured person. There are many nurses, medical technicians, and para-professionals (aside from the doctors) in the hospitals and

Table 9.--Cost elements in 81 first-aid cases, utilizing the data from organizations 3 and 4, the large and small utilities, of the Imre study, weighted averages.

Cost Elements	Percentage of Cases in Which Item Occurs	Average Cost Among All Organization Cases	Percentage of Total Uninsured (Indirect) Cost
Wage cost for time lost by workers not injured	54.32%	$2.30	13.71%
Cost of property damage	0.00	0.00	0.00
Wage cost of time lost by injured worker	97.03	5.75	34.27
Cost of supervisor's time required in connection with accident	95.80	3.14	18.71
Wage cost due to decreased production by injured worker after return to work	0.00	0.00	0.00
Cost of medical attention	82.68	3.40	20.26
Workmen's compensation and insured medical expenses	88.89	2.19	13.05
Cost of investigation	Negligible	Negligible	Negligible
"Other uninsured costs"		0.00	0.00
Total		16.78	

each one specializes in some phase of medicine or supporting service. These people tend to consult each other about the nature and extent of the injury and what treatment to administer. In the utilities and the manufacturing organizations the average employee is less medically oriented and acts impulsively and decisively on the treatment of minor injuries.

The "wage cost of time lost by the injured worker" in the utilities is nearly twice that of workers in the manufacturing cases and more than twice that of the hospital cases ($5.75 for the

Table 10.--Cost elements in 149 first-aid cases, utilizing the data from organizations 5, 6, and 7, the manufacturing firms, of the Imre study, weighted averages.

Cost Elements	Percentage of Cases in Which Item Occurs	Average Cost Among All Organization Cases	Percentage of Total Uninsured (Indirect) Cost
Wage cost for time lost by workers not injured	19.46%	$0.87	8.65%
Cost of property damage	0.00	0.00	0.00
Wage cost of time lost by injured worker	94.63	3.61	35.88
Cost of supervisor's time required in connection with accident	87.93	1.44	14.31
Wage cost due to decreased production by injured worker after return to work	0.00	0.00	0.00
Cost of medical attention	52.48	2.44	24.25
Workmen's compensation and insured medical expenses	59.73	1.70	16.90
Cost of investigation	0.00	0.00	0.00
"Other uninsured costs"		0.00	0.00
Total		10.06	

utilities, $2.10 for the hospitals and $3.61 for the manufacturing firms) as a reference to Tables 8, 9, and 10, pages 81, 82 and 83 indicates. This strongly implies that when first-aid injuries are actually treated in the utilities a relatively greater amount of time is involved due primarily to the scattered and field operating organizations. Except in the office and manufacturing buildings, treatment facilities are usually quite some distance from the place of work. Thus, if an injured person has to walk across a stockpile yard to a field dispensary or down the cable access right-of-way to

the truck with the first-aid kit a considerable amount of time is consumed. This is also the primary reason why the cost of the supervisor's time required in connection with the accidents is so much greater, comparatively, than either in the manufacturing organizations or the hospitals. The average cost for the utilities is $3.14, for the hospitals $0.99 and for the manufacturing firms $1.44. The figures were taken from Tables 8, 9, and 10, pages 81, 82 and 83. In the scattered operational facilities a supervisor can be physically quite distant from the injured person at the time of the accident. If he sees the accident or if it is called to his attention it can take him considerable time to get to the injured person, check the wound, and take a course of corrective action.

In a hospital there may be people with some degree of medical expertise available instantaneously. A response to an injury and its subsequent treatment takes little time. Frequently the treatment is by co-workers or by the injured person himself. This decreases the demand on the time of the supervisor.

This is also true, but to a lesser degree, of the manufacturing organizations. The employees are concentrated in a building or a complex of buildings. Help is readily available, there are ample communication systems, and first-aid facilities and specialized personnel are nearby. Tables 8, 9 and 10, pages 81, 82 and 83 indicate that the cost of medical attention for the utilities is greater than for the hospitals and the manufacturing organizations. The figures are $3.40 for the utilities, $2.29 for the hospitals, and $2.44 for the manufacturing firms. This is largely due to the

scattered nature of the organization and extensive field operations. It costs more to get aid and treatment to an injured lineman than to a nurse's aide in a hospital ward or to a machine operator on a production line. Medicines and first-aid materials are readily available in a hospital and also to a lesser degree in manufacturing plants. They have to be carried in special vehicles and at times sent for in the field operations of the utilities. It could be inferred that if such treatment does involve outside help, there could exist the possibility that huge organizations such as the large utility could afford higher charges because it could more easily pass its costs on to consumers than smaller organizations engaged in competition. It is somewhat less clear why the "workmen's compensation and insured medical expenses" should also be dramatically higher for the utilities than for the manufacturing organizations and, in particular, the hospitals. The cost figures are $2.19 for the utilities, $1.11 for the hospitals, and $1.70 for the manufacturing firms. The data was taken from Tables 9, 9 and 10, pages 81, 82 and 83.

The writer speculates that the utility employees might believe that the monopolistic employing organization can better afford compensation for injury while on duty. It seems more likely, however, that the utility workers in general have to be seriously injured before they seek aid, and they may simply shrug off injuries that hospital employees, for example, would have treated. This attitude seems to be present among the employees of the manufacturing concerns as well.

Elements of Uninsured Cost in the Lost-Time Cases of the Imre Study

In this category the general trend of comparative costs continues as Tables 11, 12, and 13, pages 87, 88 and 89 reveal. The utilities' cost elements as well as their average cost figures, on the average, are twice that of the hospitals and nearly twice that of the manufacturing organizations. For example, the total average uninsured cost figure for the utilities is $230.22, for the hospitals $114.49, and for the manufacturing organizations $146.79. The data was taken from Tables 11, 12 and 13, pages 87, 88 and 89. In general the same reasoning expressed for the first-aid cases is applicable here. This body of data has, however, some peculiar patterns of its own. In the hospital cases, for example, there is no significant cost of accidents attributable to "extra cost for overtime work." In both the utility and the manufacturing organizations, however, this is a very significant cost element factor, particularly in the utilities. The cost figures are $0.00 for the hospitals, $58.40 for the utilities, and $12.60 for the manufacturing firms. The lack of such an element in the reocrds of the hospitals could indicate that whatever time or production was lost due to accidents did not require overtime activities to catch up with a normal level of the production of services. The lost time may have been regained by a speedup of work after the accident, or the injured worker's job was done by co-workers who were able to perform their duties and those of the injured one simultaneously. This element also indicates that no highly specialized and skilled person was injured so seriously that

Table 11.--Cost elements in 22 lost-time cases, utilizing the data from organizations 1 and 2, of the Imre study, the Catholic and Protestant hospitals, weighted averages.

Cost Elements	Percentage of Cases in Which Item Occurs	Average Cost Among All Organization Cases	Percentage of Total Uninsured (Indirect) Cost
Wage cost of workers not injured	78.34%	$ 2.00	1.75%
Cost of property damage	46.67	9.10	7.98
Wage cost of time lost by injured worker	100.00	38.40	33.68
Extra cost for overtime work	0.00	0.00	0.00
Cost of supervisor's time	100.00	8.40	7.37
Wage cost due to decreased output from injured worker after return to work	81.67	9.95	8.73
Wage cost of learning period of new worker	0.00	0.00	0.00
Cost of investigation and processing compensation forms	100.00	15.01	12.74
Medical cost not insured	100.00	31.63	27.74
"Other uninsured costs"	0.00	0.00	0.00
Total uninsured cost		114.49	100.00

others had to work extra hard and long to make up for his loss and that no time was lost in waiting for equally competent and important personnel to replace him. This element also indicates that no crucially important machine or other piece of equipment was involved in the accident that would have required overtime to return to its original operating condition or necessitated lengthy replacement time.

In an industry dealing with an important service such as the healing of the ill and the ministering to the serious health

Table 12.--Cost elements in 56 lost-time cases, utilizing the data from organizations 3 and 4 of the Imre study, the large and small utilities, weighted averages.

Cost Elements	Percentage of Cases in Which Item Occurs	Average Cost Among All Organization Cases	Percentage of Total Uninsured (Indirect) Costs
Wage cost of workers not injured	83.93%	$ 5.30	2.30%
Cost of property damage	14.30	19.11	8.30
Wage cost of time lost by injured worker	100.00	50.30	21.85
Extra cost for overtime work	7.14	58.40	25.37
Cost of supervisor's time	100.00	18.61	8.08
Wage cost due to decreased output from injured worker after return to work	35.71	13.30	5.78
Wage cost of learning period of new worker	5.30	9.27	4.03
Cost of investigation and process of compensation forms	98.21	16.29	7.08
Medical cost not insured	100.00	39.64	17.22
"Other uninsured costs"	0.00	0.00	0.00
Total uninsured cost	100.00	230.22	100.00

(The cost elements are the same as for the Large Utility, for the original study did not contain any lost-time cases for the small utility.)

needs of humans, this trend is not surprising. All the functions, personnel, and equipment of the organizations are housed under one roof. There are always highly skilled doctors, aside from the resident staff, in the building complexes, as well as other support personnel. There is so much duplication and overlapping of skills available that it is rare for one person's injury to necessitate

Table 13.--Cost elements in 44 lost-time cases, utilizing the data from organizations 5, 6, and 7 of the Imre study, the three manufacturing firms, weighted averages.

Cost Elements	Percentage of Cases in Which Item Occurs	Average Cost Among All Organization Cases	Percentage of Total Uninsured (Indirect) Cost
Wage cost of workers not injured	73.14%	$ 2.97	2.02%
Cost of property damage	24.19	17.16	11.69
Wage cost of time lost by injured worker	100.00	47.33	32.24
*Extra cost for overtime work	14.28	12.60	8.58
Cost of supervisor's time	100.00	8.20	5.59
Wage cost due to decreased output from injured worker after return to work	77.90	12.10	8.24
Wage cost of learning period of new worker	14.09	4.79	3.26
Cost of investigation and processing compensation forms	100.00	15.34	10.45
Medical cost not insured	100.00	26.30	17.92
"Other uninsured costs"	Negligible	Negligible	Negligible
Total uninsured cost		146.79	100.00

*(This element reflects the average cost in Organization 6 only. Organizations 5 and 7 did not have this element in their records for the period of the original research. Since this element was left at $12.60 for the sake of clarity and continuity, there is an inconsistency between the total cost figure of this table and Table 9, for example.)

overtime work. Equally functional replacements are readily available. Hospitals are famous for their backup systems. Most vital pieces of equipment have at least one functional replacement waiting to be used. Hospitals, as a general rule, even guarantee a continuing source of

energy in the event of a disaster by having their own power generating equipment or alternate sources of energy ready.

In the case of the "wage cost of the learning period of the new worker," this element is totally missing in the accident history of the hospitals whereas it is present in the records of the utilities as well as the manufacturing firms. The cost figures are $9.27 for the utilities and $4.79 for the manufacturing firms. The data was taken from Tables 11, 12, and 13, pages 87, 88 and 89. A broad inter-industry reason for this may be that while the length of the pilot study was the same in all organizations, the total number of workers in the hospitals are fewer than in the utilities and the manufacturing organizations. A more specific probable reason for this comparative difference is that the hospitals have many people of similar or overlapping skills working with or near each other and thus one person can easily take over another person's job or a portion of it until the injured person returns to work or is replaced by an equally competent substitute. Or, a very likely reason may be that the hospitals simply did not bother to collect data on this.

Also, there was no evidence of a union insisting that its members not be switched from job to job when necessary. Further, their jobs are not as rigidly defined as in the strongly unionized utilities and manufacturing organizations. Because of this more pronounced specialization, finer job division, and union insistence on no crossing of job lines, when a person in the utilities and manufacturing firms was injured and had to be replaced there followed a significant learning period before the replacement came up to the

productive level of the injured person. This was not as typical of the common laborers, but even they had to learn some new routines if they were switched from one section of the organization to another.

Both the utilities and the manufacturing organizations had data in every cost element of the lost-time cases. However, the extent of the total cost as well as the individual cost elements vary markedly. In every cost element the average cost figure for the utilities is greater than that for the manufacturing firms, as a reference to Tables 11, 12 and 13 indicates. This is due to several causes. One is the generally higher wages that the utilities (particularly the large utility) paid. Two, the utilities' operations are far-flung and involve a great deal of hazardous outdoor activity as well as mobile work units, while most of the operations of the manufacturing firms were confined to plant premises. The control over the hazards was better in the manufacturing organizations than in the utilities. The utilities' outdoor operations were subject to uncontrollable weather conditions, while the weather played no role inside the manufacturing plants.

Elements of Uninsured Cost in the Doctors' Cases of the Imre Study

As Tables 14, 15 and 16, pages 92, 93 and 94 indicate, the pattern in the doctors' cases is not as clear as it was with the first-aid and lost-time cases. In this section the utilities do not lead in the total average cost figure. The manufacturing firms do. The figures are $34.37 for the hospitals, $40.33 for the utilities, and $44.87 for the manufacturing firms, the data taken

Table 14.--Cost elements in 47 doctors' cases, utilizing the data from organizations 1 and 2 of the Imre study, the Catholic and Protestant hospitals, weighted averages.

Cost Elements	Percentage of Cases in Which Item Occurs	Average Cost Among All Organization Cases	Percentage of Total Uninsured (Indirect) Cost
Wage cost of workers not injured	93.75%	$ 1.94	5.64%
Cost of property damage	0.00	0.00	0.00
Wage cost of time lost by injured worker	100.00	7.37	21.44
Extreme cost for overtime work	0.00	0.00	0.00
Cost of supervisor's time	100.00	2.53	7.36
Wage cost due to decreased output from injured worker after return to work	0.00	0.00	0.00
Wage cost of learning period of new worker	0.00	0.00	0.00
Cost of investigation and processing compensation forms	100.00	17.51	50.95
Medical cost not insured	100.00	5.02	14.61
"Other uninsured costs"	0.00	0.00	0.00
Total uninsured cost		34.37	100.00

from Tables 14, 15 and 16. But the utilities are a close second. This deviation from the trend of earlier sections is distorted by three factors. In Table 16, page 94 an $8.40 average cost figure appears under the cost element of "wage cost due to decreased output from injured worker after return to work." This cost element appears in the records of organization #6 only. Organizations #5 and #7 did not report any figures for this cost element. All three organizations are manufacturing firms. In the records of the

Table 15.--Cost elements in 119 doctors' cases, utilizing the data from organizations 3 and 4 of the Imre study, the large and small utilities, weighted averages.

Cost Elements	Percentage of Cases in Which Item Occurs	Average Cost Among All Organization Cases	Percentage of Total Uninsured (Indirect) Cost
Wage cost of workers not injured	44.08	$ 3.83	9.50%
Cost of property damage	Negligible	Negligible	Negligible
Wage cost of time lost by injured worker	99.01	10.12	25.09
Extra cost for overtime work	0.00	0.00	0.00
Cost of supervisor's time	96.42	7.86	19.49
Wage cost due to decreased output from injured worker after return to work	Negligible	Negligible	Negligible
Wage cost of learning period of new worker	0.00	0.00	0.00
Cost of investigation and processing compensation forms	91.68	13.38	33.18
Medical cost not insured	84.03	5.14	12.74
"Other uninsured costs"	Negligible	Negligible	Negligible
Total uninsured cost		40.33	100.00

utilities this element's history was considered to be negligible for analysis purposes. In the hospital records this cost element did not play any role at all. Again, referring to Table 16, page 94, one can see that under the cost element of "medical cost not insured" the manufacturing firms exhibit an average cost figure of $12.96 while the utilities and hospitals exhibit $5.14 and $5.02 respectively. The data for the utilities and the hospitals was typical of all

Table 16.--Cost elements in 83 doctors' cases, utilizing the data from organizations 5, 6, and 7 of the Imre study, the manufacturing firms, weighted averages.

Cost Elements	Percentage of Cases in Which Item Occurs	Average Cost Among All Organization Cases	Percentage of Total Uninsured (Indirect) Cost
Wage cost of workers not injured	85.54%	$ 3.66	8.16%
Cost of property damage	0.00	0.00	0.00
Wage cost of time lost by injured worker	100.00	11.20	24.96
Extra cost for overtime work	0.00	0.00	0.00
Cost of supervisor's time	95.23	4.10	9.14
Wage cost due to decreased output from injured worker after return to work	3.20	8.40	18.72
Wage cost of learning period of new worker	0.00	0.00	0.00
Cost of investigation and processing compensation forms	0.00	0.00	0.00
Medical cost not insured	100.00	12.96	28.88
"Other uninsured costs"	98.79	4.55	10.14
Total uninsured cost		44.87	100.00

organizations within the industries. The data in the manufacturing industry reflects the recorded costs of organizations #6 and #7. Organization #5 did not have any cost recorded in this category. Once again referring to Table 16 of this page one can see that the manufacturing organizations had an average cost figure for the "other uninsured costs" element of $4.55. The utilities and hospitals reported negligible and zero figures respectively. If we assume that all valid cost elements had been faithfully recorded by all the people

participating in this research, then we are left to ponder their causes. We have to assume that the cost elements of the utilities and hospitals were truly zero.

The writer has a skeptical attitude toward such assumptions, based in part on discussions during the final visits to the organizations' key personnel. Among other subjects was discussed the apparent faithfulness with which all cost elements were or were not duly recorded. This leads the writer to speculate that in the three cost elements described the cost figures for the hospitals and utilities are not complete. Another intuitive factor supporting this speculation is that it seems contrary to logic and the general patterns of the entire body of the data that an organization such as the large utility with all its hazardous field operations subject to uncontrollable factors such as weather did not have any record at all of "other uninsured costs" or "wage cost due to decreased output from injured worker after return to work." If these intuitions are correct, then the typical pattern of the utility having the largest average and elemental costs, with the manufacturing firms and hospitals following in that order could very well hold true and stay in line with the patterns of the data of the first-aid and lost-time cases.

There is yet another peculiarity in this set of data. Under the cost element "cost of investigation and processing compensation forms," the hospitals and utilities reported average cost elements of $17.51 and $13.38 respectively while the manufacturing organizations did not report any figures at all. Tables 14, 15 and 16, pages 92, 93 and 94 show this. One could speculate again that the data

recorded, this time in the manufacturing organizations were incomplete. If two of the industries had recorded figures for these cost elements, why did the third one not have any? It could be that these organizations were not used to reporting such a categorization. Their ledgers did not incorporate such cost headings and so these figures could have been omitted or incorporated in one or more of the other cost element figures. Aside from the differences identified and analyzed, Tables 14, 15 and 16 do not exhibit any startling new patterns.

The fact that the hospitals reported a greater average cost ($17.51) for the element "cost of investigation and processing compensation forms," than the $13.38 utility figure goes counter to the broad, general trend that the utilities' costs are greater than that of the hospitals. This reversal could be explained by the fact that the hospitals' personnel are very safety conscious, and the hospitals have excellent safety organizations and programs. They strongly emphasize prevention and thoroughly train their personnel in safety for they are dealing with human life and its preservation or prolongation. Thus their safety records appear better than that of the other industries and their costs lower. However, when accidents do occur in the hospitals, they are very thoroughly investigated, analyzed, communicated to many levels and branches of the organization and extensively recorded for future study and incorporated in re-education programs. In the utilities there appeared to be a less extensive procedure. Fewer people were involved in the

processing of the accident data papers and the costs involved were relatively lower.

In general, the broad trend of the total body of data seems to be very similar to the data discussed in the sections dealing with first-aid and lost-time cases. This is true even to the extent that while the utilities' average cost figure for the element "wage cost of workers not injured" is greater than that of the hospitals and manufacturing organizations ($3.83 for the utilities, $1.94 for the hospitals, and $3.66 for the manufacturing firms) its percentile rate of occurrence in this category is less than in the other industries as was true of the first-aid cases (93.75 percent occurrence rate for the hospitals, 44.08 percent for the utilities, and 85.54 percent for the manufacturing firms). The data was taken from Tables 14, 15 and 16, pages 92, 93 and 94. The generally applicable arguments and reasoning used in the first-aid and lost-time cases are also apropos in this section and need not be repeated.

Elements of Uninsured Cost in the Hospital Data of the Imre Study

The two hospitals merit a special comparative analysis of their own. This is so for two reasons. First of all, the average cost figures for the hospitals in general run lower than for the utilities and the manufacturing firms. Second, and perhaps most important, the average cost figures for the two hospitals are very close in nearly all the elements of cost in every accident category. This is clearly evidenced by the data in Tables 17, 18, 19, 20, 21, 22, 23, and 24, pages 98-105. This closeness is reflected most

Table 17.--Cost elements in 12 lost-time cases, utilizing the data from organization number 1 (Catholic Hospital) of the Imre study.

Cost Elements	Percentage of Cases in Which Item Occurs	Average Cost Among All Organization Cases	Percentage of Total Uninsured (Indirect) Cost
Wage cost of workers not injured	66.67%	$ 1.99	1.71%
Cost of property damage	33.33	11.16	9.60
Wage cost of time lost by injured worker	100.00	39.05	33.60
Extra cost for overtime work	0.00	0.00	0.00
Cost of supervisor's time	100.00	8.25	7.09
Wage cost due to decreased output from injured worker after return to work	83.33	9.02	7.76
Wage cost of learning period of new worker	0.00	0.00	0.00
Cost of investigation and processing compensation forms	100.00	14.97	12.88
Medical cost not insured	100.00	31.77	27.34
"Other uninsured costs"	0.00	0.00	0.00
Total uninsured cost	100.00	116.21	100.00

clearly in the lost-time and doctors' cases and to a lesser degree by the first-aid and no-injury cases.

There are several readily evident factors that lead to an explanation of why at times the cost averages and even the individual cost elements they are comprised of are so close. The two hospitals, although owned and managed by two different religious organizations, are similar in many respects. They are both located in the same area of an industrial city. In fact they are only a few blocks apart.

Table 18.--Cost elements in 10 lost-time cases, utilizing data from organization number 2 (Protestant Hospital) of the Imre study.

Cost Elements	Percentage of Cases in Which Item Occurs	Average Cost Among All Organization Cases	Percentage of Total Uninsured (Indirect) Cost
Wage cost of workers not injured	90.00%	$ 2.01	1.78%
Cost of property damage	60.00	6.63-	5.60
Wage cost of time lost by injured worker	100.00	37.62	33.46
Extra cost for overtime work	0.00	0.00	0.00
Cost of supervisor's time	100.00	8.57	7.62
Wage cost due to decreased output from injured worker after return to work	80.00	11.06-	9.84
Wage cost of learning period of new worker	0.00	0.00	0.00
Cost of investigation and processing of compensation forms	100.00	15.08	13.41
Medical cost not insured	100.00	31.47	27.99
"Other uninsured costs"	0.00	0.00	0.00
Total uninsured cost	100.00	112.44	100.00

They are subject to the same building, electrical wiring, plumbing, lighting, heating and ventilating, safety and other, municipal, county and state codes. They draw upon the talents of the same medical staff practicing their professions independently in the local areas, although, of course, they both have their own resident staffs. They serve the same basic clientele. They draw from the same labor pool and are influenced by the same local unions. The Catholic hospital does benefit from the voluntary and inexpensive

Table 19.--Cost elements in 25 doctors' cases, utilizing the data from organization number 1 (Catholic Hospital) of the Imre study.

Cost Elements	Percentage of Cases in Which Item Occurs	Average Cost Among All Organization Cases	Percentage of Total Uninsured (Indirect) Cost
Wage cost of time lost by workers not injured	92.00%	$ 1.77	5.52%
Cost of property damage	0.00	0.00	0.00
Wage cost of time lost by injured worker	100.00	6.86	21.40
Extra cost for overtime work necessitated by accident	0.00	0.00	0.00
Cost of supervisor's time required	100.00	2.24	6.97
Wage cost due to decreased output from injured worker after return to work	0.00	0.00	0.00
Wage cost of learning period of new worker necessitated by accident	0.00	0.00	0.00
Medical cost not insured	100.00	16.46	51.34
Cost of investigation and local processing of compensation forms	100.00	4.73	14.75
"Other uninsured costs"	0.00	0.00	0.00
Total uninsured cost	100.00	32.06	100.00

services of a few nuns and other religious people. The same sources of supply are used by both hospitals. In fact in certain instances the hospitals pool their orders and then work out a subsequent split of the bulk order after they have secured the savings of volume buying.

They are roughly on the same level in facility standards. They are very close to each other in size and even have a similar

Table 20.--Cost elements in 22 doctors' cases, utilizing the data from organization number 2 (Protestant Hospital) of the Imre study.

Cost Element	Percentage of Cases in Which Item Occurs	Average Cost Among All Organization Cases	Percentage of Total Uninsured (Indirect) Cost
Wage cost of time lost by workers not injured	95.50%	$ 2.13	5.76%
Cost of property damage	0.00	0.00	0.00
Wage cost of time lost by injured worker	100.00	7.94	21.46
Extra cost for overtime work necessitated	0.00	0.00	0.00
Cost of supervisor's time required	100.00	2.86	7.75
Wage cost due to decreased output from injured worker after return to work	0.00	0.00	0.00
Wage cost of learning period of new worker necessitated by accident	0.00	0.00	0.00
Medical cost not insured	100.00	18.71	50.57
Cost of investigation and local processing of compensation forms	100.00	5.36	14.49
"Other uninsured costs"	0.00	0.00	0.00
Total uninsured cost	100.00	37.00	100.00

floor plan for their building complexes. Their personnel and safety programs are very similar, as well as their accident reporting system. Neither one of the hospitals specializes in a single body of medicine. They are both general hospitals. The greatest percentage of local doctors practice in both hospitals. In fact, it is not uncommon for a doctor to perform an operation in one hospital in the morning and a second operation in the other hospital during the

Table 21.--Cost elements in 65 first-aid cases, utilizing the data from organization number 1 (Catholic Hospital) of the Imre study.

Cost Element	Percentage of Cases in Which This Item Occurs	Average Cost Among All Organization Cases	Percantage of Total Cost
Wage cost for time lost by workers not injured	35.40%	$ 0.45	7.92%
Cost of property damage	0.00	0.00	0.00
Wage cost of time lost by injured worker	100.00	1.62	28.52
Cost of supervisor's time required in connection with accident	80.00	0.68	11.97
Wage cost due to decreased production by injured worker after return to work	0.00	0.00	0.00
Cost of medical attention	100.00	1.97	34.68
Cost of investigation	100.00	0.96	16.90
"Other uninsured costs"	0.00	0.00	0.00
Total uninsured cost		5.68	100.00

afternoon. The steel industry heavily subsidizes both hospitals. The same ambulance service takes patients to both hospitals. And in general, with the exception of the religious, the pay rates of the employees of the two hospitals are very similar. And, of course, the doctors have to charge the same rates in both hospitals because they practice in both of them.

All these factors tend to make the work experiences of the two hospitals very similar.

Let us examine those elements of accident cost which promise to shed the most useful light in this analysis. The writer will comparatively analyze the cases in the following sequence: lost-time

Table 22.--Cost elements in 77 first-aid cases, utilizing the data from organization number 2 (Protestant Hospital) of the Imre study.

Cost Element	Percentage of Cases in Which This Item Occurs	Average Cost Among All Organization Cases	Percentage of Total Cost
Wage cost for time lost by workers not injured	15.78%	$ 4.07	35.03%
Cost of property damage	0.00	0.00	0.00
Wage cost of time lost by injured worker	17.10	2.50	21.51
Cost of supervisor's time required in connection with accident	86.64	1.25	10.76
Wage cost due to decreased production by injured worker after return to work	0.00	0.00	0.00
Cost of medical attention	86.84	2.56	22.03
Cost of investigation	88.16	1.24	10.67
"Other insured costs"	Negligible	Negligible	Negligible
Total uninsured cost		11.62	100.00

first, then doctors', then first-aid, and finally no-injury. Tables 17 and 18, pages 98 and 99 point out that there is a $3.77 difference in the average cost of accidents in the lost-time category with the Catholic hospital incurring the higher average cost. The average cost figures are $116.21 for the Catholic hospital and $112.44 for the Protestant hospital. In five of the seven cost elements on which the writer has data the costs for the two hospitals run so close that often there are only a few cents difference. There are two elements of cost, however, that do vary significantly. These are in the cost element categories of "cost of property damage" and "wage cost due to decreased output from injured worker after returning to work."

Table 23.--Cost elements in 10 no-injury accident cases, utilizing the data from organization number 1 (Catholic Hospital) of the Imre study.

Cost Element	Average Cost Per Case	Percentage of Total Cost	Percentage of Cases in Which Item Occurs
Property damage	$211.41	88.81%	100.00%
Cost of wages for manhours lost	5.19	2.18	100.00
Cost of investigation of accidents	13.69	5.75	90.00
Other costs	7.75	3.26	100.00
Total uninsured cost	238.04	100.00	

In the former category the difference comes to $4.53, $11.16 for the Catholic hospital and $6.63 for the Protestant hospital. It is difficult to pose a definitive explanation of this variance except to state that it probably reflects chance factors rather than any characteristics that are unique to either one of the hospitals. The types of damages are not so exotic and singular that they would differentiate the two hospitals. In the "wage cost due to decreased output from injured worker after return to work" element the difference in average cost amounts to $2.04. The average cost for the Catholic hospital is $9.02 and $11.06 for the Protestant hospital.

Here, again, it is difficult to assign an absolute cause-effect relationship. Perhaps it is the nature of hospitals to have the elements of lost-time cases vary in such a manner. There is nothing in the data gathering instruments or the writer's notes which would indicate a cause for such a variance. The difference between the two is not so glaring as to elicit speculation of gross

Table 24.--Cost elements in 8 no-injury accident cases, utilizing the data from organization number 2 (Protestant Hospital) of the Imre study.

Cost Element	Average Cost Per Case	Percentage of Total Cost	Percentage of Cases in Which Item Occurs
Property damage	$273.00	89.62%	100.00%
Cost of wages for manhours lost	4.94	1.62	100.00
Cost of investigation of accidents	14.40	4.73	100.00
Other costs	12.29	4.03	100.00
Total uninsured cost	304.63	100.00	

inaccuracies in the reporting techniques of the personnel of the cooperating hospitals. It may very well be that it is truly the nature of lost-time case elements such as "wage cost of workers not injured," "wage cost of time lost by injured worker," "cost of supervisor's time," "cost of investigation and processing compensation forms," and "medical cost not insured" to vary with such relative closeness among all hospitals, not just the two studied by Imre. Further longitudinal and separate replication pilot studies would be needed to test this speculation.

Tables 19 and 20 on pages 100 and 101 summarize the accident cost data in the doctors' cases of the two hospitals. The total uninsured cost figures are very close as there is a $4.94 difference between the two hospitals: $37.00 for the Protestant and $32.06 for the Catholic. Two major cost elements contribute to this difference. The others vary slightly but not dramatically. The two relatively

large variables are "wage cost of time lost by injured worker" and "medical cost not insured." Both are higher for the Protestant hospital. The figures are $7.94 and $18.71 respectively for the Protestant hospital, $6.86 and $16.46 for the Catholic hospital. The writer poses the speculation that since the Catholic hospital is staffed and managed by more religious they therefore are more dedicated to their calling and thus return to work more quickly than the employees of the other hospital. It is probably more likely that it was a matter of the Protestant hospital's employees suffering accidents that required them to stay away from work longer and to incur uninsured medical costs.

In the first-aid cases the differences in the cost elements between the two hospitals are more dramatic as a reference to Tables 21 and 22, pages 102 and 103 indicate. There is a total average cost difference of $5.94. Costs were $11.62 for the Protestant hospital and $5.68 for the Catholic hospital. This makes the Catholic hospital's average cost figure 49 percent of that of the Protestant hospital. In all the cost element categories the Protestant hospital has experienced higher costs. The greatest single element cost differential occurred in "wage cost for time lost by workers not injured." This was $4.07 for the Protestant hospital and $0.45 for the Catholic hospital. The difference is $3.62. The second greatest difference occurred in the "wage cost of time lost by injured worker." The figures were $1.62 for the Catholic hospital and $2.50 for the Protestant hospital.

Tables 23 and 24, pages 104 and 105 compare the cost element data of the two hospitals as they pertain to no-injury accident cases. In this category we have the largest relative variation between the cost elements of the two hospitals in absolute dollar terms. The dollar difference is $66.59. The average cost for the Protestant hospital is $304.63 and for the Catholic hospital $238.04. The Catholic figure is 78 percent of the Protestant figure. The largest individual cost element difference occurred in the "property damage" category. The difference is $61.59. Costs were $273.00 for the Protestant hospital and $211.41 for the Catholic one. A review of the basic data indicates that this was because the Protestant hospital incurred damage to a couple of its more expensive pieces of equipment during the pilot study period whereas the equipment of the Catholic hospital fared a little better. The other cost elements do not establish any strong pattern. The researcher has to conclude that the hospital data in the lost-time and doctors' cases are frequently so close for the two hospitals by both total average cost terms and the more detailed elements of cost that it would be very interesting and informative to see what replication studies in the same or other hospitals could reveal.

Tables 25 through 38, pages 108 through 121 follow. They contain tabulations of the data which were summarized in the tables referred to during the foregone discussions. The reader may refer to these tables to gain further insight into the data generated by the Simonds and Imre studies.

Table 25.--Average uninsured cost and standard error of industrial groups--the Simonds data updated by means of a wage and medical cost index to the 1971 cost levels.

Industrial Group	Type of Case	No. of Cases	Average Uninsured Cost	Standard Error of Mean
Metalworking Mfg.	Lost-time	49	$200.20	$ 44.66
Misc. Light Mfg.	Lost-time	17	255.64	80.08
Misc. Heavy Mfg.	Lost-time	33	144.76	49.28
Construction Cos.	Lost-time	13	155.54	35.42
Chemical Cos.	Lost-time	9	503.58	218.68
Metalworking Mfg.	Doctors'	74	46.20	5.08
Misc. Light Mfg.	Doctors'	42	37.73	4.78
Misc. Heavy Mfg.	Doctors'	45	44.20	5.70
Construction	Doctors'	16	500.50	480.00
Metalworking Mfg.	First-aid	278	7.86	0.52
Misc. Light Mfg.	First-aid	232	8.25	0.52
Misc. Heavy Mfg.	First-aid	86	6.03	Negligible
Construction Cos.	First-aid	37	13.10	3.38
Chemical Cos.	First-aid	60	22.27	1.31

(The data from Simonds' Table C-2, Appendix, p. 570 were utilized.)

At the risk of repetition the writer would like to emphasize that perhaps the most significant causes for variances between the Simonds and Imre study findings were inaccuracy in collecting data, incorrect calculations and recordings of data, variation in sample selection as well as unclear recollection of past events. It is more significant to dwell on the similarities of the Simonds and Imre studies. The degree to which the Imre study supports the Simonds findings validates that study's research methodology. This is particularly true in the case of total costs and as to what factors played significant parts in those cost figures. For example, the

Table 26.--Cost elements of 49 lost-time cases in metalworking Manufacturing companies, using the basic Simonds data adjusted to 1971 cost levels by means of wage indexes.

Cost Element	Percentage of Cases in Which Item Occurs	Average Cost (Among All Cases)	Percentage of Total (Uninsured) Cost	Median Cost Among Cases In Which Item Occurs
Wage cost of workers not injured	43%	$ 41.15	20%	$ 4.47
Cost of property damage	20	14.52	7	15.86
Wage cost of time lost by injured worker	83	55.07	27	12.01
Extreme cost for overtime work	4	10.09	5	192.50
Cost of supervisor's time	86	11.49	6	4.31
Wage cost due to decreased output from injured worker after return to work	12	11.90	6	26.95
Wage cost of learning period of new worker	18	8.87	4	28.75
Cost of investigation and processing compensation forms	92	34.90	17	16.32
Medical cost not insured	52	35.91	8	11.40
"Other uninsured costs"	0	0.00	0	0.00
Total uninsured cost		204.82		

(The above average costs were calculated by updating the basic Simonds data in Table C-3, Appendix, p. 576 by means of 1971 wage indexes.)

89¢ difference in average total costs in first-aid cases in the general manufacturing industry categorization of the two studies discussed on page 78 is amazingly close and remarkable for its smallness. In the doctors' cases, as discussed on page 79, the difference between the average uninsured cost figures of the two sutides is $6.01. This is remarkable for its smallness.

Table 27.--Cost elements in 272 doctors' cases, using the basic Simonds data adjusted to 1971 cost levels by means of wage indexes.

Cost Element	Percentage of Cases in Which This Cost Occurs	Average Cost (for all Cases)	Percentage of Total Uninsured (Indirect) Cost
Wage cost of time lost by workers not injured	27%	$ 4.94	9%
Cost of property damage	5	0.31	Negligible
Wage cost of time lost by injured worker	95	11.00	20
Extra cost for overtime work necessitated	1	0.31	Negligible
Cost of supervisor's time required	73	2.73	5
Wage cost due to decreased output from injured worker after return to work	9	2.93	5
Wage cost of learning period of new worker necessitated by accident	1	0.31	Negligible
Medical cost not insured	80	10.29	19
Cost of investigation and local processing of compensation forms	89	15.23	28
"Other uninsured costs"	1	6.56	14
"Direct costs" (insured medical)	44	14.32	
Overhead cost of insurance	44	7.87	
Total uninsured cost (excluding above two items)		54.58	

(The above adjusted cost figures were calculated by updated basic Simonds data in Table C-6, Appendix, p. 577 by means of 1971 wage indexes.)

It would be informative to see if the results of longitudinal studies of the organizations Simonds and Imre researched would yield data as close to each other as the foregone discussions disclosed.

Table 28.--Cost elements in 583 first-aid cases, using the basic Simonds data adjusted to 1971 cost levels by means of wage and medical cost indexes.

Cost Element	Percentage of Cases in Which This Cost Occurs	Average Costs (for all Cases)	Percentage of Total Cost	Median Cost Among Cases in Which This Cost Occurs
Wage cost for time lost by workers who were not injured	11%	$0.13	1%	$ 0.94
Cost of property damage	Negligible	Negligible	Negligible	8.41
Wage cost of time lost by injured worker	99	2.15	21	1.89
Cost of supervisor's time required in connection with accident	55	0.68	7	0.51
Wage cost due to decreased production by injured worker after return to work	1	0.26	1	0.68
Cost of medical attention	96	6.26	60	3.86
Workmen's compensation and insured medical expenses	2	0.17	2	1.20
Cost of investigation	7	0.68	7	3.86
"Other uninsured costs"	1	0.07	1	2.40

The writer suggests the undertaking of such longitudinal or replication studies. It would be useful to study both industries that Simonds and Imre have already researched and industries and Simonds and Imre have no data on. Thus the findings of the two researchers could be either altered or supported and the matrix of data on the uninsured costs of accidents expanded. This would help in easing

Table 29.--Cost elements in 97 no-injury accidents from all organizations, public and private, including naval shipyards, using the basic Simonds data adjusted to 1971 cost levels by means of wage of medical cost indexes.

Cost Element	Average Cost per Case	Percentage of Total Cost	Percentage of Cases in Which Item Occurs
Property damage	$356.51	81%	99%
Cost of wages for man-hours lost	57.44	13	51
Cost of investigation of accidents	5.85	1	16
Other costs	22.79	5	16

(The above adjusted cost figures were calculated by updating the basic Simonds data in Table C-4, Appendix, p. 576 by means of 1971 wage and medical cost indexes.)

the estimating of the uninsured costs of accidents in various industries. And it would help reduce the need for organizations to conduct pilot studies to get a good idea of what their true accident cost picture was.

Supplementary Material Guide

The main body of the essay of this manuscript is followed by two appendixes, and the bibliography. These were incorporated to help in further explaining the findings of the Simonds and Imre studies.

1. "Appendix A--Accident Cost Analysis Guidelines and Research Instruments."

2. "Appendix B--Individual Organization and Supplementary Data of the Imre Study.

Table 30.--Average cost for all industries.

Organization	Number of Cases	Average Uninsured Cost
	Lost-time Cases	
I-VII	122	$ 176.17
	Doctors' Cases	
I-VII	249	38.13
	First-Aid Cases	
I-VII	372	11.08
	No-Injury Cases	
I-VII	100	335.57

(A weighted mathematical averaging of the data from Table 3.)

Table 31.--Costs by industry--individual and combined format (hospitals) (I-Catholic; II-Protestant).

Organization	No. of Cases	Average Uninsured Cost	Standard Error of Mean
		Lost-time Cases	
I	12	$116.21	$ 9.60
II	10	112.44	6.28
I & II	22	114.49	Not calculated
		Doctors' Cases	
I	25	32.06	1.84
II	22	27.00	2.30
I & II	47	34.37	Not calculated
		First-aid Cases	
I	65	5.68	0.200
II	77	11.62	1.14
I & II	142	8.90	Not calculated
		No-injury Cases	
I	10	238.04	38.75
II	8	304.63	21.07
I & II	18	267.64	Not calculated

Table 32.--Costs by industry--combined format (utilities) [III-Large; IV-Small].

Organization	Number of Cases	Average Uninsured Cost
	Lost-time Cases	
III & IV	56	$ 230.22
	Doctors' Cases	
II & IV	119	40.33
	First-aid Cases	
III & IV	81	16.78
	No-injury Cases	
III & IV	53	366.32

(Organization 4 did not report any lost-time cases during the period of the original study.)

Table 33.--Costs by industry--combined format (Manufacturing).

Organization	Number of Cases	Average Uninsured Cost
	Lost-time Cases	
V, VI & VII	44	$ 138.22
	Doctors' Cases	
V, VI & VII	83	37.11
	First-aid Cases	
V, VI & VII	149	10.06
	No-injury Cases	
V, VI & VII	29	321.54

Table 34.--Average uninsured cost per case--the Simonds data adjusted to 1971 cost levels by means of wage and medical cost indexes.

Types of Cases	No. of Cases Averaged	Average Uninsured Cost
Lost-time Cases:		
All industry (except shipyards)	147	$ 200.20
Metalworking manufacturing	49	200.20
General manufacturing	80	200.20
Naval shipyards	72	161.70
Doctors' Cases:		
All industry (except shipyards)	272	53.90
General manufacturing	160	43.12
Metalworking manufacturing	74	46.20
First-aid Cases:		
All industry (except shipyards)	583	9.83
General manufacturing	400	9.17
Metalworking manufacturing	278	7.86
No-injury Accidents:		
All industry (including shipyards)	97	446.60
General manufacturing	19	577.50
Naval shipyards	71	423.50
No-lost-time Cases:		
Naval shipyards	875	23.58

Table 35.--Average uninsured cost per case--the Imre data.

Types of Cases	No. of Cases Averaged	Average Uninsured Cost
Lost-time Cases:		
All industry	122	$ 176.17
Hospitals	22	114.49
Utilities	56	230.22
Manufacturing	44	138.22
Doctors' Cases:		
All industry	249	38.13
Hospitals	47	37.00
Utilities	119	40.33
Manufacturing	83	37.11
First-aid Cases:		
All industry	372	11.08
Hospitals	142	8.90
Utilities	81	16.78
Manufacturing	149	10.06
No-injury Accidents:		
All industry	100	335.57
Hospitals	18	267.64
Utilities	53	366.32
Manufacturing	29	321.54

Table 36.--Cost elements in 372 first-aid cases, utilizing the data from organizations 1-7 inclusive of the Imre study, weighted averages.

Cost Elements	Percentage of Cases in Which Item Occurs	Average Cost Among All Organization Cases	Percentage of Total Uninsured (Indirect) Cost
Wage cost for time lost by workers not injured	29.07%	$ 1.77	15.97%
Cost of property damage	0.00	0.00	0.00
Wage cost of time lost by injured worker	80.04	3.67	33.12
Cost of supervisor's time required in connection with accident	88.03	1.62	14.62
Wage cost due to decreased production by injured worker after return to work	0.00	0.00	0.00
Cost of medical attention	74.47	2.49	22.47
Workmen's compensation and insured medical expenses	79.00	1.53	13.81
Cost of investigation	Negligible	Negligible	Negligible
"Other uninsured costs"		0.00	0.00
Total		11.08	

Table 37.--Cost elements in 122 lost-time cases, utilizing the data from organizations 1-7 inclusive of the Imre study, weighted averages.

Cost Elements	Percentage of Cases in Which Item Occurs	Average Cost Among All Organization Cases	Percentage of Total Uninsured (Indirect) Cost
Wage cost of workers not injured	78.47%	$ 3.86	1.95%
Cost of property damage	28.39	16.60	8.38
Wage cost of time lost by injured worker	100.00	47.08	23.78
Extra cost for overtime work	10.71	49.24	24.87
Cost of supervisor's time	100.00	13.01	6.57
Wage cost due to decreased output from injured worker after return to work	65.09	12.26	6.19
Wage cost of learning period of new worker	9.70	7.30	3.69
Cost of investigation and processing compensation forms	99.40	15.63	7.89
Medical cost not insured	100.00	33.00	16.67
"Other uninsured costs"	Negligible	Negligible	
Total uninsured cost			

(Since Organization IV did not report any lost-time cases, the figures of Organization III were used in arriving at an average figure for the utilities. And since Organizations V and VII did not report any cost for "extreme cost for overtime work" element, the Organization VI figure of $12.60 was used for the manufacturing industry average. These two differences are multiplied in the above table to the point where the total cost figure differs from that of Table 9. A careful recheck of all calculations reveals that this is the source for the apparent variance.)

Table 38.--Elements in 249 doctors' cases, utilizing the data from organizations 1-7 inclusive of the Imre study, weighted averages.

Cost Elements	Percentage of Cases in Which Item Occurs	Average Cost Among All Organization Cases	Percentage of Total Uninsured (Indirect) Cost
Wage cost of workers not injured	67.28%	$ 3.42	6.31%
Cost of property damage	Negligible	Negligible	Negligible
Wage cost of time lost by injured worker	99.53	9.97	18.39
Extreme cost for over-time work	0.00	0.00	0.00
Cost of supervisor's time	96.70	5.60	10.33
Wage cost due to decreased output from injured worker after return to work	*3.20	*8.40	15.50
Wage cost of learning period of new worker	0.00	0.00	0.00
Cost of investigation and processing compensation forms	*94.04	*14.55	26.84
Medical cost not insured	*92.37	*7.72	14.24
"Other uninsured costs"	*98.79	*4.55	8.39
Total uninsured cost		54.21	100.00

(This table evidences the same apparent averaging discrepancies explained in Table 65.)

*Factors not represented in every organization or industry averaged.

APPENDICES

APPENDIX A

ACCIDENT COST ANALYSIS GUIDELINES

This Appendix contains a reproduction of the booklet which was handed out to people in cooperating organizations as a guide in gathering and recording data on accidents. In effect the material contained here was either copied rotely from Simonds[38] or taken from his book on safety management and then condensed and rephrased.[39] The Research instruments are direct duplications of the instruments of the National Safety Council[40] which that organization provided for Imre and allowed him to use in the study. In effect these instruments were adopted by the National Safety Council from Simonds who developed them in his pioneering 1947 study. These instruments are illustrated in the Simonds text on safety management.[41]

As it was explained in the chapter on methodology, Imre provided the research instruments to cooperating organizations on which to record data for his pilot studies. Then he also gave the people who did the actual recording of the data the "Accident Cost Analysis Guideline" brochure to help them record the information properly and so that they would have a ready source of reference in case they forgot some details that the researcher had explained orally.

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[38]Simonds and Grimaldi, pp. 35 and 39.

[39]Ibid., pp. 112-134.

[40]National Safety Council, 425 North Michigan Avenue, Chicago, Illinois, 60611.

[41]Simonds and Grimaldi, pp. 127-129.

FREQUENCY RATE

$$\text{Frequency} = \text{Number of disabling injuries} / \frac{\text{Number of man-hours worked}}{1{,}000{,}000}$$

For ease of computation, the formula is usually expressed as:

$$\text{Frequency} = \frac{\text{Number of Disabling Injuries} \times 1{,}000{,}000}{\text{Number of Man-Hours Worked}}$$

SEVERITY RATE

Severity = Standard time charges for deaths and permanent disabilities, plus actual days lost for temporary total disabilities, for all injuries that occur during the period covered by the rate, divided by the number of millions of man-hours worked.

For convenience it is usually stated:

$$\text{Severity} = \frac{\text{Total Days Charged} \times 1{,}000{,}000}{\text{Number of Man-Hours Worked}}$$

It is important that the following points be made clear to the supervisors participating in the pilot study:

1. This study is for only a limited period of time, does not entail a permanent addition to supervisors' duties.

2. Its purpose is to find out the average cost for each type of accident, not to compare foremen of departments, or to seek ways of handling the accidents at lower cost.

3. Supervisors should not hesitate to make rough estimates as to cost. If some of the estimates are too high, and others too low, the averages may be very satisfactory.

4. They need not be concerned over the possibility of checking the wrong accident classification in making out reports, but they should be sure to report <u>all</u> accidents that may be of a given type that occur during the period stipulated for that type of accident.

There are two major classes of costs resulting from accidents, the <u>insurance</u> (or insured) cost and the <u>uninsured</u> cost.

These are not at present the most widely used expressions to classify accident costs. For years safety men have referred to direct and indirect costs.

The old indirect cost is identical with what is meant by the uninsured costs. The two expressions may be used interchangeably.

Direct cost in accident-prevention work has meant payment under workmen's compensation laws and medical expenses of the type usually covered by insurance. The overhead cost of insurance, i.e., the difference between the money paid out by the insurance company in settlement of claims from employees of a concern and the total insurance premiums paid by that company for this workman's compensation coverage, has not been included in either direct or the indirect cost.

There is also a psychological advantage in moving from the term "indirect" to "uninsured." Managements have been all too prone to regard their insurance premiums as the cost of their accidents and to disregard those costs that were apparently not subject to measurement and only indirectly stemming from the accident...Labeling such costs "uninsured" (damaged goods, gawking, etc.) tends to emphasize that they are an even more direct and unshiftable cost to the company than is the bill for medical services, if any, which affects company cost only indirectly and partially through its effect on future insurance rates or rebates, except in concerns carrying their own insurance.

ELEMENTS OF UNINSURED COST

1. Cost of wages paid for working time lost by workers who were not injured.

2. The net cost to repair, replace, or straighten up materials or equipment that was damaged in the accident.

3. Cost of wages paid for working time lost by injured workers, other than workmen's compensation payments.

4. Extra cost due to overtime work necessitated by an accident.

    a. Workers who would have done the job in regular hours are forced into temporary idleness by the accident but are continued on the payroll at their normal wages.

    b. Workers who would have done the job in regular hours but for the accident are put to work at other productive operations during the regular time.

5. Cost of wages paid supervisors while their time is required for activities necessitated by the accident.

6. Wage cost due to decreased output of injured worker after return to work.

7. Cost of learning period of new worker.

8. Uninsured medical cost borne by the company.

9. Cost of time spent by higher supervision and clerical workers on investigations or in the processing of compensation application forms.

10. Miscellaneous unusual costs.

    (Less typical costs, the validity of which must be clearly shown by the investigator on individual accident reports.)

    a. Public liability claims.

    b. Cost of renting replacement equipment.

    c. Loss of profit on contracts cancelled or orders lost if the accident causes a net long-run reduction in total sales.

    d. Loss of bonuses by company.

    e. Cost of hiring new employees if the additional hiring expense is significant.

    f. Cost of <u>excess</u> spoilage (above normal) by new employees.

It is too burdensome to record the indirect or uninsured costs of accidents in the regular, permanent books of the company; the alternative is to develop averages or ratios that may be applied to data already a part of the record-keeping system.

One could not assume a constant ratio between total direct and total indirect costs in the individual organization or plant unless the following six averages and three ratios held constant for the organization or plant:

1. Average direct cost per lost-time case
2. Average direct cost per doctor's case
3. Average indirect cost per lost-time case
4. Average indirect cost per doctor's case
5. Average indirect cost per first-aid case
6. Average indirect cost per no-injury accident
7. Ratio of doctor's cases to lost-time cases
8. Ratio of first-aid cases to lost-time cases
9. Ratio of no-injury accidents to lost-time cases

THE MODERN STANDARD METHOD OF CALCULATING ACCIDENT COSTS

Total Cost = Insurance cost + A times number of lost-time cases + B times number of doctor's cases + C times number of first-aid cases + D times number of no-injury accidents.

(This covers the ordinary run of accidents. If something in the nature of a catastrophe occurs, it should be investigated independently and any additional costs resulting from it added.)

In the formula, A,B,C,D are constants indicating respectively the average uninsured cost for each of the categories of cases.

The dividing lines between categories of accidents are indicated by:

1. Lost-time cases: (a) permanent partial disability and (b) temporary disability.

2. Doctors' cases: (a) temporary partial disabilities and (b) medical treatment cases requiring the attention of a physician.

3. First-aid cases: medical treatment cases (a) requiring only first aid and (b) resulting in property damage of less than $20 and in loss of less than eight hours of working time.

4. No-injury accidents: accidents that (a) either cause no injury or cause minor injury not requiring the attention of a physician and (b) result in property damage of $20 or more or in loss of eight or more man-hours.

The following conditions must all be present in order that there be a "loss of profit" on goods not produced as a result of accidents:

1. Accidents must cause a decrease in average rate of output over a considerable period of time.

2. The resultant rate of output must be lower than management finds it desirable to maintain in view of the demand for its product and average and variable unit costs of production.

3. The resultant rate of output must be sufficiently lower to cause a reduction in sales, due to inability to supply the goods.

4. Sales lost during this period must not be recoverable at a later date.

(It is very unusual for all these conditions to be fulfilled.)

INSTRUCTIONS FOR USE OF THE INVESTIGATOR'S COST DATA SHEET

Obtain name of injured person, date of injury, and class of accident from the department supervisor's report and the medical report. Get the wage rate of the injured person and his supervisor and the average hourly wage rate of workers in the department from appropriate

sources--the shop time clerk, the foreman, the payroll department, or the accounting department.

Item 1(a). Copy this information from department supervisor's report, item 1.

Item 1(b). Copy this item from department supervisor's report, item 2. Computation: Multiply the number of workers who lost time by the average amount of time lost per worker for 1(a) and 1(b). Add these results and multiply by the average hourly wage of workers in the department, to secure the wage cost of time lost by workers who were not injured. Enter this figure in item 1.

Item 2. Copy the description of damage and the net cost from the supervisor's report form, item 3.

Item 3(a). Copy from department supervisor's report, item 4.

Item 3(b). If it is company policy to pay an injured worker during the waiting period before compensation is paid, or if it is customary to supplement compensation payments, the number of days for which payment is made by the company and the hours per day for which the injured worker is paid while not working should be entered in this item.

Item 3(c). The number of trips to the dispensary can usually be secured from the medical records or from the shop clerk's records. For the average time per trip, the average time found from the study of first-aid cases may be used in the absence of precise data for this case. Total trip time is the product of the number of trips and the average time per trip.

Item 3(d). This refers to time lost by the employee because of appearances before the compensation commission or before the accident investigating committee, or in explaining to the foreman or others how the accident occurred. Computation: The time recorded in items 3(a-d) is the total time lost by the injured worker for which the employer has paid wages in addition to compensation. This time should be multiplied by the hourly wage rate and the result entered in item 3. If the payments for any of the time recorded are at a lower rate than the hourly wage rate stated at the top of the form, the amount paid under that item should be computed separately, using the correct wage rate.

Item 4. If item 5 of the department supervisor's accident cost report indicates probable overtime work, the amount of overtime should be determined by investigation. This overtime should be multiplied by the difference between the overtime wage rate and the normal wage rate, the costs of extra supervision, light, heat, or cleaning added and the result entered in item 4. Actual lost production, demurrage charges, and other special costs are in item 10.

Item 5(a). Copy from department supervisor's report, item 6.

Item 5(b). This is an estimate to be made by the supervisor after the case has been closed. The investigator will secure this information from the supervisor and enter it in item 5(b). Computation: The total time recorded in 5(a) and 5(b) is multiplied by the supervisor's hourly rate, and the result entered in item 5.

Items 6(a) and 6(b). Both the total time on light work at reduced output and the percentage of normal output during this period should be secured by the investigator from the supervisor. Computation: The cost is estimated by subtracting the percentage of normal output from 100, multiplying this result by the worker's average wage rate, and multiplying this in turn by the number of hours per day on light work and the number of days on light work. This result is entered in item 6. Note: Item 6 is not used if the assignment to light work is accompanied by a corresponding reduction in wages. It is used only to estimate the difference between the injured worker's actual productivity and the productivity for which he is being paid.

Item 7(a). This item is treated exactly like items 6(a) and 6(b) above. If a new worker is not hired, item 7 is not used.

Item 7(b). This item is used for the time taken by a supervisor or fellow employee to train the new worker. It should represent time taken from the regular work of the person assigned to training. The cost per hour is the wage rate of the person doing the training. Computation: As in items 6(a) and 6(b), 7(a) is the product of the hourly wage times the percentage reduction in normal output (100 minus the average percentage of normal output) times the total time in hours that the worker's output was below normal.

For item 7(b), the total time spent by others in training the new worker is multiplied by the cost per hour of this training. The results of the computation in items 7(a) and 7(b) are added, and the sum entered in item 7.

Item 8. Payments to physicians by the insurance company or payments made out of the self-insurance fund should not be entered here. However, doctor's fees paid by the company outside of its compensation insurance plan and the cost of dispensary or first-aid care (unless included in the self-insurance plan) should be entered here. For ordinary dispensary treatment, multiply the number of visits by the predetermined average cost per visit.

Item 9. The cost of time spent by higher supervision and by clerks in administrative departments investigating accidents and processing workmen's compensation application forms should be estimated by the safety director. If he prefers to make a single estimate for each class of case, for the whole period covered by the pilot study, this item may be omitted from the computations on the separate data sheets, and added in as a lump sum when the total of the sheets for each class is added and before the average cost per case for each class is calculated.

Item 10. Thorough investigation should be made to establish the validity of any costs entered in this item.

Total uninsured cost: This is the sum of the final amounts entered in items 1-10, inclusive.

Computation of average cost per case: The data sheets are sorted by class of case. The total uninsured costs recorded at the bottom of each data sheet are added for each class separately, and the sum is divided by the number of data sheets in that class. This quotient is the average cost per case for that class, which will be used in future cost estimates.

FIRST-AID CASES

It might be regarded as an undue burden to be asked to fill out cost report forms for the common first-aid cases. Fortunately, there is an easy and accurate way of calculating the average costs for this class of case.

The essential information needed is: (a) the average amount of working time lost per trip to the dispensary, (b) the average dispensary cost per treatment, (c) the average number of visits to the dispensary per case, and (d) the average amount of supervisor's time required per case.

The following method of developing averages for each of these items is recommended:

a. Estimate of average working time lost per trip to the dispensary for first aid. Departmental time records may show the amount of time each worker is absent from his job for first aid. If so, a random sample of 50 to 100 records of persons known to have received first aid should be selected from different departments. The sample should include representative cases from all parts of the plant so that no error will be introduced because most of the cases studied happen to come from departments near the dispensary. The average time lost per dispensary visit is calculated by adding the absence time for all visits in the sample and dividing by the total number of visits.

If departmental records do not contain this information, it will be necessary to assign an investigator to observe a random sample of fifty or more persons visiting the dispensary. He will record the time required to secure first-aid -reatment, including waiting time in the dispensary, for each person observed. To the recorded time should be added an estimate of the time the employee needs to secure a pass and to travel from his department to the dispensary and return.

As before, all the estimated time intervals of absence are added and then divided by the total number of persons observed, to secure the average time.

b. Average cost of providing medical attention for each visit. An estimate of this average can be made most readily by dividing the total cost of operating the dispensary for a year by the total number of treatments given during the year. Of course, it is assumed that there is no great difference between the amount of time spent by the dispensary in treating occupational first-aid cases and that spent on nonoccupational illness cases. The pilot studies conducted by the National Safety Council have indicated there is little error in this assumption.

c. Average number of visits to the dispensary per case. This figure is readily calculated by dividing the number of treatments of Class 3 (first-aid) injuries in a representative period, perhaps a month or six weeks, by the number of Class 3 injuries reported during the same period of time. It is of course necessary for the dispensary to record each treatment it gives for a Class 3 injury for the period of the pilot study.

d. The average amount of supervisor's time required per case. Where possible, this information should be secured by observing the activities of representative supervisors in connection with first-aid cases. The investigator should note the amount of time spent in filling out the necessary report forms for each case, the time spent in investigating the accident, and the time required to adjust the work schedule for the period the worker is absent from the department.

When a sufficient number of cases has been studied to be representative both of the activities of supervisors in different departments and of different types of first-aid cases, the average time spent by a supervisor is computed by adding all the time intervals recorded and dividing by the number of cases.

If it is impossible to make a time study of the supervisors' activities in connection with first-aid cases, the only alternative is to secure from each supervisor an estimate of the time he spends on the usual first-aid case, and to average these estimates by adding them and dividing by the number of supervisors.

The average total uninsured cost of a case in Class 3 is estimated from the data accumulated above as follows: The average amount of time lost for a trip to the dispensary (a) is multiplied by the plant's average wage rate, secured from the payroll department, to get the average cost per trip for the worker's time lost (b). To this figure is added the estimated cost of providing medical attention for a single visit (c). This figure is then multiplied by the average number of dispensary visits per first-aid case (d), and to this result is added the average amount of supervisor's time required per case (e). It should be noted that (c), the average number of dispensary visits per first-aid case, will usually include a fraction, for example, 2 1/3. It is, of course, important to use the precise fraction. Summarizing, then, the average cost per first-aid case (there is seldom any insured cost in first-aid cases) may be computed by the following formula, referring to the explanations above for each letter: $(a \times b + c)d + e$. Safety director will investigate all lost time injuries anyway.

Find the average hourly wage, excluding overtime, that was paid by the company during the period when the pilot study was made. Then divide that into the average hourly wage, excluding overtime, being paid by the concern during the period for which it is desired to estimate accident to the average cost figures kept from the pilot study.

For example, suppose the safety engineer of a company manufacturing metal containers is calculating the company's accident cost for 1969, using the average cost figures obtained by a pilot study in that company in 1964.

He finds the average wage, excluding overtime, in the company in 1964 was $2.15, while in 1969 it has risen to $2.54. Dividing $2.15 into $2.54, het gets $1.18.

His pilot study results in 1964 for uninsured costs were:

Lost-time cases	$ 125.00
Doctor's cases	40.00
First-aid cases	6.50
No-injury accidents	225.00

Multiplying these by 1.18 to bring them in line with 1969 costs, he has:

Lost-time cases	$ 147.00
Doctor's cases	47.20
First-aid cases	7.70
No-injury accidents	265.00

INVESTIGATOR'S COST DATA SHEET

Class 1_____
(Permanent partial or temporary total disability)

Class 2_____
(Temporary partial disability or medical treatment case requiring outside physician's care)

Class 3_____
(Medical treatment case requiring local dispensary care)

Class 4_____
(No injury)

Name_____

Date of injury_____ Its nature_____

Department_____ Operation_____Hourly Wage_____

Hourly wage of supervisor $_____
Average hourly wage of workers in department where injury occurred $_____

1. Wage cost of time lost by workers who were not injured, if paid by employer $_____

   a. Number of workers who lost time because they were talking, watching, helping_____. Average amount of time lost per worker _____ hours _____ minutes.

   b. Number of workers who lost time because they lacked equipment damaged in accident or because they needed output or aid of injured worker _____. Average amount of time lost per worker _____ hours _____ minutes.

2. Nature of damage to material or equipment _____

   _____

   Net cost to repair, replace, or put in order the above material or equipment $_____

3. Wage cost of time lost by injured worker while being paid by employer (other than workmen's compensation payments) $_____

   a. Time lost on day of injury for which worker was paid

   _____hours _____ minutes.

b. Number of subsequent days' absence for which worker was paid _____ days (other than workmen's compensation payments) _____ hours per day.

c. Number of additional trips for medical attention on employer's time on succeeding days after worker's return to work _____.

d. Additional lost time by employee, for which he was paid by company _____ hours _____ minutes.

4. If lost production was made up by overtime work, how much more did the work cost than if it had been done during regular hours? (Cost items: wage rate difference, extra supervision, light, heat, cleaning for overtime.) $_____

5. Cost of supervisor's time required in connection with the accident $_____

a. Supervisor's time shown on Department Supervisor's Report _____ hours _____ minutes.

b. Additional supervisor's time required later _____ hours _____ minutes.

6. Wage cost due to decreased output of worker after injury of old rate $_____

a. Total time on light work or at reduced output _____ days _____ hours per day.

b. Worker's average percentage of normal output during this period _____ %.

7. If injured worker was replaced by new worker, wage cost of learning period $_____.

a. Time new worker's output was below normal for his own wage _____ days _____ hours per day. His average percentage of normal output during time _____%. His hourly wage $_____.

b. Time of supervisor or others for training _____ hours. Cost per hour $_____.

8. Medical cost to company (not covered by workmen's compensation insurance) $_____.

9. Cost of time spent by higher supervision on investigation, including local processing of workmen's compensation application forms. (No safety or prevention activities should be included.) $_____

10. Other costs not covered above (e.g., public liability claims; cost of renting replacement equipment; loss of profit on contracts cancelled or orders lost if accident causes net reduction in total sales; loss of bonuses by company; cost of hiring new employee if the additional hiring expense is significant; cost of excessive spoilage by new employee; demurrage).

$_____

Explain fully.

Total uninsured cost . . . . . $_____

Name of company _____

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425 North Michigan Avenue
Chicago, Illinois 60611

DEPARTMENT SUPERVISOR'S ACCIDENT COST REPORT

Injury Accident _____
No-injury Accident_____

Date_____ Name of injured worker_____

1. How many other workers (not injured) lost time because they were talking, watching, helping at accident?

   About how much time did most of them lose? ____hours _____minutes.

2. How many other workers (not injured) lost time because they lacked equipment damaged in the accident or because they needed the output or aid of the injured worker? _____

   About how much time did most of them lose? _____ hours _____mins.

3. Describe the damage to material or equipment_____

   _____

4. How much time did injured worker lose on day of injury for which he was paid?_____hours _____ minutes

5. If operations or machines were made idle: Will overtime work probably be necessary to make up lost production? Yes___ , No ___. Will it be impossible to make up loss of use of machines or equipment? Yes ___, No ___.

   Demurrage or other special non-wage costs due to stopping an operation $_____

6. How much of supervisor's time was used assisting, investigating, reporting, assigning work, training or instructing a substitute, or making other adjustments _____ hours _____ minutes.

   Name of Supervisor_____

   Fill in and send to the safety department not later than day after accident.

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APPENDIX B

INDIVIDUAL ORGANIZATION AND SUPPLEMENTARY DATA OF THE IMRE STUDY

INDIVIDUAL ORGANIZATION AND SUPPLEMENTARY DATA OF THE IMRE STUDY

This Appendix contains Tables 39 through 63, pages 140 through 164. They contain the data that was not used directly in the main text of the dissertation. In the main text there was an exhaustive discussion on the comparative average uninsured cost figures as well as the elements that contributed to them of the Simonds and Imre studies. These tended to deal with industry by industry comparisons by accident classifications. There was also some discussion of the Imre findings in the two hospitals he studied. Tables containing data pertinent to the discussion were included in the main text. A significant amount of data was not included in the main text because it was in the form that did not lend itself readily useful for comparative analysis with the Simonds findings or the unique characteristics of the hospitals of the Imre study. This does not diminish their importance. Their value lies in the fact that they are building blocks from which the summary tables of the main text were constructed. They contain average and elemental cost information on the various individual organizations and supplemental tables dealing with the average uninsured cost and the standard error of the mean of each organization, within each industry, for each accident classification. This helps to shed light on the reliability of the data.

Table 39.--Average uninsured cost and standard error of the mean (Lost-time Cases).

Organization	No. of Cases	Average Uninsured Cost	Standard Error of Mean
(I) - Hospital, Catholic	12	$116.21	9.60
(II) - Hospital, Protestant	10	112.44	6.28
(III) - Utility, Large	56	230.22	5.95
(IV) - Utility, Small	0	0	0
(V) - Manufacturing	5	185.20	14.18
(VI) - Manufacturing	14	132.50	4.87
(VII) - Manufacturing	25	132.02	8.12

Table 40.--Average uninsured cost and standard error of the mean (Doctor's cases).

Organization	No. of Cases	Average Uninsured Cost	Standard Error of Mean
(I) - Hospital, Catholic	25	$ 32.06	1.84
(II) - Hospital, Protestant	22	37.00	2.30
(III) - Utility, Large	102	39.53	1.74
(IV) - Utility, Small	17	45.10	6.73
(V) - Manufacturing	16	33.72	2.74
(VI) - Manufacturing	31	44.15	2.68
(VII) - Manufacturing	36	32.55	1.00

Table 41.--Average uninsured cost and standard error of the mean (First-Aid Cases).

Organization	No. of Cases	Average Uninsured Cost	Standard Error of Mean
(I) - Hospital, Catholic	65	$ 5.68	0.200
(II) - Hospital, Protestant	77	11.62	1.14
(III) - Utility, Large	67	17.84	0.817
(IV) - Utility, Small	14	11.69	1.35
(V) - Manufacturing	18	9.29	0.73
(VI) - Manufacturing	66	11.54	0.47
(VII) - Manufacturing	65	8.78	0.36

Table 42.--Average uninsured cost and standard error of the mean (No-injury Accidents).

Organization	No. of Cases	Average Uninsured Cost	Standard Error of Mean
(I) - Hospital, Catholic	10	$238.04	38.75
(II) - Hospital, Protestant	8	304.63	21.07
(III) - Utility, Large	50	378.99	21.36
(IV) - Utility, Small	3	155.11	11.76
(V) - Manufacturing	4	238.12	116.00
(VI) - Manufacturing	10	327.54	15.50
(VII) - Manufacturing	15	339.78	30.36

Table 43.--Cost by industry--individual and combined format (utilities) (III-Large; IV-Small).

Organization	No. of Cases	Average Uninsured Cost	Standard Error of Mean
		Lost-Time Cases	
III	56	$230.22	$ 5.95
IV	0	0.00	0.00
III & IV	56	230.22	5.95
		Doctors' Cases	
III	102	39.53	1.74
IV	17	45.10	6.73
III & IV	119	40.33	Not calculated
		First-Aid Cases	
III	67	17.84	0.817
IV	14	11.69	1.35
III & IV	81	16.78	Not calculated
		No-Injury Cases	
III	50	378.99	21.36
IV	3	155.11	11.76
III & IV	53	366.32	Not calculated

(Organization 4 did not report any Lost-Time Cases during the period of the original study.)

Table 44.--Costs by industry--individual and combined format (Manufacturing).

Organization	No. of Cases	Average Uninsured Cost	Standard Error of Mean
		Lost-Time Cases	
V	5	$ 185.20	$ 14.18
VI	14	132.50	4.87
VII	25	132.02	8.12
V, VI & VII	44	138.22	Not calculated
		Doctors' Cases	
V	16	33.72	2.74
VI	31	44.15	2.68
VII	36	32.55	1.00
V, VI & VII	83	37.11	Not calculated
		First-Aid Cases	
V	18	9.29	0.73
VI	66	11.54	0.47
VII	65	8.78	0.36
V, VI & VII	149	10.06	Not calculated
		No-Injury Cases	
V	4	238.12	116.00
VI	10	327.54	15.50
VII	15	339.78	30.36
V, VI & VII	29	321.54	Not calculated

Table 45.--Cost elements in 56 lost-time cases, utilizing the data from organization number 3 (Large Utility) of the Imre study.

Cost Element	Percentage of Cases in Which Item Occurs	Average Cost Among All Organization Cases	Percentage of Total (Uninsured) Cost
Wage cost of workers not injured	83.93%	$ 5.30	2.30%
Cost of property damage	14.30	19.11	8.30
Wage cost of time lost by injured worker	100.00	50.30	21.85
Extra cost for overtime work	7.14	58.40	25.37
Cost of supervisor's time	100.00	18.61	8.08
Wage cost due to decreased output from injured worker after return to work	35.71	13.30	5.78
Wage cost of learning period of new worker	5.30	9.27	4.03
Cost of investigation and processing compensation forms	98.21	16.29	7.08
Medical cost not insured	100.00	39.64	17.22
"Other uninsured costs"	0.00	0.00	0.00
Total uninsured cost	100.00	230.22	100.00

Table 46.--Cost elements in 5 lost-time cases, utilizing the data from organization number 5 (Manufacturing Firm) of the Imre study.

Cost Element	Percentage of Cases in Which Item Occurs	Average Cost Among All Organization Cases	Percentage in Total (Uninsured) Cost
Wage cost of workers not injured	80.00%	$ 3.44	1.86%
Cost of property damage	20.00	38.00	20.52
Wage cost of time lost by injured worker	100.00	59.84	32.32
Extreme cost for over-time work	0.00	0.00	0.00
Cost of supervisor's time	100.00	11.31	6.11
Wage cost due to decreased output from injured worker after return to work	100.00	11.41	6.16
Wage cost of learning period of new worker	20.00	8.17	4.14
Cost of investigation and processing com-pensation forms	100.00	14.82	8.00
Medical cost not insured	100.00	38.20	20.63
"Other uninsured costs	0.00	0.00	0.00
Total uninsured cost		185.20	100.00

(Organization Number 4 did not have any lost-time cases recorded.)

Table 47.--Cost elements in 14 lost-time cases, utilizing the data from organization number 6 (Manufacturing Firm) of the Imre study.

Cost Element	Percentage of Cases in Which Item Occurs	Average Cost Among All Organization Cases	Percentage of Total (Uninsured) Cost
Wage cost of workers not injured	71.43%	$ 3.60	2.72%
Cost of property damage	28.57	24.57	18.54
Wage cost of time lost by injured worker	100.00	44.14	33.31
Extra cost for overtime work	14.28	12.60	9.50
Cost of supervisor's time	100.00	7.15	5.40
Wage cost due to decreased output from injured worker after return to work	85.71	11.93	9.00
Wage cost of learning period of new worker	14.28	1.30	0.98
Cost of investigation and processing compensation forms	100.00	14.71	11.10
Medical cost not insured	100.00	12.50	9.43
"Other uninsured costs"	0.00	0.00	0.00
Total uninsured cost	100.00	132.50	100.00

Table 48.--Cost elements in 25 lost-time cases, utilizing the data from organization number 7 (Manufacturing Firm) of the Imre study.

Cost Element	Percentage of Cases in Which Item Occurs	Average Cost Among All Organization Cases	Percentage of Total Uninsured (Indirect) Cost
Wage cost of workers not injured	68.00%	$ 2.53	1.92%
Cost of property damage	24.00	8.84	6.70
Wage cost of time lost by injured worker	100.00	46.62	35.31
Extra cost for overtime work	0.00	0.00	0.00
Cost of supervisor's time	100.00	8.17	6.19
Wage cost due to decreased output from injured worker after return to work	48.00	12.34	9.35
Wage cost of learning period of new worker	8.00	6.06	4.60
Cost of investigation and processing compensation forms	100.00	15.80	11.97
Medical cost not insured	100.00	31.66	23.98
"Other uninsured costs"	Negligible	Negligible	Negligible
Total uninsured cost	100.00	132.02	100.00

Table 49.--Cost elements in 102 doctors' cases, utilizing the data from organization number 3 (Large Utility) of the Imre study.

Cost Element	Percentage of Cases in Which Item Occurs	Average Cost Among All Organization Cases	Percentage of Total Uninsured (Indirect) Cost
Wage cost of time lost by workers not injured	47.05%	$ 2.64	6.68%
Cost of property damage	Negligible	Negligible	Negligible
Wage cost of time lost by injured worker	98.03	10.32	26.11
Extra cost for overtime work necessitated	0.00	0.00	0.00
Cost of supervisor's time required	92.84	7.90	19.98
Wage cost due to decreased output from injured worker after return to work	Negligible	Negligible	Negligible
Wage cost of learning period of new worker	0.00	0.00	0.00
Medical cost not insured	92.25	13.37	33.82
Cost of investigation and local processing of compensation forms	81.37	5.30	13.41
"Other uninsured costs"	Negligible	Negligible	Negligible
Total uninsured cost	100.00	39.53	100.00

Table 50.--Cost elements in 17 doctors' cases, utilizing the data from organization number 4 (Small Utility) of the Imre study.

Cost Element	Percentage of Cases in Which This Occurs	Average Cost For All Organization Cases	Percentage of Total Uninsured (Indirect) Cost
Wage cost of time lost by workers not injured	41.11%	$ 11.22	24.87%
Cost of property damage	0.00	0.00	0.00
Wage cost of time lost by injured worker	100.00	9.00	19.96
Extra cost for overtime work necessitated	0.00	0.00	0.00
Cost of supervisor's time required	100.00	8.35	18.51
Wage cost due to decreased output from injured worker after return to work	0.00	0.00	0.00
Wage cost of learning period of new worker necessitated by accident	0.00	0.00	0.00
Medical cost not insured	88.24	12.18	27.01
Cost of investigation and local processing of compensation forms	100.00	4.35	9.65
"Other uninsured costs"	0.00	0.00	0.00
Total uninsured cost		45.10	100.00

Table 51.--Cost elements in 16 doctors' cases, utilizing the data from organization number 5 (Manufacturing Firm) of the Imre study.

Cost Element	Percentage of Cases in Which This Occurs	Average Cost for all Organization Cases	Percentage of Total Uninsured (Indirect) Cost
Wage cost of time lost by workers not injured	50.00%	$ 8.45	24.06%
Cost of property damage	0.00	0.00	0.00
Wage cost of time lost by injured worker	100.00	13.60	40.33
Extra cost for overtime work necessitated	0.00	0.00	0.00
Cost of supervisor's time required	94.00	6.92	20.52
Wage cost due to decreased output from injured worker after return to work	0.00	0.00	0.00
Wage cost of learning period of new worker necessitated by accident	0.00	0.00	0.00
Medical cost not insured	0.00	0.00	0.00
Cost of investigation and local processing of compensation forms	100.00	4.75	14.09
"Other uninsured costs"	0.00	0.00	0.00
Total uninsured cost		33.72	100.00

Table 52.--Cost elements in 31 doctors' cases, utilizing the data from organization number 6 (Manufacturing Firm) of the Imre study.

Cost Element	Percentage of Cases in Which This Cost Occurs	Average Cost for all Organization Cases	Percentage of Total Uninsured (Indirect) Cost
Wage cost of time lost by workers not injured	100.00%	$ 2.41	5.46%
Cost of property damage	0.00	0.00	0.00
Wage cost of time lost by injured worker	100.00	10.26	23.24
Extra cost for overtime work necessitated	0.00	0.00	0.00
Cost of supervisor's time required	100.00	4.19	9.49
Wage cost due to decreased output from injured worker after return to work	3.20	8.40	19.03
Wage cost of learning period of new worker necessitated by accident	0.00	0.00	0.00
Medical cost not insured	100.00	14.14	32.03
Cost of investigation and local processing of compensation forms	100.00	4.75	10.76
"Other uninsured costs"	0.00	0.00	0.00
Total uninsured cost	100.00	44.15	100.00

Table 53.--Cost elements in 36 doctors' cases, utilizing the data from organization number 7 (Manufacturing Firm) of the Imre study.

Cost Element	Percentage of Cases in Which This Cost Occurs	Average Cost Among All Organization Cases	Percentage of Total Uninsured (Indirect) Cost
Wage cost of time lost by workers not injured	88.88%	$ 2.61	8.02%
Cost of property damage	0.00	0.00	0.00
Wage cost of time lost by injured worker	100.00	10.94	33.61
Extra cost for overtime work necessitated	0.00	0.00	0.00
Cost of supervisor's time required	91.67	2.76	8.48
Wage cost due to decreased output from injured worker after return to work	0.00	0.00	0.00
Wage cost of learning period of new worker necessitated by accident	0.00	0.00	0.00
Medical cost not insured	100.00	11.95	36.71
Cost of investigation and local processing of compensation forms	97.22	4.29	13.18
"Other uninsured costs"	0.00	0.00	0.00
Total uninsured cost	100.00	32.55	100.00

Table 54.--Cost elements in 67 first-aid cases, utilizing the data from organization number 3 (Large Utility) of the Imre study.

Cost Element	Percentage of Cases in Which This Cost Occurs	Average Cost Among All Organization Cases	Percentage of Total Cost
Wage cost for time lost by workers not injured	62.68%	$ 2.30	12.89%
Cost of property damage	0.00	0.00	0.00
Wage cost of time lost by injured worker	96.41	6.28	35.20
Cost of supervisor's time required in connection with accident	94.62	3.39	19.00
Wage cost due to decreased production by injured worker after return to work	0.00	0.00	0.00
Cost of medical attention	92.50	3.69	21.53
Cost of investigation	88.06	2.18	12.22
"Other uninsured costs"	Negligible	Negligible	Negligible
Total uninsured cost		17.84	100.00

Table 55.--Cost elements in 14 first-aid cases, utilizing the data from organization number 4 (Small Utility) of the Imre study.

Cost Element	Percentage of Cases in Which This Occurs	Average Cost Among All Organization Cases	Percentage of Total Cost
Wage cost for time lost by workers not injured	14.30%	$ 2.30	19.67%
Cost of property damage	0.00	0.00	0.00
Wage cost of time lost by injured worker	100.00	3.20	27.37
Cost of supervisor's time required in connection with accident	100.00	1.98	16.94
Wage cost due to decreased production by injured worker after return to work	0.00	0.00	0.00
Cost of medical attention	35.71	2.00	17.11
Cost of investigation	92.85	2.21	18.90
"Other uninsured costs"	0.00	0.00	0.00
Total uninsured cost		11.69	100.00

Table 56.--Cost elements in 18 first-aid cases, utilizing the data from organization number 5 (Manufacturing Firm) of the Imre study.

Cost Element	Percentage of Cases in Which This Occurs	Average Cost for all Organization Cases	Percentage of Total Cost
Wage cost for time lost by workers who were not injured	33.33%	$ 0.94	10.12%
Cost of property damage	0.00	0.00	0.00
Wage cost of time lost by injured worker	100.00	3.21	34.55
Cost of supervisor's time required in connection with accident	88.90	1.55	16.68
Wage cost due to decreased production by injured worker after return to work	0.00	0.00	0.00
Cost of medical attention	66.67	1.42	15.29
Cost of investigation	100.00	2.17	23.36
"Other uninsured costs"	0.00	0.00	0.00
Total uninsured cost		9.29	100.00

Table 57.--Cost elements in 66 first-aid cases, utilizing the data from organization number 6 (Manufacturing Firm) of the Imre study.

Cost Element	Percentage of Cases in Which This Cost Occurs	Average Cost for all Organization Cases	Percentage of Total Cost
Wage cost for time lost by workers not injured	10.60%	$ 0.88	7.63%
Cost of property damage	0.00	0.00	0.00
Wage cost of time lost by injured worker	100.00	4.18	36.22
Cost of supervisor's time required in connection with accident	100.00	1.78	15.42
Wage cost due to decreased production by injured worker after return to work	0.00	0.00	0.00
Cost of medical attention	20.00	2.68	23.22
Cost of investigation	19.70	2.02	17.40
"Other uninsured costs"	0.00	0.00	0.00
Total uninsured cost		11.54	100.00

Table 58.--Cost elements in 65 first-aid cases, utilizing the data from organization number 7 (Manufacturing Firm) of the Imre study.

Cost Element	Percentage of Cases in Which This Occurs	Average Cost Among All Organization Cases	Percentage of Total Cost
Wage cost for time lost by workers not injured	24.61%	$ 0.84	9.57%
Cost of property damage	0.00	0.00	0.00
Wage cost of time lost by injured worker	87.70	3.37	38.38
Cost of supervisor's time required in connection with accident	75.40	1.08	12.30
Wage cost due to decreased production by injured worker after return to work	0.00	0.00	0.00
Cost of medical attention	81.54	2.24	25.51
Cost of investigation	89.23	1.25	14.24
"Other uninsured costs"	0.00	0.00	0.00
Total uninsured cost		8.78	100.00

Table 59.--Cost elements in 50 no-injury cases, utilizing the data from organization number 3 (Large Utility) of the Imre study.

Cost Element	Average Cost Per Case	Percentage of Total Cost	Percentage of Cases in Which Item Occurs
Property damage	$310.92	82.04%	100.00%
Cost of wages for man-hours lost	16.00	4.22	62.00
Cost of investigation of accidents	20.31	5.36	98.00
Cost of overtime	31.76	8.38	6.00
Other costs	Negligible	Negligible	Negligible
Total uninsured cost	378.99	100.00	

Table 60.--Cost elements in 3 no-injury accident cases, utilizing the data from organization number 4 (Small Utility) of the Imre study.

Cost Element	Average Cost Per Case	Percentage of Total Cost	Percentage of Cases in Which Item Occurs
Property damage	$125.70	81.04%	100%
Cost of wages for man-hours lost	16.41	10.58	100
Cost of investigation of accidents	5.00	3.22	100
Other costs	8.00	5.16	100
Total uninsured cost	155.11	100.00	

Table 61.--Cost elements in 4 no-injury accidents, utilizing the data from organization number 5 (Manufacturing Firm) of the Imre study.

Cost Elements	Average Cost Per Case	Percentage of Total Cost	Percentage of Cases in Which Item Occurs
Property damage	$170.85	71.75%	100.00%
Cost of wages for man-hours lost	34.78	14.61	100.00
Cost of investigation of accidents	12.05	5.06	100.00
Other costs	20.44	8.58	75.00
Total uninsured cost	283.12	100.00	

Table 62.--Cost elements in 10 no-injury accident cases, utilizing the data from organization number 6 (Manufacturing Firm) of the Imre study.

Cost Elements	Average Cost Per Case	Percentage of Total Cost	Percentage of Cases in Which Item Occurs
Property damage	$251.35	76.74%	100.00%
Cost of wages for man-hours lost	18.35	5.60	100.00
Cost of investigation of accidents	18.53	5.66	90.00
Other costs	39.31	12.00	100.00
Total uninsured cost	327.54	100.00	

Table 63.--Cost elements in 15 no-injury cases, utilizing the data from organization number 7 (Manufacturing Firm) of the Imre study.

Cost Element	Average Cost Per Case	Percentage of Total Cost	Percentage of Cases in Which Item Occurs
Property damage	$204.01	60.04%	100.00%
Cost of wages for man-hours lost	14.80	4.36	100.00
Costs of investigation of accidents	16.93	4.98	93.33
Cost of overtime	26.00	7.65	20.00
Other costs	78.04	22.97	33.33
Total uninsured cost	339.78	100.00	

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