

C. Kidney Diseases Related to Hypersensitivity Phenomena, Hypothetical Program at Intermediate HEW Expenditure Level, Based on the Current State of the Art

1. Introduction

This program has four components:

- 1) Education and administration;
- 2) Research;
- 3) Training; and
- 4) Facilities.

The estimated total cost for this program is \$26,670,000. HEW's share is estimated at \$20,000,000. Figure 6 graphically presents the costs for this portion. A discussion of the various program components follows.

2. Education and Administration

Under an intermediate, postgraduate physician education program, HEW will contribute \$2,500,000, and an additional \$500,000 for administrative support. An additional \$1,000,000 will be needed from other sources. There are no immediate benefits expected from this new educational effort, although long-term benefits will be significant; therefore, the same mortality reduction figure of 610 (see Section B.2.) is used.

3. Research

With an intermediate level of financial support, clinical research funds can be increased to \$6,000,000 (\$4,500,000 from HEW). This represents twelve large scale studies at \$500,000 each, rather than eight as described above in Section B.3.

To provide more rapid developments, an increase from fifteen to twenty laboratory research centers in conjunction with an increase in the amount of financial support for each of the twenty centers, will be

Costs (\$1,000,000)

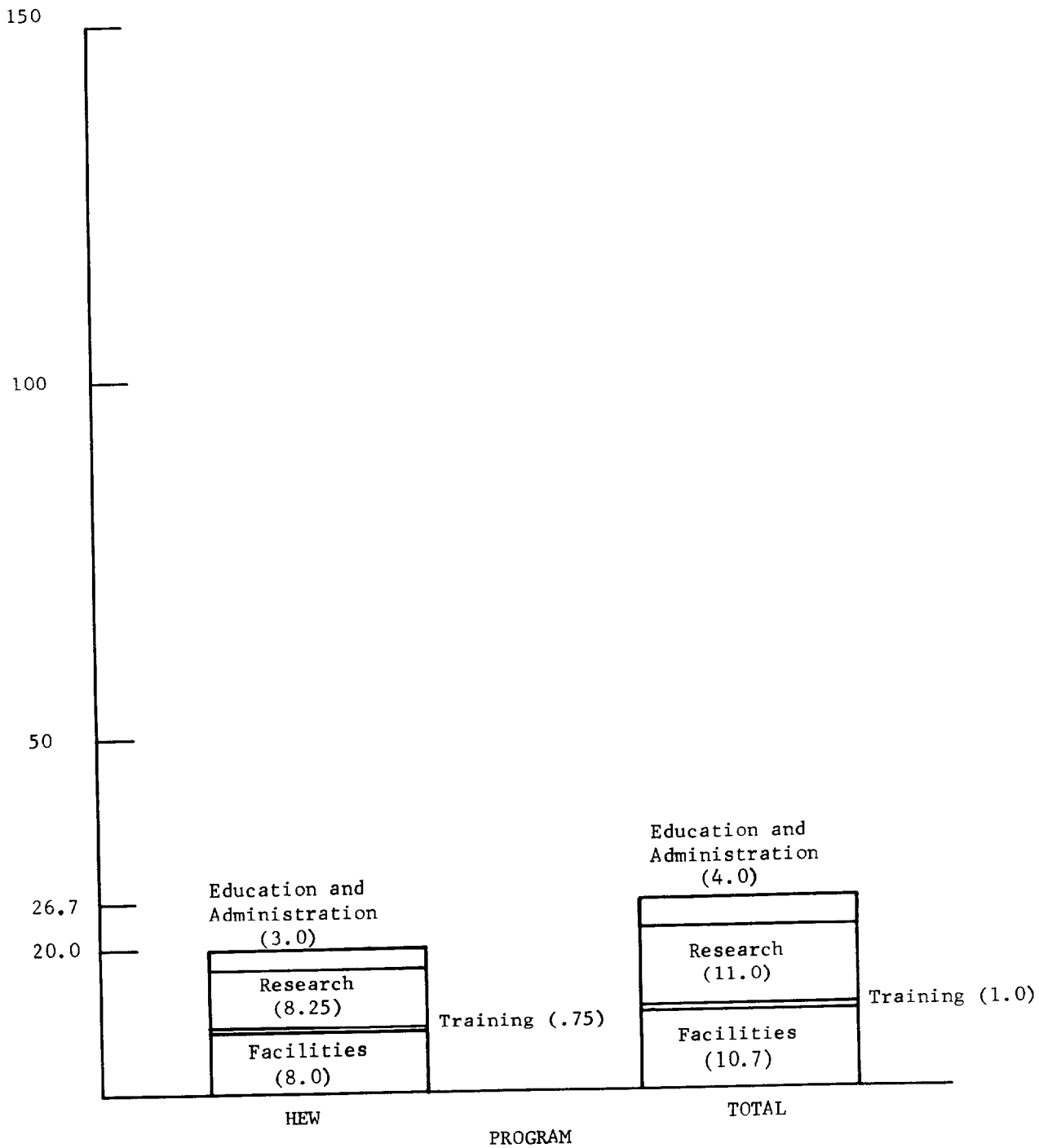


Fig. 6. Kidney Diseases Related to Hypersensitivity Phenomena  
Hypothetical Program Costs at Intermediate HEW Expenditure  
Level, Based on the Current State of the Art.

supported by an intermediate health program. Total cost would then be \$3,000,000 of which HEW would contribute \$2,250,000.

Individual research grant funds would be increased from \$1,500,000 to \$2,000,000 per year, representing an increase in number from 60 to 70 per year at an average amount of \$28,500 each. HEW's contribution would be \$1,500,000.

All research efforts would total \$11,000,000 with \$8,250,000 coming from HEW; the remainder coming from other sources.

#### 4. Training

Training for research would be extended to include 20 immunology research laboratory centers, which will provide for the training of two fellows per center at a cost of \$50,000 per center. Total expenditures are estimated to be \$1,000,000 per year (\$750,000 from HEW).

#### 5. Facilities

It is estimated that the yearly cost of expansion for the research program and the updating of equipment will require approximately \$10,670,000 (\$8,000,000 from HEW).

A benefit-cost summary associated with this program is found in Table VI.

Table VI

KIDNEY DISEASES RELATED TO HYPERSENSITIVITY PHENOMENA, HYPOTHETICAL PROGRAM AT INTERMEDIATE HEW EXPENDITURE LEVEL, BASED ON THE CURRENT STATE OF THE ART

Program	Expenditures		Short-Term Benefits			Long-Term Benefits	
			Reduction Per Year In			Reduction In End-Stage Uremia	
	HEW (\$1,000)	Total (\$1,000)	Mortality	Prevalence	Morbid Days	Per Year	Cumulative
I. Education and administration	3,000	4,000					
II. Research	8,250	11,000					
III. Training	750	1,000					
IV. Facilities	8,000	10,670					
TOTAL	20,000	26,670	610	—	—	—	—

D. Kidney Diseases Related to Hypersensitivity Phenomena, Hypothetical Program at Accelerated HEW Expenditure Level, Based on the Current State of the Art

1. Introduction

This program has four components:

- 1) Education and administration;
- 2) Research;
- 3) Training; and
- 4) Facilities.

The estimated total cost for this program is \$31,830,000. HEW's share is estimated to be \$23,875,000. Figure 7 shows the costs for this program and below follows a discussion of the various program components.

2. Education and Administration

No changes in the educational and administrative efforts are anticipated under this accelerated program. HEW will provide \$2,500,000 for educational support and an additional \$500,000 for administrative support. Approximately \$1,000,000 will be assessed to institutions other than HEW. No immediate benefits are expected, and the mortality reduction figure of 610 (see Section B.2.) is used again.

3. Research

With ample support, clinical research funds could be increased to \$8,000,000 (\$6,000,000 from HEW). This would represent 16 large scale studies rather than eight as envisioned under the current HEW budget level.

Laboratory research would remain at the level anticipated for an intermediate program at a total cost of \$3,000,000 (\$2,250,000 from HEW).

Costs (\$1,000,000)

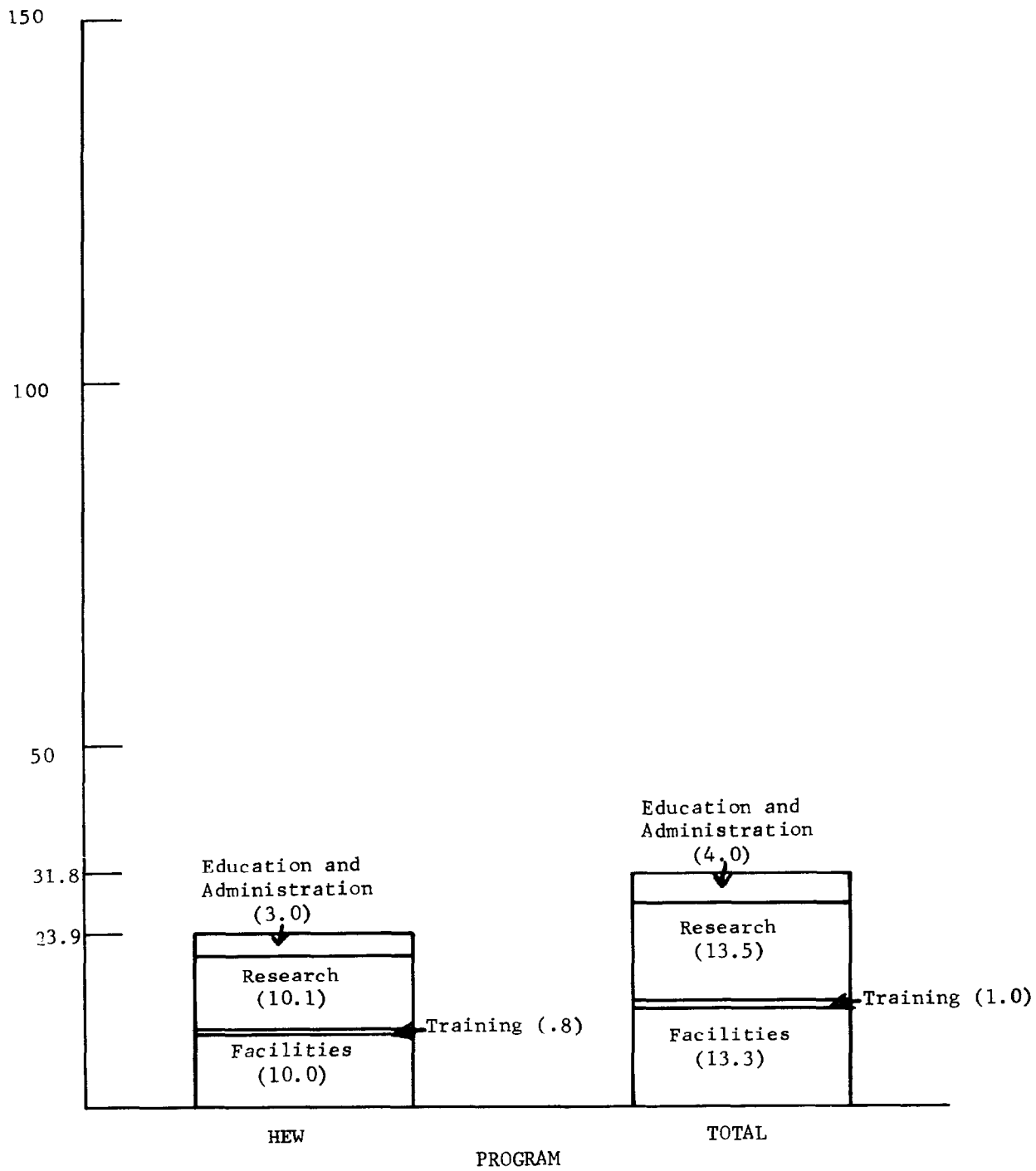


Fig. 7. Kidney Diseases Related to Hypersensitivity Phenomena, Hypothetical Program Costs at Accelerated HEW Expenditure Level, Based on the Current State of the Art.

The number of individual research grants would be increased from 60 to 80 at an average cost of about \$31,000 each and a total cost of approximately \$2,500,000 per year (\$1,870,000 would be HEW's responsibility).

Total efforts aimed at research would amount to \$13,500,000 (\$10,125,000 to come from HEW).

4. Training

Expenditures on research training will remain at \$1,000,000 (\$750,000 from HEW), the same level as anticipated for the intermediate program.

5. Facilities

With ample support from HEW, it is expected that \$13,330,000 will be expended on facilities with \$10,000,000 expected to come from HEW and \$3,330,000 from other sources.

A benefit-cost summary associated with this program is found in Table VII.

Table VII

KIDNEY DISEASES RELATED TO HYPERSENSITIVITY PHENOMENA, HYPOTHETICAL PROGRAM  
 AT ACCELERATED HEW EXPENDITURE LEVEL, BASED ON THE CURRENT STATE OF THE ART

Program	Expenditures		Short-Term Benefits			Long-Term Benefits	
			Reduction Per Year In			Reduction In End-Stage Uremia	
	HEW (\$1,000)	Total (\$1,000)	Mortality	Prevalence	Morbid Days	Per Year	Cumulative
I. Education and administration	3,000	4,000					
II. Research	10,125	13,500					
III. Training	750	1,000					
IV. Research	10,000	13,330					
TOTAL	23,875	31,830	610	—	—	—	—



E. Kidney Diseases Related to Hypersensitivity Phenomena, Hypothetical Program for Fiscal Year 1975, at Accelerated HEW Expenditure Level, Based on Expected Advanced State of the Art in 1975

1. Introduction

This program has five components:

- 1) Prevention of acute glomerulonephritis;
- 2) Early detection of disease (manifested by proteinuria), treatment of diseases associated with hypersensitivity phenomena, and supportive education and administration;
- 3) Research;
- 4) Training; and
- 5) Facilities.

The estimated total cost for this program is \$334,420,000 of which HEW will expend \$77,320,000. Figure 8 illustrates costs associated with the various program components.

Advances in the state of the art which are anticipated by 1975, have been broken down into three separate categories. They are:

- 1) Acute glomerulonephritis--in which primary preventive measures will be available (e.g., a vaccine and/or effective treatment of streptococcal infections).
- 2) Chronic glomerulonephritis--which is heralded by patients with proteinuria and in which secondary preventive measures may be available; and
- 3) Other diseases--such as chronic sclerosing nephritis, the collagen diseases (e.g., lupus erythematosus, scleroderma, etc.) in which secondary preventive measures may be available, and a miscellaneous group of renal diseases (e.g., amyloidosis).

Costs (\$1,000,000)

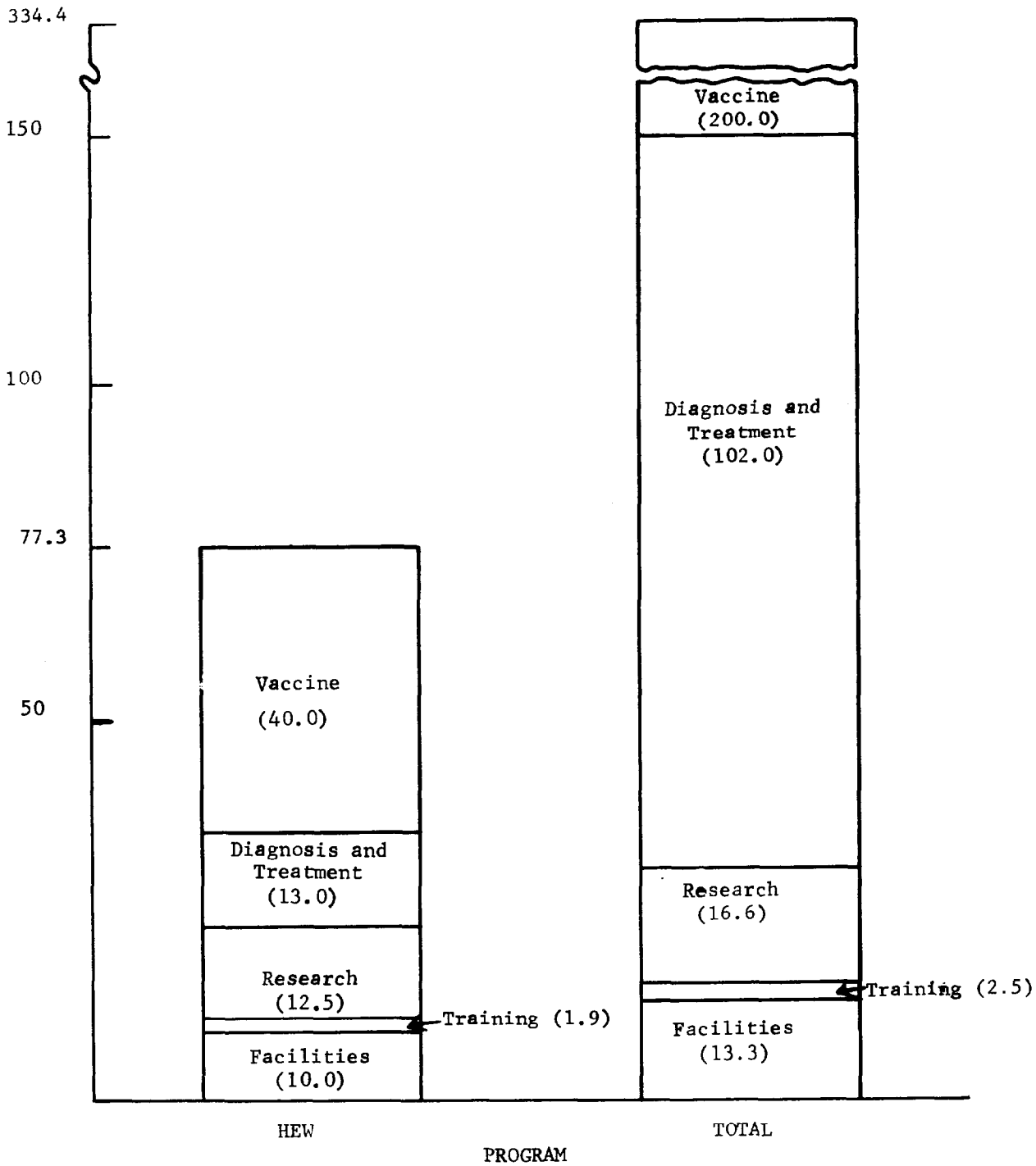


Fig. 8. Kidney Diseases Related to Hypersensitivity Phenomena, Hypothetical Program Costs for Fiscal Year 1975, at Accelerated HEW Expenditure Level, Based on Expected Advanced State of the Art in 1975.

No detailed analysis for the class of Other Diseases, namely collagen disorders and the miscellaneous group of renal diseases, has been undertaken.

## 2. Prevention of Acute Glomerulonephritis

Two possible advances in the next 10 years are analyzed in this report. These are:

- 1) The development of a vaccine to prevent Group A beta-hemolytic streptococcal infections (especially Type 12); and/or
- 2) The development of an efficient means for the early detection of beta-hemolytic streptococcal infections and the prevention of subsequent glomerulonephritis through effective therapy.

### a. Development of a Vaccine to Prevent Streptococcal Infection

#### (1) Relevant Population and Program Component Costs

The assumption is made that 200,000,000<sup>65/</sup> persons would be vaccinated in 1975 at a cost of \$1.00 per individual. Total cost for this vaccination program is estimated at \$200,000,000 (\$40,000,000 to come from HEW).

#### (2) Short-Term Benefits

Short-term benefits are estimated as the following:

- 1) From an estimated base of 650<sup>66/</sup> deaths resulting from acute glomerulonephritis which would have occurred without a vaccination program, a 95% reduction in mortality, i.e., 620 avoided deaths, is anticipated.
- 2) There will be a 95% reduction in the number of cases of acute glomerulonephritis (i.e., 52,250) from an estimated base line of 55,000 cases.

3) Assuming 40 morbid days<sup>67/</sup> per case of acute glomerulonephritis, a base line of 2,200,000 morbid days is calculated using 55,000 cases as a reference. Morbid days will be reduced by 95%, or 2,090,000, with this program.

(3) Long-Term Benefits

(a) Annual Long-Term Benefits

It is estimated that without a vaccine 5% (2,750) of the 55,000 individuals with acute glomerulonephritis eventually would have developed end-stage uremia. Assuming that each new patient with acute glomerulonephritis which progresses to the chronic stage will have a normal age-life span, then the yearly death rate from hypersensitivity diseases will be reduced by 2,610. The vaccine will reduce the number of cases of acute glomerulonephritis by 95%, (i.e., 2,610 of 2,750).

(b) Cumulative Long-Term Benefits

Assuming that without a vaccine approximately 100,000<sup>68/</sup> of the population eventually would have developed end-stage uremia due to acute glomerulonephritis, approximately 95,000 (95% of 100,000) persons will have avoided death resulting from end-stage uremia.

b. Alternate Detection and Treatment Program

An alternative possibility is the development of an effective means to detect and to provide adequate treatment for immunologic

reactions in the kidney resulting from streptococcal infections.

Two possibilities are presented below:

- 1) Early detection of streptococcal infection and immediate therapy with penicillin may prevent the serious sequelae resulting from acute glomerulonephritis; or it may succeed in interrupting an epidemic of acute streptococcal infections, thereby reducing the possible incidence of glomerulonephritis; and
- 2) Advances in immunosuppressive therapy could prevent cases of acute glomerulonephritis which arise from nephritogenic strains of streptococci.

This program would be directed toward a population in which an epidemic of nephritogenic beta-hemolytic streptococcal infection is in progress. Therefore, a program of close epidemiological surveillance of the population susceptible to streptococcal infections, and the rapid institution of immediate treatment procedures would be undertaken.

A 20% reduction in mortality would be expected lowering the number of mortalities due to the acute disease process by 130 per year.<sup>69/</sup> A reduction in prevalence rates by 30% would decrease the number of cases by 16,500 per year from a base line of 55,000; the number of morbid days would be decreased by 30%, or 660,000 days per year, from a base line of 2,200,000.<sup>70/</sup> The total effect on the 2,750 individuals who would have developed end-stage uremia each would be a reduction by 30%, i.e., 830 cases, with this program.<sup>71/</sup> Cumulative long-term benefits would be 30,000 avoided cases of

end-stage uremia (30% of the estimated 100,000 who would have developed kidney failure eventually)<sup>72/</sup> These alternative benefits have not been included in the summation of the program analysis.

### 3. Proteinuria

A second approach in preventing renal hypersensitivity disease would be an attempt at the early detection of persistent proteinuria. It is assumed that this phenomenon represents an early stage of renal disease in which the filtering apparatus of the nephron is malfunctioning, giving some indication of impending chronic nephritis. The major objective of the program is to develop an effective means for the early detection of persistent proteinuria, to identify those cases in which proteinuria signifies renal disease, and to devise adequate therapy which will interrupt the disease process, thereby preventing progression to a state of renal failure. It will be assumed that under this advanced state of the art, a means of therapy has been developed which is effective in 50% of those cases treated.

#### a. Relevant Population and Program Component Cost

Assuming that 150,000,000 people can be screened each year via periodic physical examinations, multiphasic screening programs, etc., 2% (3,000,000 of these) will have a positive test for proteinuria.<sup>73/</sup>

Of 3,000,000 patients with a positive test, approximately 20%, 600,000, will be expected to have confirmed proteinuria as shown by more refined and more expensive tests. The confirmatory test costs \$1.00; therefore, the total cost is \$3,000,000 since each individual with a positive screening test must have a confirmatory test.<sup>74/</sup>

Of the 600,000 confirmed positive patients having proteinuria, it is anticipated that additional studies will establish 20% (120,000) as having persistent proteinuria.<sup>75/</sup> The estimated cost for these additional studies is \$5.00 per test for a total cost of \$3,000,000 (\$5.00 x 600,000).

For each of these 120,000 individuals a complete diagnostic work-up including: urine analysis, amount of total protein excretion, studies of renal functions such as clearance and concentrating abilities, roentgen studies (to include a flat film of the abdomen, intravenous pyelograms, and possibly retrograde pyelograms if necessary), and in some instances a renal biopsy to be examined under the electron microscope is necessary to establish a definite cause of proteinuria. The estimated cost is \$500 per individual study for a total cost of \$60,000,000.

Total costs for confirming tests amount to \$66,000,000, none of which is expected to come from HEW.

One-third of the 120,000 individuals with confirmed persistent proteinuria (i.e., 40,000), could potentially develop debilitating renal disease.<sup>76/</sup> Of this number about 50% (20,000) are estimated to have renal disease associated with hypersensitivity phenomena. It is estimated that a single therapeutic course would cost \$100 per patient for a total of \$2,000,000.

Total costs for this program component are \$98,000,000 (\$2,000,000 of which is to be borne by HEW).

Support for education and administration is estimated to cost HEW \$3,000,000 with \$1,000,000 coming from other sources.

b. Short-Term Benefits

Short-term benefits for individuals having diagnosed renal disease with hypersensitive origin followed by some form of treatment are:

- 1) A reduction of 1%, or approximately 150 deaths, from a base line of 14,500<sup>77/</sup> expected annual deaths in patients with hypersensitivity diseases of the kidney;
- 2) A reduction of 50%, or 10,000 cases, from a base line of 20,000 cases diagnosed as hypersensitivity disease of the kidney;<sup>78/</sup> and
- 3) A reduction of 65%, 520,000 days, from an estimated 800,000 morbid days.<sup>79/</sup>

c. Long-Term Benefits

(1) Annual Long-Term Benefits

The annual death rate could be reduced by 50% based on the assumption that new cases are diagnosed each year and that therapy is effective in one-half of the individuals. The therapeutic results should improve as cases can be detected earlier; and ultimately a decrease of 6,000 from a base line of 12,000<sup>80/</sup> cases of fatal end-stage uremia per year could be effected.

(2) Cumulative Long-Term Benefits

From an expected base of 450,000 individuals<sup>81/</sup> having confirmed persistent proteinuria who would have developed end-stage uremia eventually, a reduction of 50%, or 225,000, is anticipated in an accelerated HEW health program.

4. Total Screening, Diagnosis and Treatment Costs

Total costs for screening, diagnosis, and treatment are estimated to be \$102,000,000 (\$13,000,000 from HEW).



5. Total Short-Term Benefits

Total short-term benefits resulting from the control of acute glomerulonephritis using a vaccine and from the detection and control of proteinuria are as follows:

- 1) A reduction in immediate mortality by 770 per year;
- 2) A reduction in the number of cases by 62,250; and
- 3) A reduction in the number of morbid days by 2,610,000.

6. Total Long-Term Benefits

Total long-term benefits resulting from the control of acute glomerulonephritis using a vaccine and from the detection and control of proteinuria are an annual reduction of 8,610 cases of fatal end-stage uremia and cumulative long-term reduction of 320,000.

7. Research

Research programs under the advanced state of the art are anticipated to increase so that HEW's expected level of effort will be \$12,450,000; \$4,150,000 will come from other sources.

8. Training

Funds needed for training will approximate 15% of the amount spent on research, i.e., \$2,493,000, of which \$1,870,000 will come from HEW and \$620,000 will come from other sources.

9. Facilities

HEW will expend about \$10,000,000 for facilities and an additional \$3,330,000 will come from other sources.

10. Estimated Benefits Dependent Upon Research

Benefits dependent on new disease control techniques are;

a) Short-Term Benefits:

- 1) A reduction in immediate mortality by 770 deaths (680 based on 1966 U. S. population); <sup>82/</sup>
- 2) A reduction in the number of cases by 62,250 (54,610 based on 1966 U. S. population); and
- 3) A reduction in the number of morbid days by 2,610,000 (2,289,470 based on 1966 U. S. population).

b) Long-Term Benefits:

- 1) An annual reduction of fatal end-stage uremia by 8,610 cases (7,550 based on 1966 U. S. population); and
- 2) A cumulative reduction of fatal end-stage uremia by 320,000 cases (based on 1966 U. S. population).

A benefit-cost summary associated with this program is found in Table VIII.

Table VIII

KIDNEY DISEASES RELATED TO HYPERSENSITIVITY PHENOMENA, HYPOTHETICAL PROGRAM FOR FISCAL YEAR 1975  
 AT ACCELERATED HEW EXPENDITURE LEVEL, BASED ON EXPECTED ADVANCED STATE OF THE ART IN 1975

Program	Expenditures		Short-Term Benefits			Long-Term Benefits	
			Reduction Per Year In			Reduction In End-Stage Uremia	
	HEW (\$1,000)	Total (\$1,000)	Mortality	Prevalence	Morbid Days	Per Year	Cumulative
I. Attack on acute glomerulonephritis streptococcal vaccine	40,000	200,000					
II. Proteinuria, screening, diagnosis and treatment, and supportive education and administration:							
1. Screening	10,000	30,000					
2. Confirming test for persistent proteinuria		6,000					
3. Confirming test for renal complications		60,000					
4. Treatment for renal complications		2,000					
Sub-Total	10,000	98,000					
5. Education and administration	3,000	4,000					
Sub-Total	13,000	102,000					
III. Research	12,450	16,600					
IV. Training	1,870	2,490					
V. Facilities	10,000	13,330					
TOTAL	77,320	334,420	770	62,250	2,610,000	8,610	320,000

#### IV. KIDNEY DISEASES RELATED TO HYPERTENSIVE VASCULAR DISEASES

##### A. Introduction

This section pertains to programs needed to control renal diseases associated with hypertension. It is assumed throughout the discussion that the amelioration of hypertension will result in a significant reduction in associated renal disease.<sup>83/</sup>

In 1966, 71,347 deaths<sup>84/</sup> are estimated to have had hypertensive vascular disease as the underlying cause of death. Of this group it is estimated that about 30%<sup>85/</sup> were caused at least partially by serious renal sequelae.

In 1966, some 11,430,000 individuals are estimated to have had hypertensive vascular disease; associated with these were 181,280,000 days of restricted activity, 68,580,000 days of bed disability, and 11,330,000 work-loss days resulted.<sup>86/</sup>

Three programs are considered in this analysis (see Chapter 5, Research Methodology) and are described in detail below.

##### B. Kidney Diseases Related to Hypertensive Vascular Diseases, Hypothetical Program at Current HEW Expenditure Level, Based on the Current State of the Art

###### 1. Introduction

This program has four components:

- 1) Diagnosis, treatment, supportive education and administration;
- 2) Research;
- 3) Training; and
- 4) Facilities.

The total estimated cost for this program is \$419,440,000 (\$40,272,000 specifically for associated renal problems). HEW would account for \$9,180,000, all of which would be used to control the renal complications

of hypertension. Figure 9 illustrates the program expenditures for associated renal problems. A discussion of the various program components follows.

2. Diagnosis, Treatment and Supportive Education and Administration

Screening, diagnosis and treatment are aimed at individuals 17 years of age and over who have potentially curable (non-essential) hypertension or currently non-curable (essential) hypertension.

a. Relevant Population and Program Component Costs

This program component provides for the extension of complete care to individuals with known hypertension. HEW would provide financial support for education and administration of this program.

Various studies have shown that between 10-20% of all hypertensive patients have potentially curable hypertension.<sup>87/</sup> It is estimated that approximately 15%, 1,450,000, of the known total hypertensive population (9,330,000 in 1966) have curable (non-essential) hypertension. Of this number, it is estimated that about 450,000 are presently receiving adequate treatment. With this program, an additional 450,000 would receive adequate treatment over a five-year period. This program would provide treatment for 90,000 of these patients each year.

Since this is a population of known hypertensives and no screening test would be necessary, the cost for definite diagnosis and treatment of a specific type of hypertensive vascular disease would be \$1,000 per patient per year. The total cost is then \$90,000,000 per year, and an estimated 10% (\$9,000,000)<sup>88/</sup> of this amount is to be used to treat associated renal hypertensive disease.

Costs (\$1,000,000)

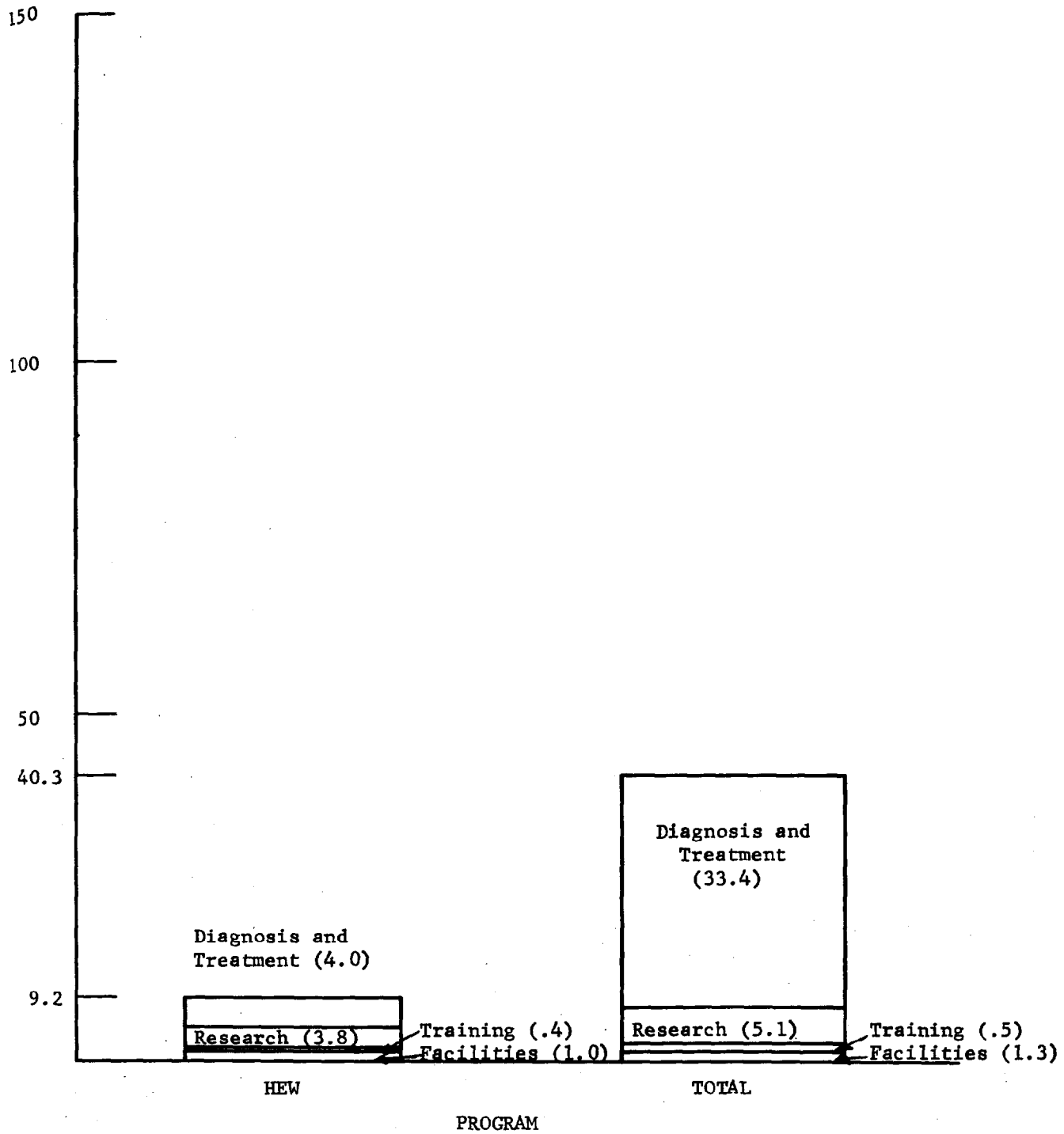


Fig. 9. Kidney Diseases Related to Hypertensive Vascular Diseases, Hypothetical Program Costs at Current HEW Expenditure Level, Based on the Current State of the Art.

No screening test is required for the currently known non-curable hypertensives. The treatment cost for each of these individuals is estimated at \$200.00 per year.<sup>89/</sup> In addition, it is anticipated that this program will provide for an increase of 20% (1,586,000)<sup>90/</sup> in the number of patients being adequately treated. Therefore, total treatment costs for these individuals would be \$317,200,000. Approximately 6%<sup>91/</sup> of this amount, \$19,032,000 would be used for the treatment of associated renal disease.

Total cost for the above program is \$407,200,000 (\$28,032,000 of which is for associated renal problems). These costs are not to be borne by HEW.

The supportive education and administration component involves the postgraduate education of physicians as well as the community on kidney malfunction as it is related to hypertensive disease. Technical support as well as some financial support is also included. It is estimated that \$4,000,000 is the minimum amount needed under the 1966 HEW funding level to activate this program component. Approximately \$1,330,000 will be generated by institutions and sources other than HEW.

Total cost for this program component is \$419,440,000 (\$40,272,000 used for associated renal disease). Total HEW expenditure for program component 2.a. is \$4,000,000, all of which is employed for treatment of kidney disease.

b. Short-Term Benefits

The following are estimated short-term benefits:

- (1) Known Potentially Curable (non-essential) Hypertensive Patients:

- 1) Of a total population of 90,000<sup>92/</sup> having non-essential hypertension, a 60% reduction in the immediate mortality rate is expected (i.e., 340 of the estimated 570 normally occurring deaths will be prevented).<sup>93/</sup> Approximately 50% (170) of these prevented deaths would have resulted from associated renal dysfunction.<sup>94/</sup>
- 2) A similar 60% decrease in the number of cases in the same population is expected (i.e., 54,000 out of 90,000). About 50% of this reduced number would be associated with renal hypertensive changes.<sup>95/</sup>
- 3) It is estimated that each patient with hypertensive vascular disease suffers an average of 16 morbid days per year;<sup>96/</sup> the total for all affected patients in this population would be 1,440,000 morbid days (90,000 x 16). Implementation of this program would effectively decrease the number of morbid days by 864,000, or 60% (50% of this number, 432,000 would involve patients with associated renal problems).<sup>97/</sup>

(2) Known Currently Non-Curable (essential) Hypertensive Patients:

- 1) It is estimated that a 15% decrease of 7,490 in mortality from a total of 49,940 deaths<sup>98/</sup> will result (27%, or 2,020, of which will have renal complications); and
- 2) It is estimated that a 20% reduction in the number of morbid days from a base line of 25,376,000<sup>99/</sup> will result in 5,075,200 additional healthy days (27%, or 1,370,300 associated renal problems).



There is no change in prevalence rate or number of new cases.

(3) Total for Known Hypertensive Patients:

Total short-term benefits for the surveyed high-risk groups are the prevention of 7,830 deaths (2,190 having associated renal problems), a reduction of 54,000 cases (27,000 with associated renal problems), and a reduced number of morbid days by 5,939,200 (1,802,230 resulting from associated renal disease).

c. Long-Term Benefits

(1) Annual Long-Term Benefits

It is anticipated that the number of patients in end-stage renal failure resulting from non-essential hypertension will be reduced by 2,940 each year (a 60% reduction rate from an estimated base of 4,900)<sup>100/</sup> At the same time, it is estimated that there would be 13,880<sup>101/</sup> patients suffering from essential hypertension who would have developed end-stage uremia each year. This number is expected to be reduced by 10%, or 1,390, by the implementation of this program.

The total annual long-term benefits will amount to a reduction in the number of patients developing end-stage uremia by 4,330.

(2) Cumulative Long-Term Benefits

It is felt that 7% or 98,000,<sup>102/</sup> of all potentially curable known hypertensives (1,400,000) would eventually develop chronic renal failure. With this program a reduction of this number by

60% (i.e., 58,800) is expected. An additional 3.5%, or 277,550, of the presently non-curable known hypertensives (7,930,000) would eventually have developed fatal end-stage uremia.

Development of this program is designed to reduce this figure by 10%, or 27,760.<sup>103/</sup>

Therefore, total cumulative long-term benefits amount to a prevention of 86,560 cases of fatal end-stage uremia.

### 3. Research

This research program will consist of a number of problem-focussed clinical and laboratory research studies as well as of individual grants for wholly independent study in the pertinent areas.

The clinical research programs would be carried out in 20 separate study groups, and laboratory research programs would also be carried out in 20 separate study groups.<sup>104/</sup> Fifteen of these study groups would be combined in the same geographic location, leaving 5 groups to accomplish basic laboratory research independently and 5 groups to accomplish clinical research independently.

The laboratory research would be funded with approximately \$40,000 per group,<sup>105/</sup> for a total of \$800,000. The clinical research would be funded with approximately \$50,000<sup>106/</sup> per group, or approximately \$1,000,000. Since 15 of these groups will be concerned with both laboratory and clinical research, the level of support to these centers would be \$90,000 each.

The remaining area of research would consist of approximately 50 individual grants, at \$40,000 each, for a total grant cost of \$2,000,000.

The total amount for research equals \$1,800,000 for laboratory and clinical research and \$2,000,000 for individual grants yielding a total

of \$3,800,000 supported by HEW. An additional \$1,270,000 is expected to be generated by other sources.

The clinical studies mentioned above will consist of long-term studies of the natural history and treatment of hypertensive vascular disease, especially as it relates to renal disease. Both the laboratory and clinical studies will result in additional benefits to disease areas other than renal disease such as hypertensive heart disease, arteriosclerosis, etc. The basic research programs would be directed towards the discovery of the etiology of hypertension, the identification of facets and factors in the disease process which affect renal function, and the development of novel treatment methods.

#### 4. Training

The training of physicians and allied personnel would cost HEW approximately \$380,000. An additional \$130,000 would be obtained from other sources.

#### 5. Facilities

The expenditures for facilities is estimated at \$1,000,000 with an additional \$330,000 to come from other agencies.

A benefit-cost summary associated with this program is found in Table

IX.

Table IX

KIDNEY DISEASES RELATED TO HYPERTENSIVE VASCULAR DISEASES, HYPOTHETICAL PROGRAM  
AT CURRENT HEW EXPENDITURE LEVEL, BASED ON THE CURRENT STATE OF THE ART

Program	Expenditures		Short-Term Benefits			Long-Term Benefits	
			Reduction Per Year In			Reduction In End-Stage Uremia	
	HEW (\$1,000)	Total (\$1,000)	Mortality	Prevalence	Morbid Days	Per Year	Cumulative
I.A. Diagnosis and treatment of individuals 17 years of age and over with known curable (non-essential) hypertension and non-curable hypertension		407,200 (28,032) <sup>1/</sup>					
B. Supportive education and administration	4,000 (4,000)	5,330 (5,330)					
Sub-Total	4,000 (4,000)	412,530 (33,362)					
II. Research	3,800 (3,800)	5,070 (5,070)					
III. Training	380 (380)	510 (510)					
IV. Facilities	1,000 (1,000)	1,330 (1,330)					
TOTAL	9,180 (9,180)	419,440 (40,272)	7,830 (2,190)	54,000 (27,000)	5,959,200 (1,802,230)	(4,330)	(86,560)

<sup>1/</sup> Figures in parenthesis refer to statistics attributable to renal complications.

C. Kidney Diseases Related to Hypertensive Vascular Diseases, Hypothetical Program at Intermediate HEW Expenditure Level, Based on the Current State of the Art

1. Introduction

This program has four components:

- 1) Screening, diagnosis, treatment, and supportive education and administration;
- 2) Research;
- 3) Training; and
- 4) Facilities.

The estimated total cost for this program is \$496,150,000 (\$6,936,000 will be used for associated renal problems). HEW will account for \$22,098,000 (\$21,207,000 for associated renal complications). Figure 10 illustrates the total program expenditures by components. A discussion of the various program components follows.

2. Screening, Diagnosis, Treatment, and Supportive Education and Administration

This program is designed to cover a six-year period in order to attain maximum effectiveness under an intermediate budget constraint. In the intermediate program level, an additional risk group must be considered. This group is comprised of individuals who have not been examined by a physician during the preceding year. In this population, there are an estimated 43,500,000 persons 17 years of age and over in the U. S., <sup>107/</sup> 2,100,000 with undiagnosed hypertension. <sup>108/</sup> Over a 6 year period, 50% (21,750,000) of these individuals could realistically be screened. This means that each year 3,792,000 persons would be subjected to a screening test. <sup>109/</sup> If only 50% of the total population at risk is randomly screened, then it can be assumed that 50% of the individuals with hypertension will be detected, i.e., 1,050,000. Since

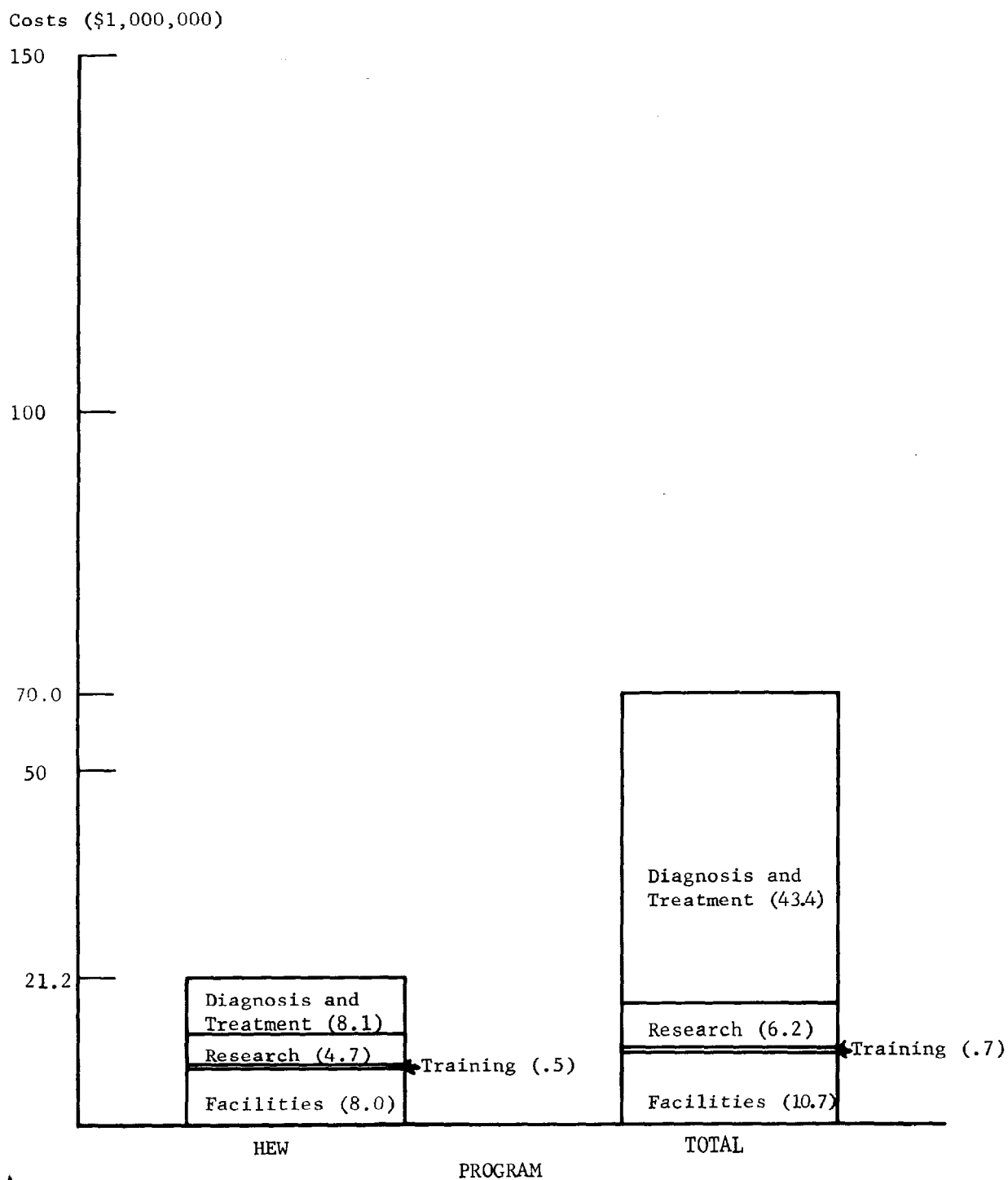


Fig. 10. Kidney Diseases Related to Hypertensive Vascular Diseases, Hypothetical Program Costs at Intermediate HEW Expenditure Level, Based on the Current State of the Art.

the program covers a 6 year period, 175,000 individuals will have a positive screening test for hypertension each year. The cost per test is \$1.25, thus, the total cost for a general screening test is \$4,740,000 ( $\$1.25 \times 3,792,000$ ). \$240,000 of this amount can be attributed to renal involvement. HEW will support 20% of the total or \$948,000 (\$57,000 of which is attributed to renal disease).

In addition to the cost of screening, expenses for treatment and confirming diagnosis will be incurred.

Approximately 15%, 26,500, of the 175,000 diagnosed hypertensives are assumed to have curable hypertension. At a cost of \$1,000 per year, total treatment and confirming diagnosis costs will be \$26,250,000 (\$2,625,000 for associated renal complications).

Approximately 85% (148,750) of the 175,000 have non-curable hypertension. At an estimated treatment cost of \$200 per individual per year, total costs will be \$29,750,000 (\$1,785,000 for associated renal complications). Treatment costs will be borne by sources other than HEW.

Total costs for this part of the program are \$467,940,000 (\$32,726,000 for associated renal complications). HEW's share of the total is \$948,000 (\$57,000 for associated renal complications).

The supportive educational and administrative funds needed to implement the screening, diagnosis and treatment for these hypertensive patients is estimated to be \$8,000,000 from HEW with an expected additional \$2,670,000 from other sources. These funds are to be used for the postgraduate education of physicians and allied medical personnel, as well as for technical and administrative support by HEW.

The total cost for this program component is estimated to be \$478,610,000 (\$43,396,000 for associated renal complications). HEW's share is \$8,948,000 (\$8,057,000 for associated renal complications).

a. Short-Term Benefits:

The following are estimated short-term benefits.

(1) Newly Detected Potentially Curable (non-essential) Hypertensives:

- 1) Of the total population of 26,250 having the disease, 140 deaths would have occurred without this program; a reduction of 80 (60%) is anticipated (50% of which reflect those deaths avoided in cases having associated renal problems). <sup>110/</sup>
- 2) A 60% reduction in prevalence is also expected, accounting for 15,750 (50% or 7,880 with associated renal problems). <sup>111/</sup>
- 3) From a base line of 420,000 morbid days <sup>112/</sup> a 60% reduction is expected, i.e., 252,000 days (126,000 in patients with associated renal problems).

(2) Newly Detected Currently Non-Curable (essential) Hypertensives

Short-term benefits associated with the currently non-curable hypertensives, 17 years of age and over, are as follows:

- 1) An estimated 15% decrease of 160 in immediate mortality from a base line of 1,070 deaths <sup>113/</sup> which would have occurred without this program (27% of the avoided deaths, or 40, are attributed to cases with associated renal problems).



- 2) There is no change in prevalence rate.
- 3) An estimated 20% reduction, 476,000, in the number of morbid days from a base line of 2,380,000<sup>114/</sup> (128,520 as a result of associated renal problems).

(3) All Hypertensives

Total short-term benefits for the surveyed high-risk groups are

- 1) A reduction of 8,070 deaths (2,270 with associated renal problems);
- 2) A reduction in prevalence of 69,750 (34,880 with associated renal problems); and
- 3) A reduction in morbid days of 6,193,720 (2,056,820 in patients with associated renal problems).

b. Long-Term Benefits

The following are estimated long-term benefits:

(1) Annual Long-Term Benefits

It is estimated that of a total of 550 deaths which would have occurred in the newly detected non-essential hypertensives annually, 60%, or 330 per year, would be prevented by this program.<sup>115/</sup>

In the population with newly diagnosed essential hypertension, a 10% reduction of 156 in the number of cases of fatal end-stage uremia is expected from a base line of 1,560.<sup>116/</sup>

Total (annual) long-term benefits for all groups surveyed equal 4,820 prevented cases of fatal end-stage uremia each year.

(2) Cumulative Long-Term Benefits

It is anticipated that this program will result in a 60% reduction in the number of cumulative cases of fatal end-stage uremia in patients with newly detected non-essential hypertension. This would be a reduction of 6,720 from a base line of 11,025.<sup>117/</sup>

It is also expected that 3,120 (10% of the total 31,240)<sup>118/</sup> potential cases of fatal end-stage uremia will be prevented in patients with essential hypertension.

Total cumulative long-term benefits for all the surveyed high-risk groups, including those discussed above in Section B.2.c., amount to a reduction of 96,300 cases of fatal end-stage uremia.

3. Research

The research program would be expanded in the following manner: clinical research will be expanded to include 25 separate groups at a cost of \$50,000 per group for a total of \$1,250,000.

Laboratory research projects will also be expanded to include 25 separate study groups at a cost of \$40,000 per group for a total of \$1,000,000.

The number of individual grants will be increased from 50 to 60 at a cost of approximately \$40,000 each for a total of \$2,400,000.

Total support for research efforts from HEW would amount to \$4,650,000. An additional \$1,550,000 would be generated by other sources.

4. Training

The training of physicians and allied personnel will cost HEW