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ABSTRACT

A study of 44 infants and toddlers with disabilities enrolled in 3 diverse early intervention programs in 3 states examined the cost of early intervention services and the core ingredients of hourly service cost. During the 12-month study, all service events were recorded for 1 week per month. Overall, findings revealed an extremely wide range in annual cost of early intervention services, from $2,860 to $11,700. Factors that comprised the cost of services were volume of service received, cancellation rate, staff salaries, program support costs, and percent of time expended on indirect services. Specific findings include: (1) the actual cost per hour of all disciplines combined was $38.00, of which 55 percent was salary and fringe benefit costs; (2) the mean amount of scheduled service was 3.14 hours per week, however, the amount of weekly service actually provided was 2.30 hours; (3) the overall utilization rate of scheduled encounters was 79 percent among all study families, however, significant variability among communities was evident; (4) the overall weekly cost ranged from appropriately $55 to $225 per child; and (5) service cancellations appear to increase actual cost of service provided. An appendix includes a service utilization protocol. (Contains 22 references.) (CR)

Early Childhood Research Institute on Service Utilization

A Multi-Site, Cost Analysis Study of Early Intervention Services

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An Institute for the Study of Education, Health Care, & Social Service Utilization of Infants, Preschool Children, and Their Families

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Executive Summary

The major objective of this study was to examine the cost of early intervention services, and to identify the core ingredients of hourly service cost. Forty-four infants and toddlers enrolled in three diverse early intervention programs in three states were studied for a twelve month period. During this time, all service events, both scheduled and provided, were recorded for one week per month. In addition, detailed cost and budget data were gathered from each site to ascertain the cost per hour of each staff member employed by these programs. Overall, findings revealed an extremely wide range in annual cost of early intervention services from $2,860. to $11,700. Factors that comprised the cost of services were volume of service received, cancellation rate, staff salaries, program support costs, and percent of time expended on indirect services. Specific, noteworthy findings were as follows.

- The actual cost per hour of all disciplines combined (non-contracted staff) was $38. Of this figure, 55% was accounted for by salary and fringe benefit costs.

  With respect to service intensity, whereas the mean amount of scheduled service was 3.14 hours per week (duplicated hours including those in which more than one professional was present for a service event), the mean amount of weekly service actually provided was 2.30 hours. Eighty-six percent of study families actually received less than three hours of service per week.

- With regard to the extent to which scheduled services were actually utilized, while the overall utilization rate of scheduled encounters was 79% among all study families, significant variability among communities was evident (range = 72%-91%).
- When cost per week is portrayed by using the median, mean, and +1 SD, the overall cost ranged from approximately $55.-$225. per child.
- Findings indicate that service cancellations appear to increase actual cost of services provided. This study did not monitor and document staff time during these cancelled sessions, and therefore, it cannot be presumed that these cancelled hours were completely unproductive. However, data presented provide compelling evidence that service cancellations appear to be an important factor in determining the actual cost of services provided.

In viewing the generalizability of findings from this study, several important limitations must be acknowledged. First, the study includes data on only 44 children and families, and does not in any way represent the universe of children and families enrolled in programs nationally. Second, service data were derived from programs that were perceived as exemplary by families and professionals in these states, and the extent to which these findings are applicable to the larger early intervention system is indeterminable. Third, "opportunity costs" (e.g., volunteer time and fair market value of space costs) were not ascertained, and therefore, cost data in this study may underestimate true annualized cost.

Whereas the cost of early intervention service reported herein must be viewed and interpreted cautiously, the value of this study may reside with the fact that it has identified areas the essential data elements requisite to valid cost ascertainment studies. Furthermore, it has identified those areas that appear to comprise cost, and, to some extent, can be controlled and manipulated by program administrators (e.g., support costs, indirect services, service cancellations). To this end, additional inquiry is imperative by both researchers and program-based staff to better understand how these factors can be used to develop meaningful and effective cost containment strategies without denying essential services for eligible children and their families.

Child development science has provided compelling evidence that early life experiences are highly influential on later development and well-being. Numerous studies have reported that cognitive, academic, and social/emotional competency in school age children are markedly affected by a constellation of ecologic factors operating during infancy and early childhood (Bradley, Whiteside, Mundfrom, Casey, Kelleher, and Pope, 1994; Cohler, 1987; Huston, McLoud and Garcia Coll, 1994; Werner, 1990). This vast knowledge base has, in turn, prompted the development of a wide array of preventive interventions and Federal policies all aimed at promoting favorable outcomes in adolescence and adulthood (Guralnick, 1997; Shonkoff and Meisels, 1990).

Prominent among these initiatives was the enactment of Federal policy in 1986 (Part H of P.L. 99-457) to support the development of a comprehensive service system for infants and toddlers with disabilities and high risk conditions. Whereas this legislation did not mandate but rather encouraged and supported the creation of a threshold service system that included fourteen core components, in fact, all states over the past decade have elected to develop and implement a service system that complies with the minimum requirements as set forth in the original statute.

A major by-product of this systems development effort has been a substantial increase in the number of children served, and as such, an increase in state and Federal fiscal appropriations needed to underwrite program implementation (Sixteenth Annual Report to Congress on the Implementation of the Individuals with Disabilities Education Act (IDEA), 1994). While there has not

been any erosion in the Federal commitment to the values and concepts that undergird this legislation, the escalating operating costs associated with this program have not gone unnoticed. At both state and Federal levels, numerous requests for information have been advanced around two focal questions: "What services are actually received by children and families enrolled in early intervention programs?" (Guralnick, 1997), and "What is the cost?" (Escobar, Barnett, and Goetze, 1994; Kates, 1997).

Despite the dramatic growth in the early intervention system that has occurred in the last decade, scant information is available that directly responds to these two questions. Recent studies however, provide some illuminating evidence. In a comprehensive service utilization study of 190 infants and toddlers (Shonkoff, Hauser-Cram, Krauss, and Upshur, 1992), major findings included: (1) the mean intensity of services received per week approximated 1.75 hours, with home visits and child groups being the most commonly provided experiences; (2) children who were older and evidenced more significant psychomotor impairment received significantly more hours of service; (3) no differences in service intensity were reported in relation to maternal education, marital status, health, or employment; (4) no significant associations were reported between a child's type and level of disability and service location (home vs. center) or service format (individual vs. group); and (5) all early intervention services occurred apart from the community in either home- or center-based environments. It is important to note that this study was limited to sites in Massachusetts and New Hampshire only, included only children with Down

Syndrome, neuromotor impairment, and developmental delay, and gathered service utilization data prior to the full implementation of Part H (i.e., late 1980s).

In a more recent prospective, multi-site study of service utilization patterns of 146 infants, toddlers and their families (Kochanek and Buka, 1996a), several pertinent findings were reported. With regard to utilization rate of services (i.e., proportion of weekly scheduled services actually used), while the overall service utilization rate has high (mean = 79%), substantial variation among families was evident (SD = 27%). For example, while 49% of the study families used virtually all (> 90%) early intervention services scheduled, 18% of families used less than 50% of scheduled services. Findings also indicated that whereas child characteristics were not significantly related to service utilization rate, providers who were younger and most similar in age to study mothers evidenced significantly higher utilization rates. Overall, data in this study revealed that the assignment of a primary service provider to a family is a critical event in the early intervention experience. That is, the characteristics of the primary service provider and the extent to which their attributes are similar to maternal characteristics influence the extent to which services stated in individualized family service plans (IFSPs) are actually utilized.

In a related study that examined service volume and location for the same cohort of children and families (Kochanek and Buka, 1996b), findings revealed: (1) the average amount of time a child/family received services was 1.7 hours per week (unduplicated hours); (2) older children and mothers of higher level of educational attainment received significantly more service per week; (3) for

location, thirty-four percent of all services provided occurred in community-based settings (e.g., child care sites, family centers); and (4) mother/provider dyads in which each member who was college educated was significantly associated with greater utilization of services in these community-based settings. Findings in this study implied that the characteristics of children and families enrolled in early intervention programs, and the attributes of providers with whom they become engaged, are likely to influence the volume of service and specific nature of services provided. Data also suggest that the overall view and horizon of early intervention has broadened over the last decade, and is no longer restricted to specific centers but includes the universe of neighborhood resources.

While other service utilization studies are rare, cost analysis investigations are even more scarce. In a recent review of 21 cost studies of early childhood services (Barnett and Escobar, 1990), only four of which addressed services to infants and toddlers with disabilities exclusively, the range in annual cost varied from $2,410. - $7,250. While these data were useful in that they began to establish the range of average annual cost, several significant limitations to these studies were also evident. These limitations included: (1) programs were presented as either home-based vs. center-based, however, this binary characterization no longer accurately reflects the array and complexion of early intervention services currently provided; (2) specific data were not reported that examined the relationships between child, family, and provider characteristics and the specific nature of services used (e.g., volume, type, and location); and (3) data were not reported that examined the extent to which scheduled services

were actually utilized, and the influence of cancelled services on cost.

Cost analysis studies that are of greatest benefit provide information not only on annualized cost, but also report those factors (consumer, provider, and program characteristics) that significantly affect the nature of services provided, and therefore, annual cost. In a recent study that attempted to examine both of these issues with service data derived from the Shonkoff et al., (1992) study, Erickson (1992) reported that: (1) on average, each child and family received 95 hours of service per year; (2) the mean annual cost per family was $4,868., however, ranged from $1,497. - $11,364.; (3) level of childhood disability and child age were significantly related to service type and volume.

Erickson noted several important implications of these findings for those seeking valid cost data. First, reporting annual cost with a single descriptive statistic (mean or median) masquerades significant variability in true cost for the wide variety of children and families enrolled in the early intervention system. Second, the common practice of dividing total program expenditures by the cumulative number of families served per year to arrive at annual cost is highly misleading, and is likely to underestimate the actual annual cost of service provision. Third, since studies exist which indicate that services are significantly influenced by child, family, provider, and program characteristics, cost ascertainment and projection studies must take into account these factors in the development of a predictive model. Finally, the most accurate cost projections are derived from analyses that examine the relationship between child, family, provider, and program characteristics and the provision of specific service events

over time.

In order to respond to the need for valid cost data that accommodates the important issues noted above, the purpose of this study was to ascertain actual costs associated with early intervention services provided to a cohort of children and families enrolled in three diverse programs located in three different states. Focal questions that the study addressed were as follows.

What is the weekly cost of early intervention services that are scheduled and ultimately provided?

What factors account for the cost of early intervention services provided?

Method

Study Sites

This study is a component of a larger, multi-site, longitudinal investigation of service utilization patterns of infants, preschool children, and their families. Within this comprehensive, systems-based study (Early Childhood Research Institute: Service Utilization), three diverse states were selected for study in this investigation. Criteria for selection included: size of population, sociodemographic characteristics, state policies governing the provision of early intervention services, methods of program funding, interagency commitments and relationships, the values and philosophy that guided service provision, and the overarching system of child-serving agencies at the state level. The three states selected were: Colorado (CO), North Carolina (NC), and Pennsylvania (PA).

Within each state, Advisory Committees were formed comprised of state

officials, families, program directors, and service providers. Committee members nominated a range of communities with early intervention programs based upon population density, sociodemographic characteristics, and resource availability. All programs were requested to be exemplars with respect to the values and concepts (e.g., service integration, community inclusion, family-centeredness and independence) that undergird the early intervention components (Part H) of IDEA (Individuals with Disabilities Education Act). The primary rationale for selecting exemplary programs was the belief that study findings would be more informative and useful to policymakers, service providers, and families if the factors and processes that relate to effective service delivery were disclosed, rather than to identify the many barriers that may result in ineffective service delivery.

Within each state, 12-15 communities were nominated. Upon reviewing key sociodemographic, fiscal, geographic, and contextual factors, three diverse communities in each state were selected. An attempt was also made to select one community in each state with high population density and resource availability, one with moderate population density and resource availability, and one with low population density and resource availability. Nine communities were ultimately selected for study, only three of which were involved in this cost analysis investigation. The three sites selected were intentionally diverse, and differed by: (1) geographic location (one site in each of the three study states); (2) population density and resource availability (high, moderate, and low); (3)

early intervention program model (e.g., affiliation with community-based programs; array of available services); and (4) funding amounts and sources.

Table 1 provides a descriptive portrait of each of the three cost study communities, and indicates significant variability in resident population, the percent of the population represented by racial minorities, per capita income, and the prevalence of low birthweight and single parent families. Also of noteworthy importance is that the prevalence of childhood poverty ranged from 14-20% across study sites.

Table 1
Descriptive Portrait of Study Communities *

	CO	NC	PA
Population	32,273	347,420	1,336,446
% Minority	14%	29%	13%
% Child Poverty	20%	14%	17%
Per Capita Income	$9,971.	$18,117.	$15,115.
% Single Parent Families	9%	23%	24%
% Low Birthweight	9%	9%	8%

* Colorado, North Carolina, and Pennsylvania Vital Statistics (1994).

With regard to the programs themselves (Table 2), features common to all programs included the availability of a multidisciplinary staff as well as a variety

of service options. However, several important distinctions also existed between programs. For example, the site in Colorado evidenced a strong commitment to population-based service access and coordination. This was demonstrated by formal linkages with a universal screening program, medical passport for pediatric services, a Family Center and Even Start program. Additionally, the array of available services included developmental surveillance, family-centered intervention, direct child therapy, home visits, and child groups within community-based, fully integrated settings.

Table 2
Program Philosophy, Characteristics and Size

	CO	NC	PA
Philosophy	population-based service access and coordination	specialized intervention and linkage with community programs	specialized intervention
Array of Services	developmental surveillance, family centered intervention, direct therapy, center based group services, home visits	developmental stimulation, direct therapy, service coordination	home visits, center based groups
Relationship to Other Service Systems	formal linkage with universal screening, medical passport, Family Center, Even Start	attempts single port of entry via interagency consortium; some linkage with child care	independent care coordination system and Medicaid reimbursement guidelines result in relatively autonomous program
Point in Time Program Enrollment	17	200	395
Total Number of Families Served Per Year	40	507	630
Total Number of Staff (FTEs)	4.1	29.6	53.6
Non-contracted	3.9	27.4	41.4
Contracted	.2	2.2	12.2

In North Carolina, the program studied was affiliated with a much larger agency that served individuals with developmental disabilities from birth through adulthood. This program attempted a single port of entry into the early childhood system via a community-based, interagency consortium. Furthermore, this site actively promoted linkages with child care programs, and emphasized developmental stimulation, direct child therapy, and service coordination.

Finally, the study site in Pennsylvania was a very large program (i.e., 630 families served per year) in an urban setting that provided primarily specialized intervention (i.e., home visits and center-based groups), and was significantly influenced by Medicaid reimbursement guidelines and a service coordination system that was external to, and independent of, the program.

Sample

The sample for this study includes 44 infants, toddlers, and their families. As is evident in Table 3, the mean age of children in this study was 23.3 months, whereas the mean age at referral was 7.2 months. Approximately 27% of the children and families were characterized as low/need complexity, 55% as moderate, and 18% as high. Since individualized family service plans (IFSPs) and ultimately services provided are intended to include both child and family needs and goals, need/complexity ratings were based on four dimensions: degree of child developmental delay (low, moderate, high), child health status (presence of a chronic health condition that required no, occasional, or ongoing medical specialty services), degree of family need (low, moderate, or high in such areas as basic needs, parent education or employment, transportation,

mental health and health care services, information and referral services), and number of agencies and programs (child protective services, maternal and child health) with which the family was affiliated (none, one to two, more than two).

Need/complexity ratings were made by the family's primary service provider who was either a care manager or the professional with whom the family had the greatest amount of contact. These providers were instructed to rate the need/complexity level of each participating family based upon the four dimensions noted above. For approximately 30% of the sample, Institute staff who were blind to these results conducted in-home interviews with families, and on this basis, also provided independent need/complexity ratings. Inter-rater agreement was acceptable (kappa=.46; $p<.001$) with 66% of the ratings being identical, and 94% within one rating category (e.g., low vs. moderate).

With regard to key characteristics of mothers (Table 4), they were approximately 30 years of age, and diverse in their educational attainment (48% with $\leq$ high school; 25% with a college degree). Seventy-three percent of the families reported annual incomes in the poverty or near poverty range, and consistent with this finding, 50% of the families were Medicaid eligible and 10% were uninsured. Finally, 40% of the mothers were employed either part or full time whereas 60% of the sample were at home managing their households on a full time basis.

Service providers (Table 5) were approximately 36 years of age, primarily White (95%), and well educated (34% with an undergraduate degree and 55%

Table 3
Child Characteristics of Study Sample

		CO	NC	PA	Total	
Age	n	13	15	16	44	
	mean	25.3	24.1	20.9	23.3	F = 1.94 (ns)
	SD	6.9	6.1	6.1	6.5	
Gender	male	5 (38%)	9 (60%)	11 (69%)	25 (57%)	Chi Square = 2.78 (ns)
	female	8 (62%)	6 (40%)	5 (31%)	19 (43%)	
Race	White	10 (77%)	2 (13%)	4 (25%)	16 (36%)	Chi Square = 13.57 (p<.001
	non-White	3 (23%)	13 (87%)	12 (75%)	28 (64%)	
Need/Complexity	low	6 (46%)	6 (40%)	0	12 (27%)	
	moderate	4 (31%)	8 (53%)	12 (75%)	24 (55%)	Chi Square = 11.21 (p<.02)
	high	3 (23%)	1 (7%)	4 (25%)	8 (18%)	
Age at Referral	n	13	15	16	44	
	mean	10.7	6.2	5.3	7.2	F = 5.83 (p<.006)
	SD	5.4	4.1	3.9	5.0	
Length of Program Involvement	n	13	15	16	44	
	mean	14.2	16.6	13.8	14.9	F = 1.44 (ns)
	SD	6.4	3.8	4.6	5.0	

Table 4
Mother Characteristics of Study Sample

		CO	NC	PA	Total	
Age	n	12	14	14	40	
	mean	28.7	29.9	29.9	29.5	F = .15 (ns)
	SD	5.4	6.3	7.4	6.3	
Race	White	10 (83%)	3 (21%)	4 (29%)	17 (43%)	Chi Square = 11.84 (p<.003)
	non-White	2 (17%)	11 (79%)	10 (71%)	23 (57%)	
Education	≤ high school	5 (42%)	7 (50%)	7 (50%)	19 (48%)	Chi Square = .61 (ns)
	some college	4 (33%)	3 (21%)	4 (29%)	11 (28%)	
	college degree	3 (25%)	4 (29%)	3 (21%)	10 (25%)	
Employment	employed	4 (33%)	8 (57%)	4 (29%)	16 (40%)	
	unemployed seeking work	2 (17%)	2 (14%)	1 (7%)	5 (13%)	Chi Square = 4.05 (ns)
	at home managing household	6 (50%)	4 (29%)	9 (64%)	19 (48%)	
Insurance	insured	4 (33%)	5 (36%)	6 (43%)	15 (38%)	
	Medicaid	4 (33%)	8 (57%)	8 (57%)	20 (50%)	Chi Square = 7.37 (ns)
	not insured	4 (33%)	1 (7%)	0	5 (12%)	
Income	< $10,000.	4 (33%)	6 (43%)	1 (7%)	11 (28%)	
	$10 - 20,000.	4 (33%)	3 (21%)	7 (50%)	14 (35%)	Chi Square = 5.28 (ns)
	> $20,000.	4 (33%)	5 (36%)	6 (43%)	15 (38%)	
Single vs. Dual Parent	single	3 (25%)	8 (57%)	5 (36%)	16 (40%)	Chi Square = 2.95 (ns)
	dual	9 (75%)	6 (43%)	9 (64%)	24 (60%)	

Table 5
Provider Characteristics of Study Sample

		CO	NC	PA	Total	
Age	n	16	17	30	63	
	mean	36.8	34.6	33.6	34.7	F = .69 (ns)
	SD	7.2	8.1	9.8	8.7	
Race	White	16 (100%)	15 (88%)	29 (97%)	60 (95%)	Chi Square = 2.77 (ns)
	non-White	0	2 (12%)	1 (3%)	3 (5%)	
Education	≤ some college	4 (24%)	2 (12%)	1 (3%)	7 (11%)	
	college degree	4 (24%)	8 (47%)	10 (33%)	22 (34%)	Chi Square = 6.44 (ns)
	graduate degree	9 (53%)	7 (41%)	19 (63%)	35 (55%)	
Academic Discipline	social worker/psychologist	3 (19%)	2 (14%)	6 (19%)	11 (18%)	
	educator	1 (6%)	4 (29%)	10 (32%)	15 (25%)	
	motor	5 (31%)	5 (36%)	5 (16%)	15 (25%)	Chi Square = 9.19 (ns)
	paraprofessional	4 (25%)	1 (7%)	2 (7%)	7 (12%)	
	speech/language	3 (19%)	2 (14%)	8 (26%)	13 (21%)	
Children at Home	yes	15 (88%)	9 (53%)	7 (23%)	31 (48%)	Chi Square = 18.49 (p<.001)
	no	2 (12%)	8 (47%)	23 (77%)	33 (52%)	
Family Member with a Disability	yes	3 (18%)	4 (24%)	3 (10%)	10 (16%)	Chi Square = 1.58 (ns)
	no	14 (82%)	13 (76%)	27 (90%)	54 (84%)	

with a graduate degree). A broad range of academic disciplines was represented including ancillary staff (psychologists, social workers, nurses; 18%); educators (25%), motor therapists (25%), paraprofessionals (12%), and speech/language therapists (21%).

Service Data

Service utilization data examined in this study included all services provided within the context of the early intervention program (i.e., included within IFSPs and paid for with early intervention program income funds). Service utilization data were gathered for one week out of every month for a twelve month duration (September, 1994 - August, 1995). Designated weeks varied from month to month, and weeks that included holidays or vacations were excluded. All encounters that were scheduled between providers and children and their families were recorded for the target weeks. For each encounter, the duration, location (e.g., home, center, child care setting), type of service (e.g., assessment, individual therapy, center group), and academic discipline of service provider were recorded (Appendix A). Furthermore, for scheduled services that did not occur, the source of cancellation was reported (i.e., family no show, provider/agency cancellation, family cancellation). Underlying reasons for cancellation were not reported. For all scheduled services, a service utilization rate was calculated for each family (i.e., proportion of scheduled service encounters actually used).

To examine how well this data collection strategy (sampling one week per month) reflected all services scheduled and provided, full service records were

reviewed for four children in the total study sample. Complete service protocols were reviewed on-site by Institute staff for an entire twelve week period, and all service events both scheduled and provided were recorded from service provider case files. The relationship between data reported by providers for one week per month and that obtained from full record reviews was very high. For the primary measure of service utilization analyzed in this paper, namely service intensity (hours per week), the correlation between provider and record reviews was .99 ($p<.001$). The distribution of reported service events by location also corresponded almost identically with the distributions revealed from record reviews. Consequently, it is presumed that the service data reported in this study are an accurate portrait of services made available and actually used by families for the twelve month period examined.

Two dimensions were used to characterize service utilization over the twelve month period examined: intensity and location. Service intensity was determined by aggregating all contact hours per week for each child/family, and calculating a weekly average from the twelve weeks reported (i.e., one week per month). With regard to location, all service events were reported in one of five categories: home, center, family-based child care, center-based child care, and other. Services provided in child care settings and other community-based programs (family centers) were combined into a single category entitled "community".

Cost Data

Cost data in this study were gathered consistent with the "ingredients model" described by Levin (1983). Specific cost information was gathered on-site by the senior author of this paper for fiscal year 1994-95. Data were gathered by examining actual cost and budget data as well as through interviews with program directors. All program income data were categorized as follows: state/county, Federal (IDEA), Medicaid and other insurance, Chapter I, and other. Program expenditure categories included personnel (contracted and non-contracted), administration, occupancy, transportation (child and family), supplies, equipment, staff travel, and indirect costs.

In order to ascertain the actual cost per hour of each service provider enrolled in the study, the model described by Dunst and Brookfield (1994) in a recent time and motion study conducted in Pennsylvania was adopted. In brief, the model assumes that cost per contact hour is comprised of three components: salary (including fringe benefits), indirect service time (e.g., staff meetings, report preparation), and support costs. Indirect service time for each provider was determined by administrator interview, and when available, actual billing records for services provided.

Cost per hour was initially determined for each provider by dividing total salary (including benefits) by the number of hours worked per year. Second, this figure was then adjusted consistent with the percent of time devoted to indirect service activities for each individual provider. For example, for a provider whose salary per hour was $20. and the indirect service percent was 40%, the adjusted

cost per hour was equal to $28. (i.e., $20. x 1.4). Finally, average program support cost was determined by dividing total support costs (administration, occupancy, transportation, supplies, equipment, staff travel, and indirect costs) by the total number of hours service providers worked per year. This cost was further adjusted for each provider under the assumption that individuals who provide more direct service also consume greater support costs. As such, each provider's direct service percent was multiplied by the average program support cost to yield an individual program support cost. Therefore, the actual per hour cost for each individual was the sum of three values: salary, the hourly cost of indirect service time, and hourly support costs.

Results

Program Income

Information regarding total program income by funding source among the three study sites is presented in Table 6. Despite substantial variation in overall budget (range from $189,083. to $2,306,451.), the proportion of income derived from state/county sources was approximately equal (59%). For two communities, funding derived from IDEA accounted for 10%, while the third program reported 20% of its budget derived from IDEA. Significant variability among sites was also evident in income from Medicaid and private insurance (0% to 25%), Chapter I/P.L. 89-313 (0% to 11%), and miscellaneous sources (8% to 22%). With regard to miscellaneous funding sources, substantial variability was evident among sites, and partly reflected program philosophy. For

Table 6
Program Budgets by Income Source

	CO	NC	PA
State/County	$ 110,614. (59%)	$ 777,626. (57%)	$1,377,014. (60%)
IDEA	$ 16,378. (9%)	$ 136,426. (10%)	$ 456,109. (20%)
Medicaid/Insurance	$ 0.	$ 341,064. (25%)	$ 152,502. (7%)
Chapter I	$ 21,147. (11%)	$ 0.	$ 97,297. (4%)
Other	$ 40,944. (22%)	$ 109,141. (8%)	$ 223,529. (10%)
Total	**$ 189,083.**	**$1,364,257.**	**$2,306,451.**

example, the miscellaneous income in Colorado was derived from ten different sources (e.g., Title V, private foundation, state funds for Family Centers, school district). Alternatively, miscellaneous funds in North Carolina were principally derived from Title XX (Child Care Block Grant). In Pennsylvania, the majority of funds were received from a school district to support children who had turned three years of age in late spring and early summer and continued to receive early intervention services.

Program Expenditures

The distribution of funds across line item budget categories is presented in Table 7. Overall, data consistently reveal that 78% of the total operating budget was expended on personnel; that is, for each dollar of revenue, nearly $.80 was expended on direct service staff. Approximately 14% was expended on administrative costs, and the remaining budget categories (supplies, equipment, travel, occupancy) consumed approximately 5% of total income.

Table 7
Program Line Item Budgets

	CO	NC	PA
Personnel	$88,868. (47%)	$688,797. (51%)	$921,816. (40%)
Fringe Benefits	$21,478. (11%)	$172,187. (13%)	$244,464. (11%)
Sub-Contracted Personnel	$33,000. (18%)	$186,217. (14%)	$627,718. (27%)
Occupancy	$165. (.09%)	$8,921. (.7%)	$138,840. (6%)
Transportation (Children and Families)	0.	$500. (.04%)	$3,615. (.2%)
Supplies	$1712. (.9%)	$22,828. (2%)	$18,358. (.8%)
Equipment	$3,234. (2%)	$20,137. (2%)	$11,091. (.5%)
Staff Travel	$4,947. (3%)	$48,575. (4%)	$30,772. (1%)
Administration	$33,322. (18%)	$200,000. (15%)	$197,117. (9%)
Indirect Costs	$2,357. (1%)	$16,095. (1%)	$112,660. (5%)
Total	$189,083.	$1,364,257.	$2,306,451.

Hourly Service Provider Costs

Data with regard to hourly cost by academic discipline among the three study communities are presented in Table 8. Several important findings are noteworthy. First, the difference in actual cost per hour for contracted (per diem consultants) vs. non-contracted staff (full time staff) within discipline was inconsistent among sites. More specifically, in the four instances in which such comparisons were possible (three in Pennsylvania and one in Colorado), two revealed that the actual cost/hour was greater for non-contracted staff, whereas the remaining two produced opposite findings. While the initial hourly salary costs were greater for contracted staff, adjusting hourly costs for non-contracted staff to include fringe benefits, indirect service time, and support costs markedly reduced, and in fact, eliminated these differences in 50% of the cases in which such comparisons could be made.

Second, with regard to differences among study communities by academic discipline for non-contracted staff, significant differences were evident. Findings revealed that the North Carolina site reported the highest hourly cost for all disciplines, while the Colorado site revealed the lowest hourly cost for all service providers. Two factors accounted for the greater hourly costs in North Carolina: (1) salary and fringe benefits were somewhat higher; and (2) the percent of time devoted to indirect services was somewhat higher than the other two communities.

With respect to differences among disciplines within study communities,

Table 8
Mean Cost Per Hour for Service Providers by Study Site

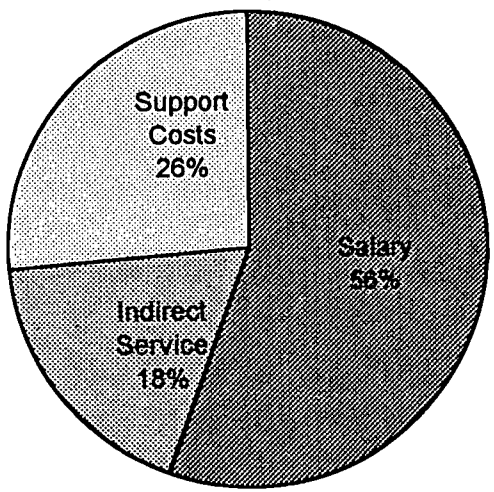
	CO				NC				PA			
	Salary	Indirect * Service %	Support * Costs	Actual Cost	Salary	Indirect Service %	Support Costs	Actual Cost	Salary	Indirect Service %	Support Costs	Actual Cost
Social Worker/ Psychologist												
Contracted	n/a	n/a	n/a	**n/a**	n/a	n/a	n/a	**n/a**	$38.	30%	0.	**$49.**
Non-Contracted	$16.	67%	$8.	**$35.**	$21.	55%	$9.	**$42.**	$18.	48%	$10.	**$37.**
Educator												
Contracted	n/a	n/a	n/a	**n/a**	n/a	n/a	n/a	**n/a**	n/a	n/a	n/a	**n/a**
Non-Contracted	$15.	21%	$11.	**$28.**	$18.	53%	$9.	**$37.**	$17.	40%	$10.	**$29.**
Motor Therapist												
Contracted	$25.	40%	0.	**$35.**	$45.	28%	$11.	**$58.**	$44.	30%	0.	**$57.**
Non-Contracted	$19.	15%	$11.	**$33.**	n/a	n/a	n/a	**n/a**	$41.	30%	$11.	**$65.**
Speech Therapist												
Contracted	n/a	n/a	n/a	**n/a**	n/a	n/a	n/a	**n/a**	$22.	30%	0.	**$29.**
Non-Contracted	$17.	10%	$11.	**$30.**	$23.	48%	$9.	**$43.**	$23.	40%	$10.	**$42.**
Paraprofessional												
Contracted	n/a	n/a	n/a	**n/a**	n/a	n/a	n/a	**n/a**	n/a	n/a	n/a	**n/a**
Non-Contracted	$9.	17%	$11.	**$21.**	$16.	50%	$9.	**$33.**	$10.	39%	$10.	**$24.**

* Indirect service percent includes all time devoted to non-direct service functions and activities.
Support Costs include administrative, occupancy, transportation, supplies, equipment, staff and travel, and indirect costs.

Figure 1

Percent of Actual Cost Per Hour by Salary, Indirect Service Percent, and Program Support Cost For Non-Contracted Staff

All Disciplines



Discipline Groups

	Salary	Indirect Service Percent	Support Costs	Cost/ Hour
Social Worker/Psychologist	50%	26%	24%	$38.
Educator	49%	23%	28%	$35.
Motor Therapist	64%	17%	19%	$53.
Speech Therapist	54%	22%	24%	$41.
Paraprofessional	42%	13%	55%	$24.

actual hourly costs were significantly different in all three sites. Consistent with expectations, paraprofessional costs were lowest in all communities, while costs for therapists (motor, speech/language), social workers, and psychologists were approximately 25% greater than that reported for educators.

Finally, two consistent findings were evident in data reported for all three study sites: (1) average support costs approximated $10./hour with little variation among sites; and (2) the actual cost per hour of non-contracted staff was nearly twice that of salary (and fringe benefits) per hour. Data in Figure 1 reveal that of the actual cost per hour of all disciplines (non-contracted staff) combined ($37.63), 55% was accounted for by salary and fringe benefit costs, 18% by indirect service costs, and 26% by program support costs.

Weekly Services

Findings that summarize weekly services by intensity, utilization rate, and location of service for the 44 infant/toddlers studied are presented in Table 9. With respect to intensity, findings revealed that whereas the mean amount of scheduled service was 3.14 hours per week (median = 1.50 hours), the average amount of weekly service actually provided was 2.30 hours (median = 1.00 hours). These findings are substantiated by data presented in Figure 2 which reveal that the majority of families (81%) enrolled in programs in these three sites were scheduled to receive less than three hours of service per week, and 86% actually received less than three hours per week.

Second, data in Table 9 also reveal that while the overall utilization rate of scheduled services was 79% among all study families, significant variability (F =

Table 9
Service Events by Intensity, Utilization Rate, and Location by Study Site

Intensity: Hours/Week

	CO	NC	PA	F value for mean differences	Total
n	13	15	16	3.64; p<.05 (scheduled)	44
mean	2.11* (1.37)	3.54 (3.28)	3.57 (2.20)		3.14 (2.30)
SD	1.31 (1.40)	7.04 (7.00)	4.60 (3.43)	5.71; p<.01 (provided)	5.01 (4.63)
median	2.00 (1.00)	2.00 (1.50)	1.25 (1.00)		1.50 (1.00)

*** Scheduled (Provided)**

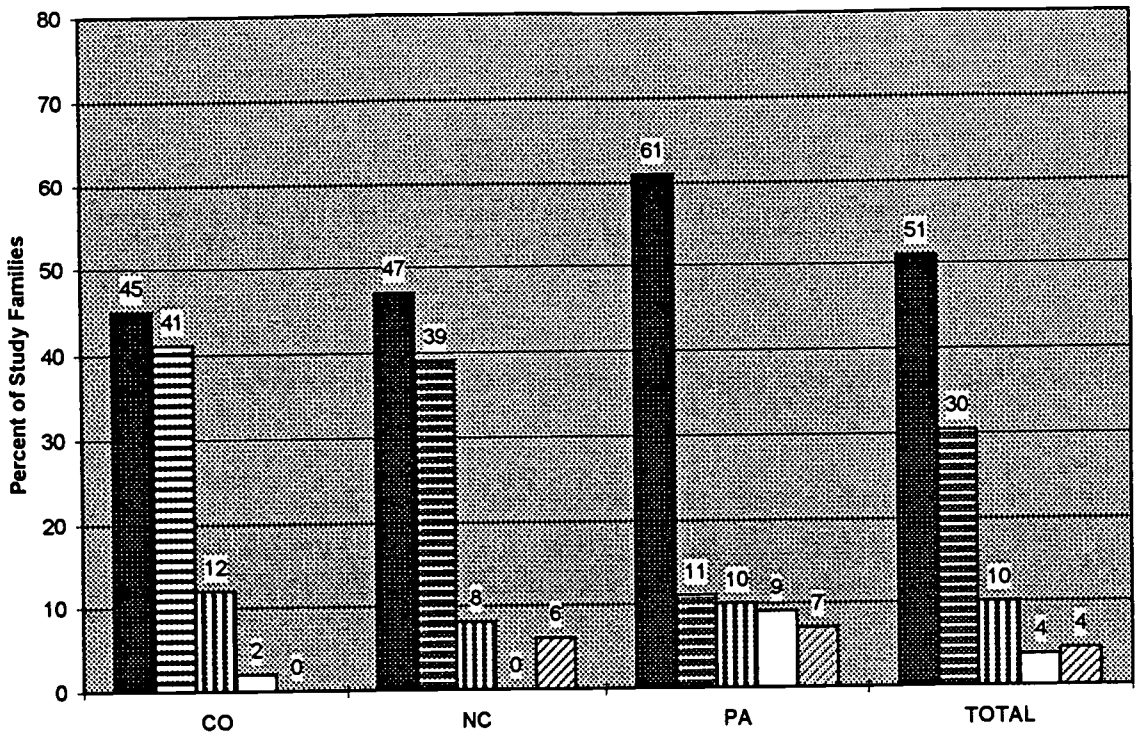
Utilization Rate

	CO	NC	PA	F value for mean differences	Total
n	13	15	16		44
mean	72.23	90.80	74.50	10.26 (p<.001)	79.40
SD	13.30	8.70	13.70		14.50

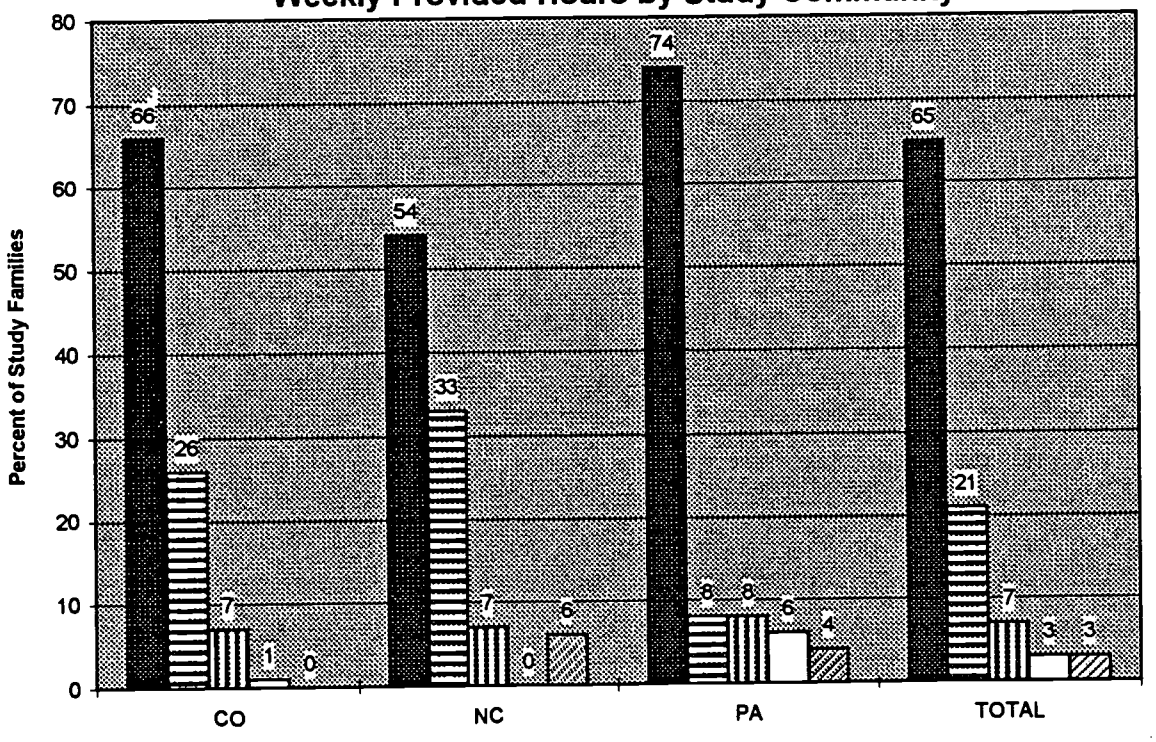
Location

	CO	NC	PA	Chi Square	Total
home	80 (50%)	80 (29%)	80 (25%)		240 (32%)
center	0	32 (11%)	214 (67%)	352.02 (p<.001)	246 (32%)
community	79 (50%)	168 (60%)	27 (8%)		274 (36%)

Figure 2
Weekly Scheduled Hours by Study Community



Weekly Provided Hours by Study Community



10.26; p<.001) among communities existed with the North Carolina site reporting the highest utilization rate (91%).

Finally, when services actually provided were examined by location among study sites, findings revealed significant differences (Chi Square = 352.02; p<.001). More precisely, while the majority of services provided in both the Colorado (50%) and North Carolina (60%) sites occurred in integrated, community-based settings, the majority of service encounters in the Pennsylvania site occurred in either homes (25%) or at the center-based early intervention site (67%).

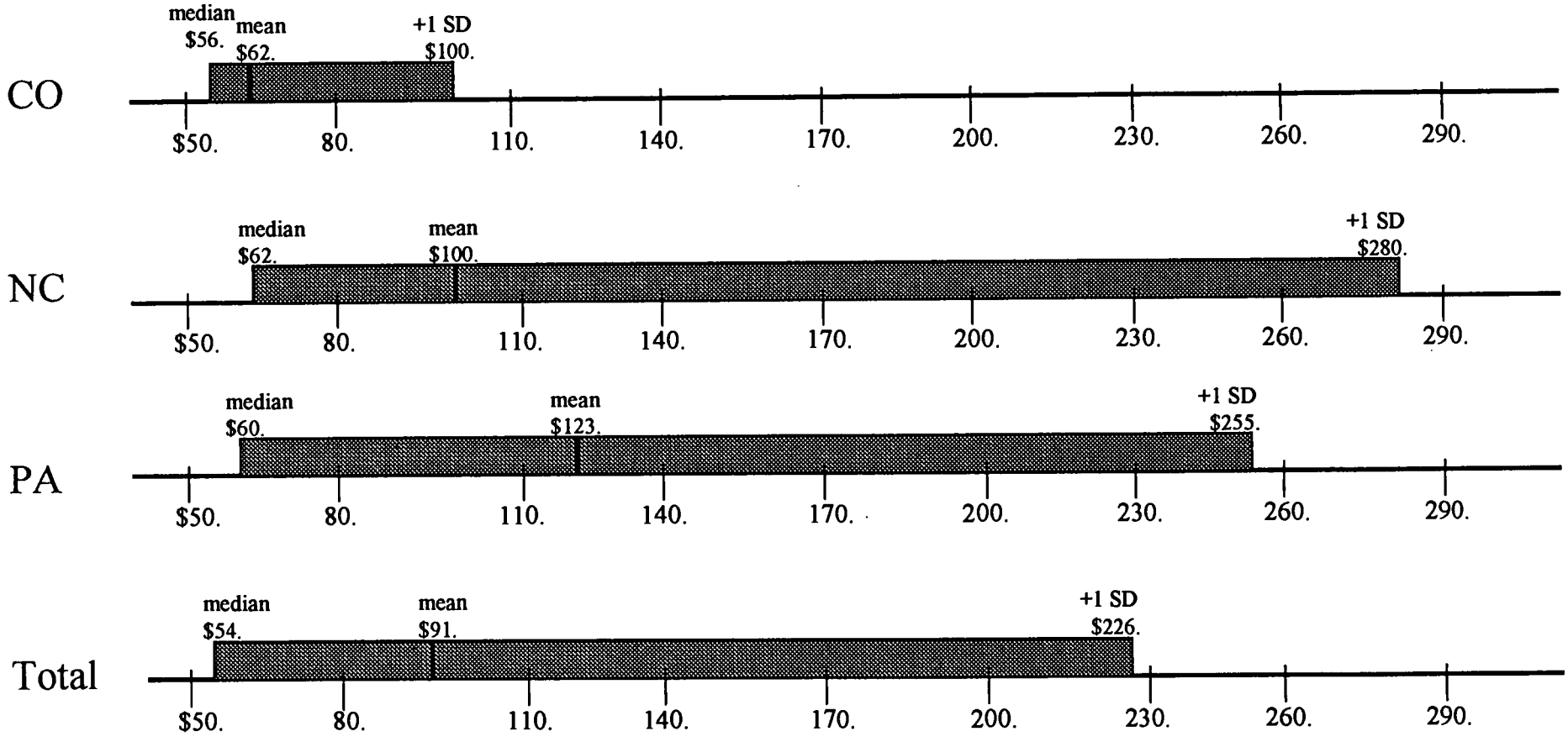
Range in Weekly Cost of Services

Findings with regard to the weekly cost of scheduled services by study site are presented in Figure 3. Consistent with the variability in service utilization data previously presented, a wide range in cost of services scheduled weekly was also evident in all three study communities. More precisely, when cost per week is portrayed by using the median, mean, and +1 SD, the overall cost ranged from approximately $55.- $225. This translates into annual costs that approximated $2,860. - $11,700 per child.

While these data are illuminating with respect to the cost of weekly scheduled services, they do not fully disclose the adverse impact that cancellation has on cost. For example, data in Table 10 reveal that the aggregate cost per hour of scheduled services approximated $29 (i.e., total cost per week divided by mean scheduled hours; $91./3.14 hours). However, given

Figure 3

Range of Weekly Cost of Scheduled Services by Community



that only 2.30 hours were actually provided, services actually provided was $40. per hour (i.e., total cost per week divided by mean provided hours; $91./2.30 hours).

Table 10
Cost for Scheduled vs. Provided Service Hours Per Week

	CO	NC	PA	Total
Mean scheduled hours/week*	2.11	3.54	3.57	3.14
Mean provided hours/week	1.37	3.28	2.18	2.30
Percent of scheduled service events actually used	72%	91%	75%	79%
Mean total cost/week of scheduled hours	$62.	$100.	$123.	$91.
Cost per scheduled hour per week	$29.	$28.	$34.	$29.
Cost per provided hour per week	$45.	$30.	$56.	$40.

*** Total scheduled service hours by all providers**

Since the majority of service providers in this study were non-contracted staff, their salaries were fixed, and did not depend upon what proportion of their services were actually provided. However, in viewing this constant cost in the context of services hours that were scheduled vs. those that were actually provided, the influence of service cancellation on hourly cost is apparent.

Data within the study sites clearly reveal this important determination. For example, in the North Carolina site which reported a service utilization rate of

91%, the difference in hourly cost between scheduled and provided service was only $2. ($28. Vs. $30.). In contrast, in both the Colorado and Pennsylvania study communities that reported utilization rates of 72% and 75% respectively, the difference in hourly cost between scheduled and provided services was quite significant (i.e., $16. - $22./hour). It is important to note that this study did not monitor and document staff time and effort during these cancelled sessions, and therefore, it cannot be presumed that these cancelled hours were completely unproductive. However, these data do provide compelling evidence that service cancellation appears to be an important factor in determining the actual cost of providing early intervention services.

This finding has important implications for both program administrators and researchers. For administrators who are principally responsible for staff utilization and program efficiency decisions it is crucial to develop a clearer understanding of the origin of service cancellations, and to devise strategies that minimize their occurrence. Additionally, monitoring staff activities and tasks that are accomplished during these cancelled sessions, and ascertaining their relative benefit and impact is an area worthy of thoughtful consideration.

For researchers conducting cost analysis and cost benefit studies of early intervention services, it is imperative that precise methods be devised to record both scheduled as well as provided service events. Moreover, in determining cost benefit, it is critical to examine the association between scheduled and provided hours an child and family outcomes. In addition, determining the benefits, if any, of alternative services and functions that are performed during

cancelled sessions is also an area that must be examined and accounted for as well.

Discussion

The major objective of this study was to examine the cost of early intervention services, and to identify the core ingredients of hourly service cost. Forty-four infants and toddlers enrolled in three diverse early intervention programs in three states were studied for a twelve month period. During this time, all service events, both scheduled and provided, were recorded for one week per month. In addition, detailed cost and budget data were gathered from each site in order to ascertain the cost per hour of each staff member employed by these programs. Overall, findings revealed an extremely wide range in annual cost of early intervention services from $2,860. to $11,700. Factors that comprised the cost of services were volume of service received, cancellation rate, staff salaries, program support costs, and percent of time expended on indirect services.

With regard to volume of services received, findings indicated that the majority (81%) of families were scheduled to receive less than three hours of service per week. In a related study with the same data set that examined factors related to service volume (Kochanek and Buka, 1996b), findings revealed that older children (i.e., toddlers) and mothers of higher level of educational attainment received significantly more service per week. With respect to service cancellation, again, a related study with the same data set (Kochanek and Buka, 1996a) revealed that while the overall service utilization rate was relatively high

(i.e., 79%), nearly one-fifth of the families studied utilized less than 50% of services that were scheduled. Factors that were associated with high utilization rates included providers who were younger and most similar in age to the mothers of children they served. Overall, data in both of these studies revealed that the characteristics of both consumers and providers in early intervention programs significantly influenced service volume and utilization. As such, as program administrators attempt to understand not only current costs but also project future costs, it is imperative to examine the characteristics of those involved in programs, and the relationship between these characteristics and service volume, type and cancellation. Studies are recommended that examine the relationship between eligibility policies, enrolled populations, and services scheduled and actually utilized.

With respect to service utilization, data in other related studies (Kochanek and Buka, 1996a) have revealed that there are families enrolled in early intervention programs that use only a small portion of services that are scheduled on a weekly basis. These cancelled service events can significantly increase the true cost of services provided. A significant limitation of this study is that it did not document underlying reasons for cancelled services, nor did it record those functions and activities performed by staff during these cancelled events. Nevertheless, findings in this investigation revealed that service cancellations are costly in economic terms, and presumably, in human terms as well.

Three additional factors were also identified that relate to cost: salary schedules, program support costs, and indirect service time. Whereas salary rates may be difficult to manipulate and control due to shortages of clinicians within specific disciplines and competition with more attractive salary schedules within public school districts, indirect service time is an area worthy of thoughtful examination. Findings in this study revealed a range of indirect service time from 10% to 67% among non-contracted staff, and 30% to 40% for contracted staff. While the merits of the activities completed during this time are not disputed (staff meetings, report writing), they also increase hourly cost. The manner in which these functions are accomplished by various staff is also an area worthy of examination and experimentation by program administrators and staff.

In summary, findings in this study underscore the fact that understanding and projecting cost of early intervention services is a complex, multivariate challenge. Significant variation in cost was noted both within and among programs studied. This variability was primarily related to four factors: (1) amount of service scheduled and actually used per week; (2) salary rates of providers; (3) program support costs; and (4) percent of staff time devoted to indirect service activities. Given the variability in these factors among programs, and also that each study site presented a unique profile and identity, the range in annual service cost was $2,860. - $11,700 per child.

In viewing the generalizability of these findings, several important limitations to this study must be acknowledged. First, the study includes data on only 44 children and families, and does not in any way represent the universe of

children and families enrolled in programs nationally. Second, service data were derived from programs that were perceived as exemplary by professionals and families in these states, and the extent to which these findings are applicable to the larger early intervention system is indeterminable. Third, "opportunity costs" (Escobar, Barnett, and Goetze, 1996) are not reflected in data presented. More specifically, estimates of volunteer time and the fair market value of space costs were not ascertained. In fact, two of the three sites studied (Colorado and North Carolina) were located in publicly owned buildings, and negligible occupancy costs were reported. Therefore, cost data in this study may underestimate true annualized costs.

While the above limitations must be considered seriously by those attempting to understand and ascertain cost, the methodology used to understand cost in this study appears worthy of replication and further enhancement in future studies. That is, whereas the costs of early intervention services reported herein must be viewed and interpreted cautiously, the value of this study may reside with the fact that it has identified the essential data elements requisite to valid cost ascertainment studies. Furthermore, it has identified areas that appear to comprise cost, and to some extent, can be manipulated and controlled by program administrators (e.g., support costs, indirect services, service cancellations). To this end, additional inquiry is imperative by both researchers and program-based staff to better understand how these factors can be used to develop meaningful and effective cost containment strategies without denying essential services for eligible children

and families. These data are essential to develop meaningful responses to widespread concern and occasional misunderstanding regarding the current and future investment in the early intervention enterprise.

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Appendix A

Service Utilization Protocol

E.C.R.I.

Early Childhood Research Institute

Infant / Toddler Weekly Service Summary

County _____ State _____ Service Provider Code _____

Service Provider Name _____ (Last / First / MI)

Week Ending Date (Saturday) _____ (Mo. Day Year)

	Child's Name	Service Date	Service Type	Service Location	Length of Contact * (Round to nearest 1/2 hr)	Cancellation Code
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						

Provider Codes

1. Adaptive PE
2. Audiologist
3. Educator
4. Nurse
5. OT
6. PT
7. Physician
8. Psychologist
9. Social Worker
10. Special Educator
11. Speech/Language Therapist
12. Vision Impairment Specialist
13. Hearing Impairment Specialist
14. Paraprofessional/Aide
15. Interpreter
16. Child Care/Head Start Teacher

Other _____

Service Location

1. Home
2. Center
3. Family Day Care
4. Day Care Center
9. Other _____

Cancellation Code

1. No Show
2. Provider/Agency Cancellation
3. Client Cancellation

Service Unit Type

Individual

1. Screening (Intake)
2. Assessment
3. Semi-Annual Progress Review
4. IFSP Meeting
5. Developmental Monitoring
6. Service Coordin/Management
7. Child Therapy
8. Family/Child Therapy
9. Family Counseling
10. Transition Planning
11. Consultation to Day Care
12. Consultation to Other Agency
19. Other Individual Service

Group

20. Integrated Group Placement
21. Center Development Group
22. Parent/Child Group
23. Parent Education/Support Group
29. Other Group Service

** Please place an asterisk next to services that are provided by more than one person at the same time, or that are provided in the context of a group activity.*

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