



Using portable computers in home visits: Effects on programs, data quality, home visitors and caregivers

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ABSTRACT

Collecting and using high-quality data related to participant outcomes are critical for monitoring program quality in home visitation programs for child abuse and neglect prevention, as well as for efforts to improve effectiveness and use limited funds efficiently. An evaluation was conducted to determine the impact of using portable computers to record data from standardized screening tools during home visits. Six home visiting agencies participating in the Early Years Home Visitation Outcomes Project of Wisconsin implemented computerized screenings with wireless uploading of data to a state public health database. Using portable computers saved agencies time and money on all four screening tools tested, with significant cost savings ($p < 0.05$) on three of the four tools, as compared to paper-and-pencil administration of screenings and manual data entry. The average time used per screening dropped between 9 and 63 min, saving agencies between \$2 and \$14 per screening administration. Screening completion was also higher when portable computers were used for data capture. There was little effect on home visitors' perceptions of the ease of data collection or their interactions with families being served. The use of portable computers to collect standard screening data holds promise for the field of home visitation.

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1. Introduction

1.1. Objective of the work

Collecting and using high-quality participant outcome data are important elements of program quality in home visitation programs that work with families of young children at risk for abuse, neglect and/or adverse developmental outcomes. From a policy perspective, a strong set of data related to the effectiveness of home visiting services is needed so that limited funds can be used as effectively as possible. The recent attention to evidence of effectiveness in home visitation calls for a scientifically based approach to data collection and management, so that both the effectiveness and cost-effectiveness of programs can be documented and monitored. An evaluation was conducted to determine the impact of using portable computers to record data from standard developmental screenings during home visits. This study does not assess participant outcomes; rather, it assesses the effects of a new method of data collection on home visiting programs, data quality, and home visitors.

1.2. Home visitation and efforts to improve its effectiveness

Home visitation is a service delivery strategy to promote child health and development, prevent child abuse, and identify developmental delays through regular visits to parents and children in their homes. Programs typically begin prenatally or at the birth of the child and continue through the child's second birthday or beyond. Home visitors may be professionals such as nurses or social workers, or they may be paraprofessionals, typically defined as individuals with job-related training but no formal, relevant degree. The majority of home visiting programs in the United States target specific populations that are deemed to be at increased risk for child abuse and neglect.

Recent attention to the field of home visitation, following an increase in federal funding for the strategy as part of the Patient Protection and Affordable Care Act of 2010 (P.L. 111–148), has brought to light issues of program quality and evidence of effectiveness. Evaluations of the effectiveness of home visitation programs have found varied results (Reynolds, Mathieson, & Topitzes, 2009). The Nurse–Family Partnership model has shown strong, consistent results related to a variety of maternal and child outcomes (e.g., Olds, Eckenrode, Henderson, Kitzman, Powers, Cole et al., 1997), and is considered the most rigorously “evidence-based” model in the field. Other national models have not shown as consistent results (e.g., Harding, Galano, Martin, Huntington, & Schellenbach, 2007), while

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perhaps the majority of home visitation programs in the country have never been rigorously evaluated, leaving a fair amount of uncertainty about the effectiveness of many programs.

The Early Years Home Visitation Outcomes Project of Wisconsin (Outcomes Project) works to define a set of common outcome measurements for home visitation programs which use a variety of program models throughout the state. The central purpose of this initiative, launched in 2001, is to develop an evaluation and measurement system using common, measurable outcomes across home visiting programs regardless of program model used. The Outcomes Project framework consists of five key outcomes and related indicators that are based on best practice for the field of home visitation, and are meaningful and measurable across program models. Sites in rural and urban communities representing private and public service providers are piloting the outcome measurement framework. The home visitation program models using this framework include Healthy Families, Parents as Teachers and a variety of hybrid program models that use multiple sources for content. All participating agencies are committed to the twelve “critical elements” for quality home visitation (Daro & Harding, 1999) regardless of the model they implement.

Standardized screening tools are used by home visiting programs to monitor child development, assess the safety and appropriateness of the child's environment, and identify potential areas of concern. Electronic versions of four screening tools were created for the project evaluated here, including (a) the Ages & Stages Questionnaires[®], Second Edition (ASQ, Squires, Bricker, Twombly, Nickel, Clifford, Murphy et al., 1999), and (b) the Ages & Stages Questionnaires[®]: Social-Emotional (ASQ-SE, Squires, Bricker, Twombly, Yockelson, Davis and Kim, 2002), which compare a child's physical, cognitive, and social-emotional development to established milestones for his or her age, allowing for early identification of potential developmental delays; (c) the Home Observation and Measurement of the Environment (HOME) Inventory (Caldwell & Bradley, 1984), which assesses the stimulation provided by a child's home environment; and (d) a Home Safety Assessment developed by the Wisconsin Division of Public Health to assess whether appropriate safety precautions have been taken in various rooms of a home.

1.3. The use of portable computers for data collection

Portable computers – including personal digital assistants and handheld, laptop and tablet computers – are increasingly being used to collect data for a variety of purposes. They have been adopted and tested in the medical field for point-of-care data entry by health professionals, both in clinical settings (e.g., Lal, Smith, Davis, Castro, Smith, Chinkes et al., 2000) and for home health care (e.g., Wilson & Fulmer, 1997); in schools for teachers to record student attendance and behavior (see summary in Adiguzel, 2008); and as a method for collecting research data in a variety of fields (e.g., Fletcher, Erickson, Toomey, & Wagenaar, 2003; Gravlee, Zenk, Woods, Rowe, & Schulz, 2006; Villordon, Franklin, & LaBonte, 2004). Studies have also found that portable computers work well for patients or research participants completing surveys or self-reporting data on a computer (Bobula, Anderson, Riesch, Canty-Mitchell, Duncan, Kaiser-Krueger et al., 2004; McBride, Anderson, & Bahnson, 1999).

A 2006 review of nine randomized controlled trials (RCTs) comparing handheld computers to paper data collection methods concluded that using handheld computers was faster than paper and pencil data collection and that most users preferred handheld computers to paper (Lane, Heddle, Arnold, & Walker, 2006). Five of the studies compared accuracy of the two methods, and their results were not consistent.

A more recent RCT in health care found that hospital nurses preferred wireless electronic devices (tablet laptop computers and personal digital assistants) over paper forms for collecting inpatient

data, and that the forms filled out on wireless devices were significantly more complete than those filled out on paper (Dykes, Carroll, Benoit, Coakley, Chang, Empoliti et al., 2007). There were no significant differences in completion rates or user satisfaction between the two types of wireless devices.

Two other recent studies call into question the assumed improvement in data quality with electronic means of data collection and entry. Shelby-James, Abernethy, McAlindon, and Currow (2007) found high rates of error, particularly in fields that contained default values, when nurses used handheld devices for data collection, as compared with paper-and-pencil data collection and manual entry into a database. A study by Haller, Haller, Courvoisier, and Lovis (2009) further explores the issue of data accuracy with electronic data collection. This RCT compared data entry from paper questionnaires into laptop computers or handheld devices. Laptop data entry was found to be substantially more time-efficient and resulted in fewer errors than handheld data entry. Both typing errors and rates of missing data were lower when data were entered into a laptop, with the difference in missing data being quite large. Users also preferred the laptop computers.

A literature review did not identify any published research exploring the use of portable computers in the field of home visitation. The use of web-based management information systems to track participation and participant outcomes in home visiting programs was reported in a recent article (Falconer, Rhodes, Mena, & Reid, 2009), but it was not reported whether home visitors use portable computers to collect information during home visits, or enter the information from an office or other location.

1.4. “Measuring the Impact” project description and research questions

The Outcomes Project developed software to facilitate standardized screenings with families using a portable computer in the home. The computers could be used in either tablet or laptop mode. The information was uploaded from the portable computer to the state's Secure Public Health Electronic Records Environment (SPHERE) database, and used to assess the program's compliance with specific indicators. Prior to this project, the data were collected on paper and then manually entered into the database.

The present evaluation was designed to assess the effects on programs, on the quality of the data collected, on home visitors and on participating caregivers. The research protocol was approved by the University of Wisconsin-Madison Social and Behavioral Sciences Institutional Review Board.

2. Methods

2.1. Participants

Home visitors working for seven agencies participating in the Outcomes Project were the primary participants in this study. One agency operates two home visitation programs, for a total of eight sites participating in the evaluation; one agency stopped participating in the Outcomes Project over the course of the evaluation and is not represented in post-implementation data. Sites that joined the Outcomes Project while the evaluation was underway were not included in the evaluation.

Each site serves a targeted population in a different part of the state, with families at risk for child abuse and neglect being the most commonly identified target population. However, all sites report a combination of targeted populations that may include first-time parents, teen mothers, low-income families and single mothers. Three of the sites strive to offer services to all first-time parents in their communities.

A total of 87 home visitors and program directors responded to surveys related to the introduction of the portable computers.

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