



Coordination of early childhood home visiting and health care providers

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A B S T R A C T

Although early childhood home visiting (HV) programs and primary care often have overlapping goals for child health and family well-being, little is known about the extent of coordination between HV and medical providers for women and children. The current study sought to measure coordination between HV and primary care medical providers, and to identify factors that influence its achievement. We developed and administered a web-based survey of HV providers who are members of the Home Visiting Applied Research Collaborative (HARC), a voluntary national network of HV programs, networks, and researchers. Program managers reported on coordination activities, health outcomes of the HV program, and supports for coordination. The 80 respondents indicated that nearly all HV programs ask whether and where participants receive primary medical care. However, less than half hold memoranda of understanding (MOU) agreements or regularly communicate with medical providers. Regular communication of HV programs with medical providers for women or children was positively associated with selected eligibility requirements (teenage mother, low-income family), having performance standards for one or more health related outcomes, favorable coordination perspectives by HV supervisors, and HV program supports for coordination (policies for training and supervision regarding coordination, MOU, and participation in medical visits) (all $p < 0.05$). Despite recent efforts to improve coordination between HV and medical providers, the extent of coordination remains limited.

1. Introduction

Early childhood home visiting (HV) is a national priority in the United States and an important public health strategy to improve maternal and child health. The federal government has invested nearly \$2.7 billion in home visiting since the establishment of the Maternal Infant and Early Childhood Home Visiting (MIECHV) Program (The Federal Home Visiting Program) in 2010 and the subsequent one year extension followed by a two year reauthorization through fiscal year 2017 (First Focus, 2015b; HRSA: Maternal and Child Health Bureau, 2015; Medicare Access and CHIP Reauthorization Act, 2015; Patient Protection and Affordable Care Act, 2010). Evidence-based home visiting programs have been shown to enhance family self-sufficiency, improve health for mothers and children, increase school readiness, and prevent child abuse and neglect (Council on Community Pediatrics, 2009; Finello, Terteryan, & Riewertz, 2016; Minkovitz, O'Neill, & Duggan, 2016; Sama-Miller et al., 2017).

Coordination of early childhood home visiting with other community services for families is a required Federal benchmark and priority of the national Home Visiting Research Agenda (Duggan et al., 2013; Home Visiting Applied Research Collaborative, 2017; Home Visiting Research Network, 2013; HRSA, 2016). Most federal HV support is for expansion of evidence-based home visiting in at-risk communities and for strengthening infrastructure to promote service quality and collaborations across early childhood systems, programs, and communities (Alliance for Early Success, 2014; Johnson, 2009; Willis, 2013). Similarly, primary care health providers for both mothers and children striving to attain medical home certification emphasize coordination and collaboration with community-based programs and supports for the families they serve (Medical Home Advisory Committee, 2002).

Several recent publications emphasize the importance of consistent communication between HV programs and primary care providers to ensure effective collaboration (Duffee et al., 2017; Minkovitz, West, & Korfmacher, 2016; Toomey, Cheng, & APA-AAP Workgroup on the

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Family-Centered Medical Home, 2013; Tschudy, Toomey, & Cheng, 2013; Willis, 2013). Possible benefits to greater coordination of services across sectors include facilitating referrals to community resources and supports, jointly addressing social conditions important to health and safety, and reducing unnecessary duplication of services (Council on Community Pediatrics, 2009; Duffee et al., 2017; Sides & Baggett, 2014). In addition, greater coordination offers the opportunity for health providers and home visitors to align to reinforce messaging and advice, and may strengthen HV program impacts (Minkovitz, O'Neill, et al., 2016). However, early research also has shown that coordinated communication between these systems will likely require explicit strategies (Barnet, Liu, DeVoe, Alperovitz-Bichell, & Duggan, 2007; Brown, Perkins, Blust, & Kahn, 2015).

Although limited to date, research specific to collaboration between HV and medical providers is consistent with themes identified across child welfare and other human service settings. For example, long-standing efforts have addressed the need to coordinate efforts between juvenile justice and child welfare agencies (Wiig et al., 2013), among early care and education providers (Chien et al., 2013), between mental health and child welfare providers (Collins & Marshall, 2006; He, Lim, Lecklitner, Olson, & Traube, 2015; Smith, Fluke, Fallon, Mishna, & Pierce, 2017), and between welfare and workforce development agencies (Pindus, Koralek, Martinson, & Trutko, 2000). Some of the goals of improved coordination across sectors highlighted in these examples included simplifying and improving information sharing, decision making, and case management processes for shared clients and families; increasing referrals; and improving family engagement. Efforts across these sectors highlight variation in the extent and scope of coordination, facilitators and barriers to its achievement, the role of contextual factors in influencing coordination, and work needed to advance collaborative relationships across sectors (Collins & Marshall, 2006; He, 2015; He et al., 2015).

In parallel with federal priorities aimed at improving maternal-child health, the Institute of Medicine (IOM, 2012) provided guidance to promote integration of primary care and public health. The IOM continuum of integration spans from working in isolation to mutual awareness, cooperation, collaboration, partnership, and finally merger, increasing in connectedness between the two extremes (Fig. 1). Although neither extreme (isolation or full merger) is considered ideal, the authors provide a range of actions to advance along this continuum of increased integration to achieve better health for the nation. Consistent with the existing literature on service coordination across other sectors (Collins & Marshall, 2016), the IOM document defines each step along the continuum and examples of each. Mutual awareness involves each entity knowing of the other entity and services provided. Cooperation comprises sharing of resources such as space or personnel, whereas coordination involves more purposeful joint planning and co-management. True partnerships or collaborations rely on programmatic integration and often appear as a unified program. Examples of fully integrated partnerships between home visiting programs and health systems do exist, but few have been described in the literature (Paradis, Sandler, Manly, & Valentine, 2013; Sides & Baggett, 2014). For example, Paradis et al. (2013) describe a home visiting program that is fully integrated into pediatric primary care. This model leveraged shared documentation in the electronic health record, transportation to medical appointments, and case conferencing to accomplish goals and

achieve shared health outcome measures. Moving health systems and home visiting programs further along the IOM continuum from mutual awareness towards merged systems of care could decrease waste and duplication while strengthening impacts on a broad range of outcomes. Coordination requires purposeful efforts to improve services through shared goals, delegated responsibility, accountability, communication, aligned resources and the exchange of information (Institute of Medicine of the National Academies, 2012; McDonald et al., 2014). As illustrated in the South Carolina example (Sides & Baggett, 2014; First Focus, 2015a), The Children's Center underwent a multi-step process over several years to move from isolation to complete integration of home visiting and primary care medical services.

Despite some early successes, multiple barriers to widespread adoption of these types of collaborations have been recognized; these include communication hurdles, conflicting goals and priorities, and lack of understanding of the roles of other providers serving families and how to access their services (Margolis et al., 2001; Roberts, Behl, & Akers, 1996; Schmied et al., 2010; Tschudy et al., 2016). Additionally, given the proliferation of home visiting models and variability in operating characteristics (eligibility requirements, duration of services, focus of program, desired outcomes), it is possible that wide variation also exists regarding communication and coordination with other services such as health care providers (Sama-Miller et al., 2017).

HV models also vary in the extent to which they report explicit outcomes related to maternal and child health. Of the 20 HV models designated as evidence-based and included in the national report on HV program effectiveness (Sama-Miller et al., 2017), only 10 models showed a positive outcome related to child health as measured by direct observation, with one additional model showing positive child health outcomes by self-report. Of the 9 remaining models in the report, 3 showed no effect on child health outcomes and 6 HV programs did not measure child health outcomes as part of their program model. Similarly, 11 of the 20 highlighted programs showed positive maternal health outcomes (5 by direct report and 6 by maternal self-report) while 6 programs showed no effect on maternal health measures and 3 did not measure maternal health outcomes. The variation in is not unexpected since the models vary in their target populations, intended outcomes, providers, services, and underlying theories of change (Minkovitz, O'Neill, et al., 2016). Given the variability in program outcomes related to maternal and child health, it is likely that coordination and communication between HV programs and medical providers for mothers and children varies by HV model. While the potential benefits to integration of primary care services for mothers and children and home visiting programs have been recognized, little is known about the current extent of coordination between these providers.

This study was designed to understand activities, views, and supports for coordination between home visiting programs and medical providers for women and children by surveying home visiting programs participating in a national research network. Specifically, we sought to answer the following questions: *Question 1:* What is the current extent and types of communication between home visiting programs and medical providers for mothers and children? *Question 2:* How do home visiting program outcomes, supports, and views related to coordination vary? *Question 3:* What factors are associated with coordination between home visiting programs and medical providers for women and children? *Question 4:* What topics are of importance to HV programs for coordination between HV and medical providers?

2. Methods

2.1. Setting

This study was conducted in collaboration with the Home Visiting Applied Research Collaborative (HARC), which was established in 2013 to promote innovative research to address national home visiting research priorities. HARC is a voluntary network of persons involved with

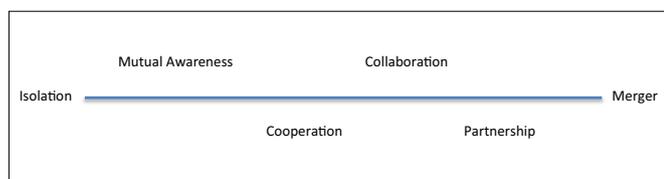


Fig. 1. Institute of Medicine Degrees of Primary Care and Public Health Integration*.
*Institute of Medicine of the National Academies, 2012.

home visiting including 272 local home visiting programs, 60 home visiting networks and 151 researchers. Membership is open to all in these categories, regardless of the HV model used. At the time of this study, member sites were distributed across 48 states and territories and the District of Columbia.

2.2. Study development

We developed a 75-item web-based survey in collaboration with the HARC leadership council. The survey was informed by a review of the literature surrounding communication and coordination, the policy statement from the American Academy of Pediatrics and the Academic Pediatric Association (Toomey et al., 2013), and a review of instruments used in the national Mother and Infant Home Visiting Program Evaluation (MIHOPE). The survey was pilot tested in five sites and reviewed by HARC Council members for readability and content with modifications based on feedback.

Eligible respondents were HARC members who were employed at the HV program for at least 6 months, read English, and held a supervisory role in the organization. Typically this comprised either HV program managers or supervisors, or others who were knowledgeable about their program's communication with medical providers. Only one response per HARC site was allowed.

2.3. Survey variables

Categories of survey items included: home visiting program characteristics; coordination activities of the HV program with regard to medical providers for both mothers and children (including communication); supports for coordination; health outcomes of the HV program; and views on coordination. As an exploratory question, we also asked home visiting programs about topics of shared interest and greatest importance for future coordination efforts between home visiting programs and health care providers for women and children.

2.3.1. Home visiting program characteristics

We chose program characteristics to both give general demographic information about the home visiting program as well as specific factors that may influence a program's degree of coordination. These factors were based on theory and empirical literature on coordination (Council on Community Pediatrics, 2009; Duffee et al., 2017). Program characteristics included program size and capacity, eligibility criteria (expectant mother, first-time mother, teenage mother, low-income family), prenatal enrollment (yes/no), implementing agency (community-based non-profit, local health department, school district, health care organization), and geographic location (urban, suburban, rural).

2.3.2. Coordination activities

Key activities of coordination that were assessed included HV programs asking whether and where clients (mothers and children) receive medical care (both primary and prenatal care), as well as typical frequency and mode(s) of communication between HV programs and health providers.

Coordination was assessed by a series of categorical variables regarding mode (fax/mail, phone, in-person, electronic), frequency (none, enrollment/discharge, intermittently, or at regular intervals) and reasons for communication with women's and children's health providers (such as report screening results or discuss health-related concerns, review advice given or missed appointments, or simple notification of enrollment). Each categorical variable contained 4–5 response options, some allowing for multiple responses (including communication mode and reasons for contact). Additional categorical variables included the number of medical practices attended by the HV program's clients (to understand the potential burden of communication on HV programs), and the number of medical offices with which the HV program had a designated point of contact (as a possible

facilitator to coordination). Finally, participants reported on communications that the HV program received from each type of medical provider (mother's prenatal care, mother's primary care, child's primary care) to understand whether communications were bidirectional or only give/receive in nature. As above, responses were categorical.

2.3.3. Supports for coordination

HV program managers reported on an array of possible supports for coordination, derived from relevant literature (Council on Children with Disabilities, 2014; McDonald et al., 2014). Participants indicated whether formal policies and protocols existed within their HV program about the role, training, and supervision of home visitors regarding communication with health providers. Additional items included having a memorandum of understanding (MOU) with health care providers, transporting clients to and attending medical visits with clients, and actively participating in medical visits with clients. These various supports for coordination were assessed with regard to mother's prenatal providers, mother's primary care providers, and child's primary care providers.

2.3.4. Health outcomes

An additional context we explored were the intended health outcomes of the HV program, relative to the MIECHV benchmarks established by the federal government (HRSA, 2016). Respondents reported whether they had explicit performance standards for 7 different maternal health measures and 6 child health measures. Maternal health measures included: having regular source of prenatal care; use of alcohol, tobacco or illicit drugs during pregnancy; mental health; breastfeeding; postpartum visit attendance; emergency department visits; and health insurance status. Child health measures included: having regular source of pediatric health care; health insurance status; well-child visit attendance; immunization status; developmental screening; and emergency department visits. Two dichotomous variables, one for mothers and one for children, were created to indicate whether the program had standards for 1 or more health-related measures versus none. We also examined health outcomes as a continuous variable for analyses; however, this did not change the significance of results so dichotomized results are listed in the tables for consistency.

2.3.5. Views on coordination

We sought to understand the current perceptions and barriers of home visiting programs regarding coordination with medical providers. Our hypothesis was programs that perceive value or importance to coordination will prioritize this activity. First, respondents ranked their agreement with a series of statements about their HV program's views on coordination with both maternal and child health providers, assessed using a 5-point Likert scale (strongly disagree, disagree, neutral, agree, and strongly agree). For instance, HV respondents were asked to rate the importance of communication with medical providers for the mothers and children they serve. They also rated their perceptions of health promotion, shared goals, and medical provider engagement with HV programs. Likert responses were dichotomized to strongly agree/agree (vs. strongly disagree/disagree or neutral) to compare general agreement versus not and give meaningful groups for comparison.

Next, we assessed barriers to coordination with medical providers for both mothers and children using a 4-point scale (not a challenge, small challenge, moderate challenge, big challenge) to avoid neutral responses. Understanding current barriers may help to inform future interventions aimed at enhancing or improving meaningful collaboration efforts. Barriers regarding coordination of HV services with primary care providers for mothers and children that were included in the analysis included 'not a priority of our HV program' and 'lack of time'. These were reverse coded and dichotomized to 'not a challenge' (vs. any challenge) to create contrasting groups for the analysis.

As an exploratory aim, we sought to understand areas of commonality between HV programs and medical providers that might be ideal

for initial coordination efforts. Additional survey items included a list of 10 possible topics that might be of importance to both HV programs and health care providers for women and children (such as developmental monitoring, smoking cessation, and injury prevention). These items correlated well with ongoing quality improvement efforts in the home visiting field, and also included additional areas of interest to the authors (*Home Visiting Collaborative Improvement and Innovation Network, 2016*). Respondents were asked to rank the top 3 topics of benefit to coordination between home visitors and health care providers. There were also open-ended responses for additional categories or feedback.

2.4. Survey protocol

One week after receiving an email introducing the study, email invitations and up to 3 reminder emails were sent to HARC liaisons to invite nomination of a study participant at each HV program. In addition, study authors made phone calls to non-responding HARC liaisons to encourage nomination of study participants or declination of participation. Nominated staff members (program managers or supervisors) received an email link to the survey and up to two additional weekly reminder emails. Participants received a \$5 gift card upon survey completion as a token of appreciation for their time. This study was approved by the HARC Council as well as the Human Subjects Review Boards at the corresponding home academic institutions of the study's authors.

We sent 228 email invitations to HARC member programs in November and December 2014. Of these, 114 (50%) programs responded and 96 nominated staff members to complete the survey, while 18 programs declined participation. We received 80 completed surveys, giving a 35% completion rate and including respondents from 32 states and territories and the District of Columbia. Sixty percent of survey respondents were home visiting program managers and 40% were supervisors.

Respondents were similar to non-respondents with regard to program size (40% respondents vs. 36% non-respondents had > 100 participants), community served (58% respondents vs. 54% non-respondents in urban communities), receipt of MIECHV funding (43% respondents vs. 40% non-respondents), number of home visitors (48% respondents vs. 53% non-respondents had ≤ 5 home visitors) and program eligibility requirements (21% respondents vs. 15% non-respondents, first time mother; 17% respondents vs. 21% non-respondents, expectant mothers; all $p > 0.05$).

2.5. Analysis

The primary outcome of interest was coordination of home visiting program with health care providers. We chose regular communication as a proxy for coordination, given our hypothesis that overall communication (and therefore other activities of coordination) would be low. In addition, since we believed that regular communication of HV programs would be higher with pediatric medical providers than with adult providers for women (prenatal or primary care), we asked respondents to differentiate their replies based on types of medical providers and stratified our results based on provider type (mother's prenatal, mother's primary, and child's primary).

We used descriptive statistics to report HV program characteristics. Then we assessed the current extent and key activities of coordination that HV programs reported with health providers, by provider type. Dichotomized responses were analyzed based on provider type, and chi square tests compared each group (prenatal versus mom's primary care, mom's primary care versus child's primary care, and child's primary care versus prenatal). Next, we performed similar analyses to compare HV program supports for coordination, health outcomes, and views on coordination, by provider type. Again, chi square statistics were used for group comparisons.

For the second analysis, we dichotomized the communication variable to regular versus all other responses. Consistent with our hypothesis, regular communication with medical providers was considered a proxy for coordination to give adequate group sizes for meaningful comparisons. Given the similarity between group responses in the first analysis and for ease of comparison, we also combined responses for mother's prenatal and mother's primary care providers into one category. Thus, HV programs were coded as having regular communication with maternal health providers if either or both mother's prenatal and mother's primary care provider communication was regular.

We chose variables based on characteristics or supports that we predicted were more likely to be associated with coordination or that showed significant differences in the above analysis. Likert scale responses for HV program perspectives were dichotomized based on those who strongly agree or agree/strongly agree with statements of interest, and barriers were reverse dichotomized (those who reported no challenge versus any challenge) to correlate positively with coordination. Chi squared statistics were used to compare characteristics of programs that reported regular communication with medical providers for women and children versus those that do not. All analyses were completed using SPSS version 23 (IBM SPSS Statistics, IBM Corporation, Armonk, NY).

3. Results

Table 1 describes characteristics of the responding home visiting programs. Most were housed at community based non-profit agencies (62%), followed by local health departments (16%) or health care organizations (15%). Over 20 different HV models were represented; for 12 of these, there was a single local site and for the other 8 the sample included two or more local program sites. Program size was evenly distributed among categories (26% had < 50 participants; 34% had 50–100; 36% had > 100). About two-thirds of programs (63%) reported having open slots at the time of survey completion. Only a small number (12%) of programs carried a requirement of teenage mothers at enrollment. More programs required that the new enrollees be

Table 1
Home visiting program characteristics (n = 80).

Characteristic	Percent (n)
Enroll women prenatally	90 (72)
Implementing agency	
Community based non-profit	62 (50)
Local health department	16 (13)
Health care organization	15 (12)
School district	3 (2)
Other ^a	4 (3)
Program size	
< 50 participants	26 (21)
50–100 participants	34 (27)
> 100 participants	36 (29)
Program capacity	
Open slots	63 (50)
Full capacity	21 (17)
Wait list	15 (12)
Program eligibility requirements ^b	
Expectant mothers	21 (17)
First time mothers	24 (19)
Teenage mothers	12 (10)
Low-income families	32 (26)
Community type served ^b	
Urban	69 (55)
Suburban	42 (34)
Rural	70 (56)

^a Community based for-profit agency, Head Start, and Educational Service Center.

^b Respondents could choose multiple responses.

Table 2
Key activities of coordination of home visiting (HV) programs with health care providers, by provider type.

	Health care provider type		
	Mother's prenatal (n = 72)	Mother's primary (n = 80)	Child's primary (n = 80)
Program asks whether participant has a health care provider	NA	95% (76)	99% (79)
Program asks name/location of health care provider	96% (69)	90% (72)	96% (77)
Frequency of communication with health care provider			
Regular	25% (18)	18% (14) [*]	38% (30) [*]
Only if specific concerns	62% (45)	63% (50)	50% (41)
Enrollment/discharge only	6% (4)	3% (2)	4% (3)
Never	7% (5)	16% (13)	8% (6)
Typical mode of communication with health care provider ^a			
Fax	60% (43)	49% (39)	61% (49)
Telephone	79% (57)	71% (57)	80% (64)
In-person	22% (16)	20% (16)	17% (14)
Electronic health record	4% (3)	6% (5)	8% (6)
Email	3% (2)	5% (4)	4% (3)
Reasons for communication with health care provider ^a			
Discuss specific health-related concerns	71% (51)	64% (51)	71% (57)
Inform of specific screening results	50% (36)	46% (37)	64% (51)
Review or clarify medical advice given	44% (32)	26% (21)	41% (33)
Notify of HV program enrollment	43% (31)	24% (19)	29% (23)
Report missed home visits (assist locating client)	32% (23)	21% (17)	25% (20)
Review missed medical visits	26% (19)	16% (13)	18% (14)

NA = Not asked. Questions regarding coordination with prenatal providers were asked among programs enrolling some or all women prenatally so not all women were expected to have prenatal provider.

* $p < 0.05$ for Chi square comparison between mother's primary and child's primary health care provider only. All other comparisons were NS.

^a Answers sum to > 100% because multiple options could be chosen.

expectant mothers (21%) or first-time mothers (24%), and nearly one third (32%) required new enrollees to be low-income families.

3.1. Question 1: what is the current extent and types of communication between home visiting programs and medical providers for mothers and children?

In examining the key activities related to coordination with medical providers that were reported by home visiting programs, the vast majority of programs responded that they ask whether and where participants obtain medical care (Table 2), and this did not differ based on type of health care provider. When asked about regular communication with health providers, responses varied by provider type. Home visiting programs reported the highest level of regular communication with children's primary medical care providers (38%), followed by prenatal providers (25%) and adult primary care providers (18%, $p < 0.05$). Home visiting programs cited telephone as the most common mode of communication with health care providers of all types (range 71% to 80%), followed by fax (49% to 61%). Relatively few programs reported in-person meetings with health care providers (range 17% to 20%), and almost none communicate by electronic medical record (range 4% to 8%) or email (3% to 4%). The most commonly cited reasons for HV programs to communicate with health providers were to discuss specific health-related concerns (range 71% to 64%), inform of specific screening results (46% to 64%), and to review or clarify medical advice that was given (26% to 44%). Fewer HV programs reported communication with health providers to notify of HV program enrollment (range 24% to 43%), get assistance with locating client after missed home visits (21% to 32%), or review missed medical visits (16% to 26%).

3.2. Question 2: how do home visiting program outcomes, supports, and views related to coordination vary?

Table 3 presents home visiting program health outcomes, supports for and views on coordination, again measured by health care provider type. Nearly all respondents reported having 1 or more health related performance standards with no differences observed by provider type

(range: 82% to 85%; $p > 0.05$). In addition, over a quarter of home visiting programs reported having all of the health related performance standards we assessed for (range: 25% to 35%; $p > 0.05$). With regard to home visiting supports for coordination, approximately one third of programs currently hold a memorandum of understanding (MOU) with health care providers (range: 35% to 39%). Just over one quarter of programs responded that they transport clients to health care appointments (range: 26% to 29%); larger percentages of home visiting programs reported attending some health care visits with clients (range: 30% for mother's primary care to 42% for child's primary care visits). Although many HV programs reported having a formal policy or protocol pertaining to the home visitor's role, training, or supervision around coordination, the only significant difference between groups was identified regarding the HV role in coordination (43% for mother's prenatal versus 58% for child's primary, $p < 0.05$).

We also assessed 5 perspectives related to coordination, with all 5 showing significant differences between HV program perspectives towards child health providers versus maternal health providers (both mother's prenatal and mother's primary care providers). The most commonly reported perspective was identifying health promotion as a focus of the home visiting program (range: 63% for mother's health care provider to 85% for child's primary care provider). Least commonly reported was identifying that home visiting and primary care providers share common goals (range: 20% for mother's health care provider to 38% for child's primary care provider) and having adequate time for coordination (range 18% for mother's health care provider to 34% for child's primary care provider).

3.3. Question 3: what factors are associated with coordination between home visiting programs and medical providers for women and children?

As a final analysis, we assessed what factors were associated with regular communication with mother's and child's medical providers (Table 4), grouped by HV program characteristics, supports for coordination, and HV program health outcomes and views on coordination. Since health outcomes and respondent views on coordination (and barriers to coordination) were only asked for mother's and child's health care provider types in the survey, we combined mother's prenatal and

Table 3
Home visiting (HV) program supports for coordination, health outcomes, and views on coordination.

	Health care provider type		
	Mother's prenatal (n = 72)	Mother's primary (n = 80)	Child's primary (n = 80)
HV program supports for coordination			
Formal policy or protocol			
HV role in coordination	43% (31)	44% (35)	58% (46)
HV training around coordination	33% (24)	28% (22)	40% (32)
HV supervision around coordination	42% (30)	39% (31)	45% (36)
HV program has MOU with health care provider	36% (26)	35% (28)	39% (31)
HV program transports to medical visits	29% (21)	26% (21)	29% (23)
HV program staff participate in medical visits	31% (22)	30% (24)	42% (34)
Health outcomes of HV program			
Performance standards for 1 or more health-related outcomes		85% (68)	81% (65)
Performance standards for all health-related outcomes assessed for mothers (7) and children (5)		25% (20)	35% (28)
HV program views on coordination			
Health promotion is a focus of the HV program		63% (50)	85% (68)
HV and primary care providers (PCPs) share common goals		20% (15)	38% (30)
PCPs understand the purpose and services provided by HV programs		31% (25)	48% (38)
Coordination is a priority		49% (39)	74% (59)
There is adequate time for coordination		18% (14)	34% (27)

Columns indicate % respondents with affirmative response to questions regarding various supports for coordination, HV program health outcomes, and views on coordination. Bolded items = p < 0.05 for column comparisons.

Table 4
Factors associated with regular communication with mother's and child's medical providers.

Characteristic	HV program regularly communicates with mother's health care provider			HV program regularly communicates with child's health care provider		
	Yes (n = 21)	No (n = 59)	p-Value	Yes (n = 30)	No (n = 50)	p-Value
Home Visiting (HV) program characteristics						
Implementing agency is health care organization	24% (5)	12% (7)	0.28	23% (7)	10% (5)	0.12
HV program has open slots	57% (12)	64% (38)	0.56	62% (18)	63% (32)	0.95
Eligibility Requirements						
Expectant mother	10% (2)	25% (15)	0.13	27% (8)	18% (9)	0.40
First-time mother	5% (1)	30% (18)	< 0.05	33% (10)	18% (9)	0.17
Teenage mother	10% (2)	14% (8)	0.63	30% (9)	2% (1)	< 0.001
Low-income family	43% (9)	29% (17)	0.24	47% (14)	24% (12)	< 0.05
Enroll moms prenatally	90% (19)	86% (51)	0.50	87% (26)	88% (44)	0.93
Clients receive care at fewer (< 5 vs. 5 or more) medical practices	38% (8)	51% (30)	0.32	21% (6)	24% (12)	0.77
More (≥ 3 vs. 2 or less) medical practices with designated points of contact	81% (17)	42% (25)	< 0.01	77% (23)	42% (21)	< 0.01
HV program supports for coordination						
Formal policy or protocol						
HV role in coordination	57% (12)	46% (27)	0.37	79% (23)	45% (23)	< 0.01
HV training around coordination	52% (11)	27% (16)	< 0.05	55% (16)	31% (16)	< 0.05
HV supervision around coordination	62% (13)	36% (21)	< 0.05	62% (18)	35% (18)	< 0.05
HV program has MOU with health care provider	71% (15)	34% (20)	< 0.01	55% (16)	29% (15)	< 0.05
HV program transports to medical visits	48% (10)	25% (15)	0.06	47% (14)	18% (9)	< 0.01
HV program staff participate in medical visits	76% (16)	22% (13)	< 0.001	63% (19)	28% (14)	< 0.01
Health outcomes of HV program and views on coordination						
Performance standards for 1 or more health-related outcomes	100% (21)	80% (47)	< 0.05	100% (30)	72% (36)	0.001
Perspectives						
Health promotion is a focus of the HV program	81% (17)	56% (33)	< 0.05	90% (27)	82% (41)	0.520
HV and primary care providers share common goals	24% (5)	17% (10)	0.49	40% (12)	36% (18)	0.813
PCPs understand the purpose and services provided by HV programs	10% (2)	2% (1)	0.17	27% (8)	8% (4)	0.05
Coordination is a priority	67% (14)	42% (25)	0.06	93% (28)	62% (31)	< 0.01
There is adequate time for coordination	10% (2)	20% (12)	0.26	43% (13)	28% (14)	0.22

Bold data indicate significant (p < 0.05) comparisons.

mother's primary responses in the remaining categories (HV program characteristics and supports for coordination) to simplify group comparisons.

Selected HV program characteristics were associated with regular communication. A larger percentage of programs reporting regular communication with child's health care provider reported eligibility requirements of teenage mother (30% of programs with regular child health provider communication vs. 2% of programs without, $p < 0.001$) or low-income family (47% vs. 24%, $p < 0.05$). Surprisingly, a smaller percentage of HV programs reporting regular communication with mother's health care provider had eligibility criteria of first-time mother (5% of programs with regular maternal health provider communication vs. 30% of programs without, $p < 0.05$). In addition, having 3 or more medical practices with designated points of contact (versus fewer) was associated with HV programs that reported regular communication with both maternal and pediatric health providers (81% vs. 42%, $p < 0.01$ and 77% vs. 42%, $p < 0.01$, respectively). However, neither having a health care organization as the implementing agency nor having open HV program slots showed an association with regular communication with health care providers. Similarly, enrolling mothers prenatally or having an expectant mother requirement for eligibility were also not associated with regular health care provider communication.

Regarding HC program supports for coordination, holding an MOU agreement was associated with regular communication with medical providers for both mothers (71% vs. 34%, $p < 0.01$) and children (55% vs. 29%, $p < 0.05$), respectively. Transporting clients to medical visits was associated with regular communication between home visitors and children's medical providers only (47% vs. 18%, $p < 0.01$). Finally, HV staff participation in medical visits (76% vs. 22%, $p < 0.001$ and 63% vs. 28%, $p < 0.01$) was reported by HV programs having regular communication with both maternal and pediatric medical providers. Programs reporting regular health provider communication were also more likely to have formal policies or protocols to support the HV role in coordination (79% vs. 45%, $p < 0.01$ pediatric providers only), HV training around coordination (52% vs. 27% for mother's provider, $p < 0.05$ and 55% vs. 31% for child's provider, $p < 0.05$), and HV supervision around coordination (62% vs. 36% for mother's provider, $p < 0.05$ and 62% vs. 35% for child's provider, $p < 0.05$).

Among the health-related outcomes that we examined, a larger percentage of HV models reporting regular communication with both maternal and pediatric health care providers had a health-related outcome performance standard (100% of programs reporting regular communication with mother's health care provider vs. 80% without regular communication, $p < 0.05$ and 100% vs. 72% for regular pediatric health provider communication, $p < 0.01$, respectively). However, only HV programs reporting regular communication with mother's health providers were associated with a focus on health promotion (81% with regular communication vs. 56% without, $p < 0.05$), versus no association with programs reporting regular communication with children's health providers. In addition, agreeing that primary care providers understand the purpose and services provided by HV programs (70% with regular communication vs. 34% without, $p < 0.01$) or indicating that coordination is a priority of the HV program (93% vs. 62%, $p < 0.01$) were perspectives associated with HV programs reporting regular communication with pediatric health providers.

3.4. Question 4: what topics are of importance to HV programs for coordination between HV and medical providers?

As an exploratory aim to better identify areas for coordination efforts, we presented a list of ten health-related topics of potential interest to both medical providers and home visitors, plus a write-in category. Respondents were asked to rank their top 3 choices of topics where coordination between home visitors and health care providers would be

beneficial to the clients they serve. The top 3 topics that respondents ranked were: (1) parental education about healthy child development; (2) developmental screening and Early Intervention systems; and (3) parental depression. In contrast, least often selected topics included infant feeding practices, early reading/literacy development, smoking cessation, and pediatric oral health.

4. Discussion

This national survey of home visiting programs identifies early and highly variable efforts at integration between HV programs and health care providers. The home visiting programs participating in this survey were evenly distributed with regard to program size (< 50, 50–100, and > 100 participants) and community type served (urban, suburban, and rural). Half of the sample reported their HV program was located at a community based non-profit, at had open slots at the time of survey completion. Despite regularly assessing the identification of health providers for mothers and children they are serving, relatively few home visiting programs currently report regular communication with health care providers for either mothers or children. A greater percentage of programs reporting regular communication with health care providers held MOU agreements, had policies and procedures around coordination, and recorded health-related outcomes for their participants. Additionally, traversing physical or communication barriers by identifying designated points of contact in medical offices, transporting clients, and participating in medical visits were all associated with our outcome of interest. These factors represent actionable steps that HV programs can take to improve coordination with health care providers and are consistent with previously identified key elements of service coordination (AHRQ 2014, Minkovitz, O'Neill, et al., 2016).

Increasing the engagement of health providers with local HV programs may be mutually beneficial through enhanced information exchange and reinforcement of messages. The HV programs we surveyed identified parental education, developmental screening, and parental depression as topics of importance to both home visitors and health care providers, and may represent an ideal starting place to coordinate care and recommendations. These same issues are among those prioritized by medical providers in the delivery of well child care (Hagan, Shaw, & Duncan, 2017) and preventive services for women (Siu, 2016; Women's Preventive Services Initiative, 2016).

Based on previously defined classification systems, the survey results suggest that current integration of home visiting programs with medical providers, as assessed on the IOM continuum, rests between mutual awareness and cooperation (IOM, 2012; Tschudy et al., 2013). Improving coordination between HV programs and health care providers through mutable factors has also been a recent focus of related professional organizations. Several efforts nationally highlight this push of the IOM continuum towards better integration of these services. The Illinois chapter of the American Academy of Pediatrics, for example, has used federal home visiting resources to develop an online toolkit for streamlined cross-sector coordination among early childhood providers (Coordinating Medical Homes and Community Services, 2015). This publically available toolkit includes education about HV program models, a common referral form, and templates for shared written communication. The chapter has also developed a centralized intake system to facilitate triage of HV referrals to appropriate MIECHV-funded community service agencies to further support coordination and referrals (American Academy of Pediatrics Illinois Chapter, 2017).

Another example of successful coordination between HV and medical providers include Carolina Health Centers, a network of federally qualified health centers, which has successfully integrated three different home visiting models, case management, and early literacy development into one primary care pediatric site (First Focus, 2015a). The successful blending of these services has been highlighted in multiple national conferences and serves as a model for other sites nationally (Design Options for Home Visiting Evaluation, 2014; Minkovitz, 2015;

Minkovitz, 2017). Additional models of successful integration include the Healthy Steps program, which was designed to augment pediatric primary care (Minkovitz et al., 2003), as well as Building Healthy Children, which is a tiered HV model designed to integrate with the pediatric medical home (Paradis et al., 2013). Additional examples of innovative statewide efforts to promote coordination between home visiting and medical systems include pilots in New Jersey (The Center for Law and Social Policy and the Center for American Progress, 2015), Ohio (Goyal, Ammerman, Massie, Clark, & Van Ginkel, 2015), and Oregon (Oregon Health and Science University, 2015).

New Jersey has been able to bring 3 different evidence-based HV models to all 21 counties, and to create a statewide centralized intake system. MIECHV funding has also allowed the state to overcome interdepartmental communication challenges by creating formal inter-agency agreements between the Department of Health, Department of Children and Families, Department of Education, and others. The state also encourages data sharing agreements at the local level to facilitate cross-sector communication (The Center for Law and Social Policy and the Center for American Progress, 2015). In Ohio, quality improvement techniques were utilized across a multi-site home visiting program to increase the percentage of infants enrolled in HV who attended at least 3 recommended well-child visits in the first 6 months of life. During the project lifespan, these rates increased from 58% to 86% for enrolled infants (Goyal et al., 2015). Finally, CaCoon is a statewide public health nurse HV program in Oregon that specifically focuses on community-based care coordination for children with special health care needs. With an emphasis on coordination and communication with health care providers, the program has demonstrated multiple positive health outcomes for its participants (Oregon Health and Science University, 2015).

4.1. Strengths and limitations

Strengths of this study include its cross-model design, with inclusion of over 20 different HV models among participating programs, as well as geographic distribution of respondents across the US. Limitations include the non-experimental cross-sectional design, and a relatively small sample size, with just over one third of HARC individual site members represented despite strategies to increase participation. Strategies included individual phone calls by study staff to HARC liaisons who did not indicate interest or decline survey participation, and tailored upbeat emails to nominated participants to encourage survey completion. These efforts, though labor intensive, increased study participation from 75 to 96 respondents and increased survey completion from 60 to 80 surveys. Most HARC liaisons who were reached by phone were eager participants and completed the survey; however, only about 35% of non-responders were reached by phone after 2 to 3 attempts. Since survey findings are based on voluntary participation with potential differences between responders and non-responders, results may not be generalized to a larger population of home visiting programs. Although respondents and non-responders were comparable in terms of many program characteristics, we believe these results may over represent early adopters of integration between HV programs and health care providers. In addition, our classification of mother's health provider communication produced an overestimation bias, and actual levels of coordination between HV programs and maternal health care providers is likely poorer than estimated.

In addition to the limitations given above, this survey only focused on the views and perspectives of home visiting program supervisors, and did not assess the point of view of health care providers. Nor did this study assess actual HV program performance; thus, we cannot ascertain whether report of regular communication between HV programs and health care providers is associated with improved outcome metrics. Future research should evaluate health care provider perspectives regarding home visiting programs in order to more fully understand service coordination, and how to bridge these two fields.

Additionally, future research should more fully understand the types and quality of information that is being shared between HV programs and health care providers, as a next step to improve meaningful communication and coordination efforts.

5. Conclusion

This study contributes important information to a previously under-researched area of HV programs. Study findings suggest that communication between home visiting programs and medical providers may depend on HV program characteristics, outcome measures, and supports for coordination. Enhanced understanding of the synergistic roles of other providers in the early childhood system and potential benefits for families and providers may further improve the quality of communication and encourage meaningful exchange of information between home visiting programs and medical homes. Considering the IOM vision for integration between public health and primary care systems as well as priorities of the national Home Visiting Research Agenda, these findings are promising to inform future efforts related to systems alignment. As early childhood home visiting remains a national priority and as health systems focus on health promotion and prevention of disease, improving meaningful coordination is essential to future sustainability and achieving improvements in population health.

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