



OKLAHOMA DEPARTMENT OF HUMAN SERVICES

Interactive Voice Response/Authentication: A Pilot Study

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IVRA Evaluation Executive Summary

The Interactive Voice Response/Authentication (IVRA) system is a management information tool providing real-time information for managing health care workers in the field. The system enables providers to track and measure accurately and timely, both in real-time and historically, consumer service delivery.

Upon arrival in the consumer's home, health care workers use the consumer's telephone to call a toll-free number. This login call authenticates the health care worker through a secured logon and password, validates the location of the call through published phone number identifier (caller ID), and takes a voice print of the home health worker. The health care worker may also key in miles and time traveled during this process. After services have been provided, the home health worker uses the same process to log out of the system and also enter the service and specific activities such as bathing, grooming, meal preparation, that were delivered during the visit. These processes authenticate that the authorized home care worker was in the home of the appropriate consumer and tracks service start and stop time, and provides documentation on activities performed while in the home.

Within the provider agency, the web application shows when home health workers begin their activities and for whom the service is being delivered. At the conclusion of the visit, the provider agency can see exactly how many minutes and billable units were spent during the visit. Agencies may also view information indicating delivery of a service has failed to occur allowing them to quickly take action to resolve the situation. Each action is fully audited within the system enabling provider agencies to confirm the delivery of the service and approve the service delivery record for batch submittal to the MMIS for claim processing. Providers also extract data to feed directly into their back office business accounting software system that supports health worker payroll and other business functions.

The introduction of the IVRA management enhancement technology tool was hypothesized to impact two key areas of in-home service operation (1) service delivery and service reimbursements and (2) system operational efficiency.

The following measures of service delivery and service reimbursements were analyzed:

- Service Visits per member per month;
- Reimbursed Units per member per month;
- Reimbursed Units per Visit per member per month; and
- Total reimbursement per member per month.

The following measure of system operational efficiency was analyzed:

- Days lag time from date of service delivery to date of claim payment.

All measures are based upon MMIS claims paid data records organized by month of service delivery. Measures were assessed for 1,724 unduplicated members served by two provider agencies participating in the pilot. Each measure was assessed during the 5 month period immediately prior to IVRA introduction and during the 5 month period of IVRA use. Measures were compared for Pre and Post IVRA periods.

Study Findings

Visits, Units per Visit and Total Units & Cost per Member per Month

The main impact of IVRA on service delivery is that visits per month decline while units reimbursed per visit increase slightly and total reimbursed units and cost per member per month decrease for Pre to Post IVRA intervention periods. However, the specific impact of IVRA depended upon the individual provider.

For example, from Pre to Post IVRA periods the analysis indicates, on average, an 8% decrease in number of visits per member per month (about 1 visit less per month). The most pronounced IVRA effect on visits is associated with the provider having the most visits per member in the Pre IVRA period and for whom average number of visits per member declined from Pre to Post IVRA by almost 2 visits per month. However, for the other provider which had the least visits per member per month in the Pre IVRA period, visits per member increased slightly from Pre to Post IVRA periods.

The reimbursed units per member per month and cost per member per month show effects consistent with the effects for visits and units per visit analyses. That is the provider with less visits per member per month in the Post IVRA period demonstrated a significant decrease in reimbursed units per member and likewise a decrease in cost per member per month from the Pre to Post IVRA period. In contrast, the other provider with on average 0.5 more visits per member per month from Pre to Post IVRA demonstrated a significant increase in units reimbursed per member and likewise an increase in cost per member per month from the Pre to Post IVRA period.

Days Lag in Service Delivery to Payment

From Pre to Post IVRA periods, the average days lag between dates of service delivery to receipt of payment for that service decreased significantly (an average 12 day decrease in lag time per claim payment per month). However, the provider experiencing the longest payment lag time in the Pre IVRA period experienced the greatest improvement in payment lag from Pre to Post IVRA – a decrease of 18 days (almost a 2.5 week improvement in performance). By contrast, the other provider experienced an average per member decrease in payment lag time of only 1.5 days.

Mailing and Travel Cost per Member

Other measures of provider operational performance from the Pre to Post IVRA periods showed similar mixed effects. The provider with modest mailing expenses in the Pre IVRA period experienced a per member per month decrease in Post IVR period mailing cost; whereas, the other provider with two and one-half times the Pre IVRA period mailing costs of the other participating provider, experienced a significant per member per month increase in mailing cost in the Post IVRA period.

Only one of the participating providers reimbursed workers for travel time and mileage. With IVRA's ability to more accurately track travel time and mileage, the provider experienced an average decrease in per member per visit travel expenditure of \$1.37 from Pre to Post IVRA periods.

Conclusion

Based upon these analyses, implementation of an IVRA system appears to offer potential benefits to providers and to the state. Specifically, Providers may benefit from improved efficiency of operation including more timely turn around in claims payment from the state. The IVRA system provides a more verifiable means to assure the public that tax dollars are being expended only for services that are delivered. Over participating providers, the IVRA system had the effect of reducing the average number of reimbursed units and thus the average state expenditure per member per month.

Interactive Voice Response/Authentication Pilot Evaluation

Background and Objectives

The Interactive Voice Response/Authentication (IVRA) system is a management information tool providing real-time information for managing health care workers in the field. The system enables providers to track and measure accurately and timely, both in real-time and historically, consumer service delivery. It also has the capacity to increase the accuracy and timeliness of provider billing.

In July 2005, a study entitled "State Policy in Practice, South Carolina's Care Call" conducted by Rutgers' Center for State Health Care Policy reported one state's experience with a similar IVR telephony system. South Carolina implemented their system statewide in January of 2003. The study reported the findings as follows:

Workforce Tracking

Prior to implementing *Care Call*, SC only had approximations of the number of people making up its service delivery workforce. Through *Care Call*, the state is able to maintain an accurate and current profile of its agency service provider workforce.

Cost Savings

After billing records were compared prior to and after adoption of *Care Call*, it was determined that service provider agencies were often billing for the authorized length of time of services rather than for the actual time that a worker spent in the home providing services. *Care Call's* automated Check-In and Check-Out system provides an extremely accurate way of documenting the exact time that workers arrive and depart from a consumer's home, thereby ensuring that the state pays only for services that are actually provided. Additionally, when documentation of worker hours was done manually and verified by the client receiving services, it was found that the hours worked were often approximated, and sometimes inflated.

Emergency Back up

Care Call has been integrated into South Carolina's Emergency Back-up system. South Carolina has a number of waiver participants who are considered to be at high risk if disruption of services occurs. *Care Call* provides capability for State Care Advisors, Case Managers or family members to generate real-time reports to verify that services for persons at high risk are being provided assistance in a timely manner. If immediate action is required to provide assistance to the consumer, the Case Manager can access contact information from the *Care Call* database for family members or back-up service providers who can provide assistance on an emergency basis.

Improved Billing and Claims Processing

Care Call enables automated, real-time entry of electronic time-tracking records that are used to generate billing and claims for provider services. Numerous efficiencies can be delivered because the lag-time between generation of paper-based time sheets and data entry into the billing system has been eliminated, and records are available immediately for online review. Providers are able to access and evaluate billing records online, and therefore they are able to make any corrections prior to billing submissions. Data entry errors are eliminated. Billing can be scheduled on a regular basis without delays from data entry backlogs. These capabilities provide for a more accurate and efficient billing and payment process.

Improved Consumer Service and Consumer Empowerment

One of the primary reasons that *Care Call* was adopted was to reduce the pressures that consumers experienced in having to personally verify time sheets documenting service provision. While *Care Call* accomplishes the goal of reducing the participant's accountability in this process, it also empowers the consumer who self-directs to effectively manage required personal care

assistance services. Consumers are able to access real-time online records of services provided. With this capability, they can verify that authorized services have been delivered and reported correctly, they can contact case managers when they identify problems in service records and can immediately ensure that corrective changes have been made to the database, and they are provided with a tool to manage their budgets for necessary assistive services.

SC Care Call Study Conclusions

Care Call has enabled South Carolina to improve upon management of in-home personal care service delivery by making processes more efficient through automation and by improving the accuracy of billing and claims processing.

South Carolina reports that provider reactions to the *Care Call* system have been mixed. While some providers say that they are losing money because of *Care Call*, some providers report that *Care Call* has greatly improved their operations by alleviating their scheduling and payroll burden. *Care Call* has also helped service provider agencies to achieve better workforce management operations through its verification capabilities for worker attendance.

Oklahoma IVRA Pilot

The IVRA pilot had three key objectives:

- Determine IVRA system capacity to assist providers with improvements in business office efficiency and ability to track workforce in order to manage the significant growth in their businesses they will experience over the next ten years as Oklahoma reduces its reliance on nursing facilities to meet long term care needs; and
- Determine IVRA system capacity to assist the state in its responsibility to assure the health and welfare of waiver participants required of it by the Centers for Medicare and Medicaid Services (CMS) by accurately tracking service delivery and reimbursing only for services delivered.
- Determine potential benefits, pitfalls and challenges for providers and the state in implementing an IVRA system.

In the IVRA pilot, the LTCA transmits from the Waiver Information Management System (WMIS) the ADvantage consumer demographic and service plan information into the application's database. The providers have security privileges to the information only for consumers they serve. Upon arrival in the consumer's home, health care workers use the consumer's telephone to call a toll-free number. This login call authenticates the health care worker through a secured logon and password, validates the location of the call through announced number identifier (caller ID), and takes a voice print of the home health worker. Voice authentication is a value-added verification feature of the Oklahoma IVRA pilot that was not part of South Carolina's *Care Call*. The health care worker may also key in miles and time traveled during this process. After services have been provided, the home health worker uses the same process to log out of the system and also enter the service and specific activities such as bathing, grooming, meal preparation, that were delivered during the visit. These processes authenticate that the authorized home care worker was in the home of the appropriate consumer and tracks service start and stop time, and provides documentation on activities performed while in the home.

Within the provider agency, the web application shows when home health workers begin their activities and for whom the service is being delivered. At the conclusion of the visit, the provider agency can see exactly how many minutes and billable units were spent during the visit. Agencies may also view information indicating delivery of a service has failed to occur allowing them to quickly take action to resolve the situation. Each action is

fully audited within the system enabling provider agencies to confirm the delivery of the service and approve the service delivery record for batch submittal to the MMIS for claim processing. Providers also extract data to feed directly into their back office business accounting software system that supports health worker payroll and other business functions.

The IVRA pilot was originally funded by a Real Choice Systems Change grant awarded to OKDHS and administered by LTCA. When the CMS grant ended in September 2006, the pilot was continued as an OKDHS Administrative Demonstration project. During the State sponsored extension, the capability of the pilot to handle State Plan Personal Care services was incorporated into the IVRA system.

General and Qualitative Lessons Learned

Pilot design and re-design in post grant phase

The IVRA pilot experienced a number of false starts and challenges. Management staff originally working on the project seems to have misunderstood fundamental requirements for such a pilot and underestimated the challenges for providers in marshalling the level of commitment necessary to implement such fundamental operational change within an agency.

Currently less than 10% of providers use an IVR telephony system. Late in the pilot, a survey of agency providers was taken to assess provider interest in implementation of an IVR telephony type system and their concerns. For agency respondents with no experience with IVR systems, 100% had a very high concern about the initial investment to startup such a system particularly about the potential investment for hardware upgrades that might be required (83%). Half of the providers had a very high concern about required changes in their business operation and about the level of resistance to this change that they thought they would encounter from both workers and consumers.

Necessarily provider participation in the pilot had to be offered on a voluntary basis. Voluntary provider participation presented major challenges for obtaining valid data for IVRA evaluation.

As an inducement, potential benefits to participation were presented to providers including improved efficiency of business operation for a minimal start-up and for zero on-going system maintenance cost to the provider. In addition, during the initial grant period, pilot management embraced the position that a valid evaluation could be achieved with only partial commitment from participating providers. This stance further reduced provider expenditure of resources and risk of disruption to existing practice associated with participation. This low demand for commitment may have aided in recruiting several providers into the initial pilot. However, the provider-partial-commitment strategy significantly compromised the pilot's ability to obtain meaningful information during this initial phase.

One can perform valid statistical analyses and perhaps generalize study findings if controls exist to randomly sample participants or, more ideally, if all members participate. However, allowing providers to select worker/consumer dyads to participate with no constraints on selection dooms the usefulness of the data from the start.

In addition, until the provider has committed completely to IVRA, the provider must operate both a paper system and the IVRA system; thereby, negating the potential for improved operational efficiency from conversion to an automated time and attendance

system that is integrated with billing and back office systems. From the South Carolina experience, the state can expect return on investment costs for conversion to an IVRA-type system. However, the margins for return on investment represented a small percentage change (6% or less) due to the intervention which may be difficult to detect unless a large data sample Pre and Post IVRA is evaluated.

During the grant phase of the pilot, only one of the four participating providers committed to a complete conversion to IVRA for all workers/consumers. The three other providers never committed more than 10 to 20 consumers each to IVRA participation (less than 2% of consumers for each) and none of their data has been used in the analyses of this report. In the State funded portion of the pilot, a pre-condition to participation in the pilot was that a provider must fully commit to conversion to IVRA. An additional provider serving over a thousand consumers agreed to participate in this second phase of the IVRA pilot.

Quantitative Analysis of Pilot Outcomes

The introduction of the IVRA management enhancement technology tool was hypothesized to impact two key areas of in-home service operation: (1) service delivery and service reimbursements and (2) system operational efficiency.

The following measures of service delivery and service reimbursements were analyzed:

- Service Visits per member per month;
- Reimbursed Units per member per month;
- Reimbursed Units per Visit per member per month; and
- Total reimbursement per member per month.

The following measure of system operational efficiency was analyzed:

- Days lag time from date of service delivery to date of claim payment.

All measures are based upon MMIS claims paid data records organized by month of service delivery. For each of the analyses presented, the results are based upon all ADvantage claims for personal care services delivered to pilot participating members within the months of the analysis for the two home care agencies participating in the pilot. A total of 1,724 unduplicated members are included in each of these analyses. A total of 1,435 are included in analyses of variables measured from the five months prior to IVRA implementation and 1,294 are included in analyses of variables measured from the five months after IVRA implementation. Most members are included in both the pre and post IVRA implementation periods.

The study was analyzed as a two factor design with Provider as one factor and Period, Pre and Post IVRA implementation, as the other factor. Two providers participated in the study and for each of the providers the five months of data on each variable immediately prior to IVRA implementation was coded as the Pre IVRA Period data and the five months of data immediately after implementation of IVRA was coded as Post IVRA Period data. For each of the dependent measures a Two-Factor Analysis of Variance (ANOVA) was performed to evaluate main and interaction effects of Provider and Period (IVRA Pre and Post) on each.

In the IVRA implementation each provider had a transition period in which some member service delivery was documented using the pre-IVRA paper-based system and some through IVRA. For one provider the transition period was one month; whereas, for the

other the transition took four months. Due to the difference in IVRA transition periods for the providers, uncertainty of analysis interpretation due to the different mix of IVRA and non-IVRA participation between providers during the transition periods and less interest in differences that might be found associated with the transition period, transition data was excluded from this analysis.

Measures of Service Delivery and Service Reimbursement Results

The ANOVA indicates a significant main effect of Pre to Post IVRA Period implementation for variables of Visits and Units per Visit as well as significant Provider main effect for Visits, Units, Units per Visit and Cost. In addition, the ANOVA indicated significant Provider by Period interaction effects for Visits, Units, and Cost. The following ANOVA tables and interaction graphs show means and 95% confidence intervals for each of the variables associated with each factor and indicate the direction and degree of each of these effects.

Visits - Pre and Post

ANOVA Table for Visits

	DF	Sum of Squares	Mean Square	F-Value	P-Value	Lambda	Power
Period	1	793.769	793.769	16.771	<.0001	16.771	.993
Provider	1	1141.064	1141.064	24.109	<.0001	24.109	1.000
Period * Provider	1	3408.697	3408.697	72.020	<.0001	72.020	1.000
Residual	10948	518169.064	47.330				

Means Table for Visits

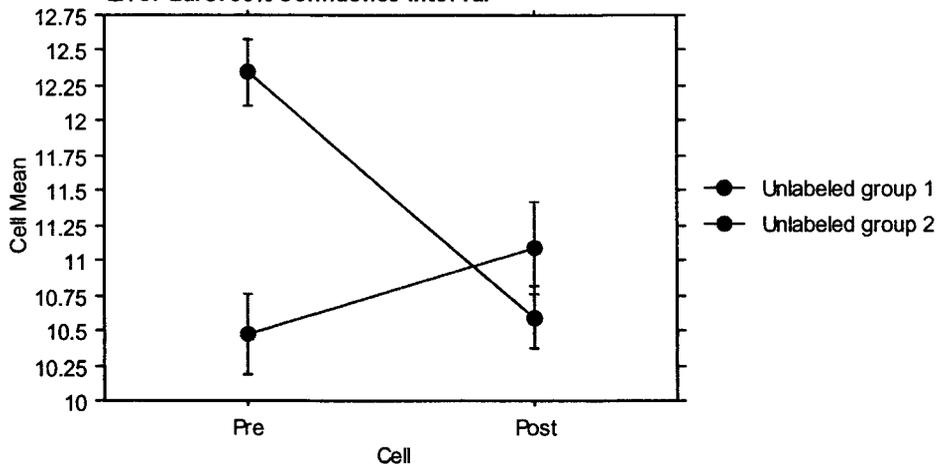
Effect: Period * Provider

	Count	Mean	Std. Dev.	Std. Err.
Pre, Unlabeled group 1	3685	12.344	7.180	.118
Pre, Unlabeled group 2	2138	10.476	6.663	.144
Post, Unlabeled group 1	3516	10.589	6.769	.114
Post, Unlabeled group 2	1613	11.088	6.698	.167

Interaction Line Plot for Visits

Effect: Period * Provider

Error Bars: 95% Confidence Interval



The analysis indicates the following:

- A significant decrease in the average number of visits per member per month from Pre to Post IVRA implementation;
- A significant difference in the average number of visits per member per month between Group1 and Group2 Providers, regardless of Period; and,
- A significant interaction between Period and Provider. That is the IVRA Period factor has a significant effect on Visits but it effects Visits differently depending upon the Provider – a significant decrease in Visits for the Provider with more Visits per member per month in the Pre Period and a significant increase in Visits for the Provider with less Visits per member per month in the Pre Period.

Units - Pre and Post

ANOVA Table for Units

	DF	Sum of Squares	Mean Square	F-Value	P-Value	Lambda	Power
Period	1	5167.550	5167.550	.617	.4322	.617	.118
Provider	1	50143.287	50143.287	5.986	.0144	5.986	.688
Period * Provider	1	393742.037	393742.037	47.004	<.0001	47.004	1.000
Residual	10948	91709088.996	8376.789				

Means Table for Units

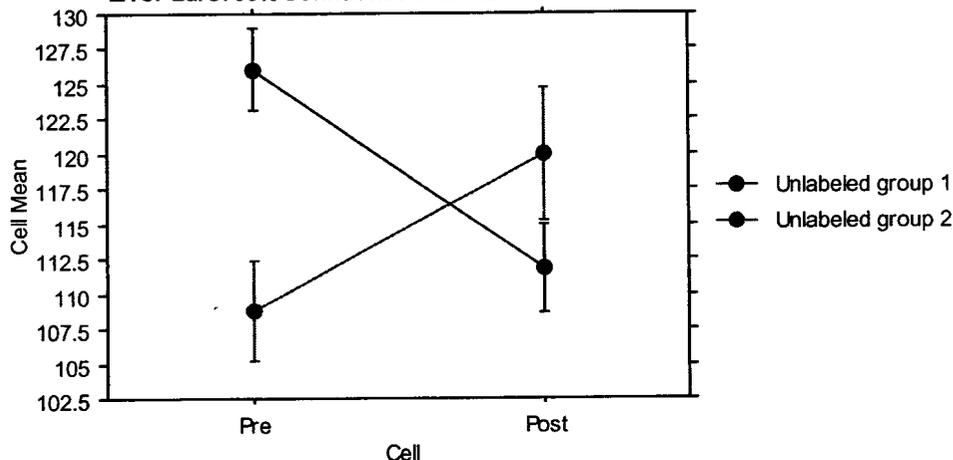
Effect: Period * Provider

	Count	Mean	Std. Dev.	Std. Err.
Pre, Unlabeled group 1	3685	126.008	90.943	1.498
Pre, Unlabeled group 2	2138	108.750	84.566	1.829
Post, Unlabeled group 1	3516	111.832	93.892	1.583
Post, Unlabeled group 2	1613	120.012	96.367	2.399

Interaction Line Plot for Units

Effect: Period * Provider

Error Bars: 95% Confidence Interval



The analysis indicates the following:

- A significant difference in the average number of reimbursed units per member per month between Group1 and Group2 Providers, and,
- A significant interaction between Period and Provider. That is the IVRA Period factor has a significant effect on Units per member per month but it effects Units differently depending upon the Provider – a significant decrease in Units for the Provider with more reimbursed Units per member per month in the Pre Period and a significant

increase in Units for the Provider with less Units per member per month in the Pre Period.

Units/Visit - Pre and Post

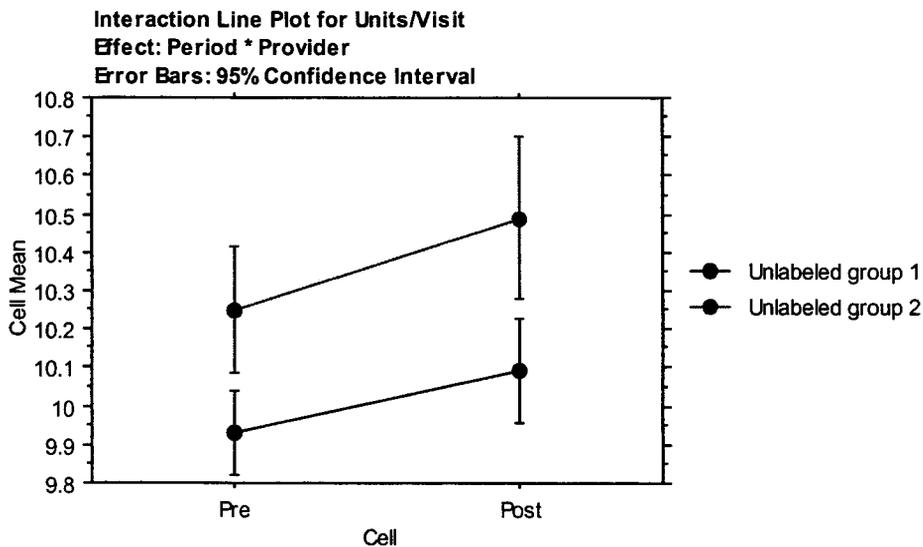
ANOVA Table for Units/Visit

	DF	Sum of Squares	Mean Square	F-Value	P-Value	Lambda	Power
Period	1	98.779	98.779	6.626	.0101	6.626	.737
Provider	1	314.129	314.129	21.071	<.0001	21.071	.999
Period * Provider	1	3.303	3.303	.222	.6379	.222	.075
Residual	10948	163213.920	14.908				

Means Table for Units/Visit

Effect: Period * Provider

	Count	Mean	Std. Dev.	Std. Err.
Pre, Unlabeled group 1	3685	9.928	3.388	.056
Pre, Unlabeled group 2	2138	10.250	3.897	.084
Post, Unlabeled group 1	3516	10.092	4.077	.069
Post, Unlabeled group 2	1613	10.489	4.318	.108



The analysis indicates the following:

- A significant difference in the average number of units per visit per member per month between Group1 and Group2 Providers, and,
- A significant increase in the average number of units per visit per member per month from Pre to Post IVRA implementation, with similar effect for both Providers.

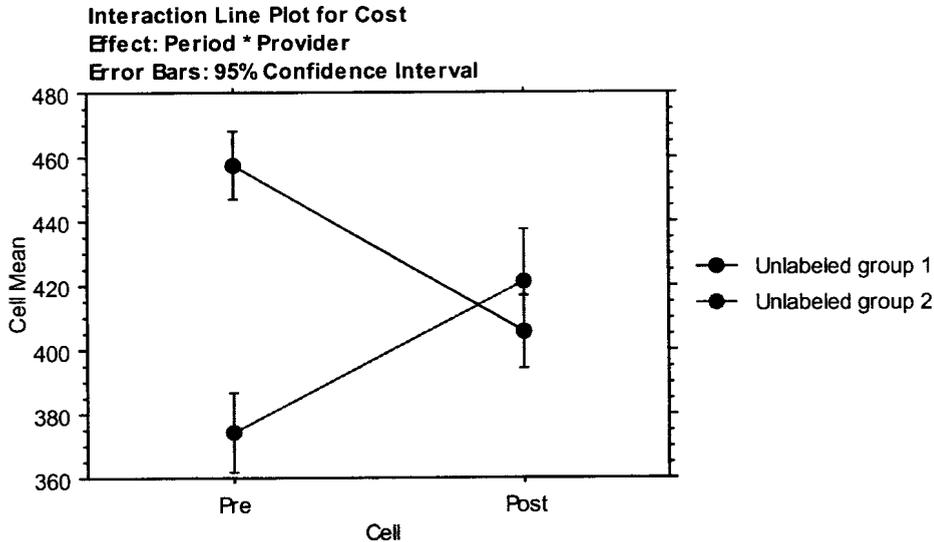
Cost - Pre and Post

ANOVA Table for Cost

	DF	Sum of Squares	Mean Square	F-Value	P-Value	Lambda	Power
Period	1	14845.376	14845.376	.138	.7102	.138	.066
Provider	1	2771918.941	2771918.941	25.774	<.0001	25.774	1.000
Period * Provider	1	5854356.428	5854356.428	54.435	<.0001	54.435	1.000
Residual	10948	1177423240.017	107546.880				

Means Table for Cost
Effect: Period * Provider

	Count	Mean	Std. Dev.	Std. Err.
Pre, Unlabeled group 1	3685	457.389	330.099	5.438
Pre, Unlabeled group 2	2138	374.597	293.377	6.345
Post, Unlabeled group 1	3516	405.874	340.765	5.747
Post, Unlabeled group 2	1613	421.172	337.758	8.410



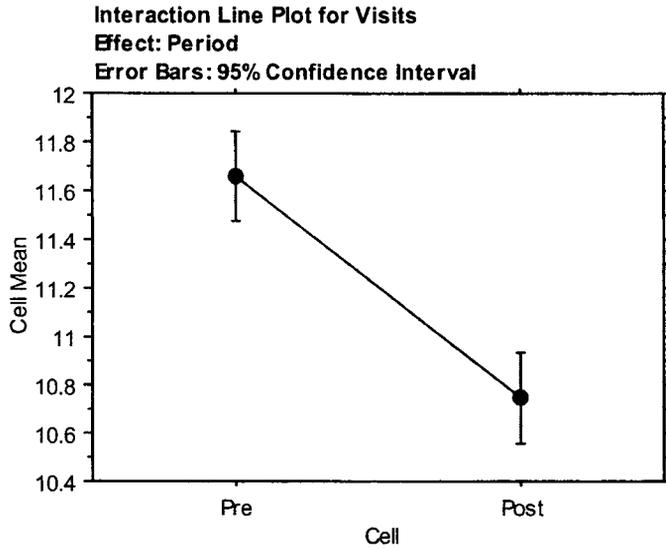
The analysis indicates the following:

- A significant difference in the average cost per member per month between Group1 and Group2 Providers, and,
- A significant interaction between Period and Provider. That is the IVRA Period factor has a significant effect on Cost per member per month but it effects Cost differently depending upon the Provider – a significant decrease in Cost per member for the Provider with greater Cost per member per month in the Pre Period and a significant increase in Cost per member for the Provider with less Cost per member per month in the Pre Period (which was already expected from the Units analysis).

IVRA Pre to Post Main Effects on Service Delivery

The factor of IVRA Period had an effect on each service delivery variable – either directly as a main effect or as a significant interaction effect with the Provider factor. The next analyses disregard the Provider factor to evaluate the effect of the IVRA Period over all members. The following graphs of means and standard deviations and t-test analyses of means indicate the direction and degree of effect associated with implementation of IVRA on each service delivery variable.

Visits - Pre and Post Effect



Unpaired t-test for Visits
Grouping Variable: Period
Hypothesized Difference = 0

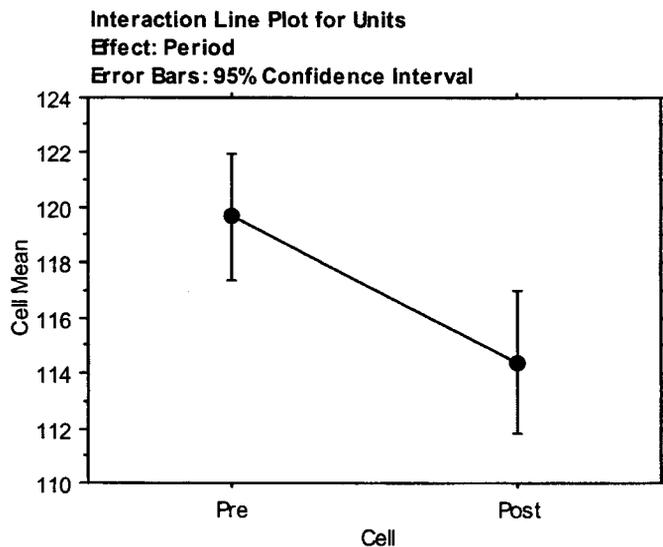
	Mean Diff.	DF	t-Value	P-Value
Pre, Post	.912	10950	6.888	<.0001

Group Info for Visits
Grouping Variable: Period

	Count	Mean	Variance	Std. Dev.	Std. Err
Pre	5823	11.658	49.730	7.052	.092
Post	5129	10.746	45.561	6.750	.094

The analysis indicates a significant decrease in the average number of visits per member per month from Pre and Post IVRA implementation. The mean number of visits decreased from 11.7 to 10.7 (about 7.8% decline); or almost 1 visit less per month.

Units - Pre and Post



Unpaired t-test for Units
Grouping Variable: Period
Hypothesized Difference = 0

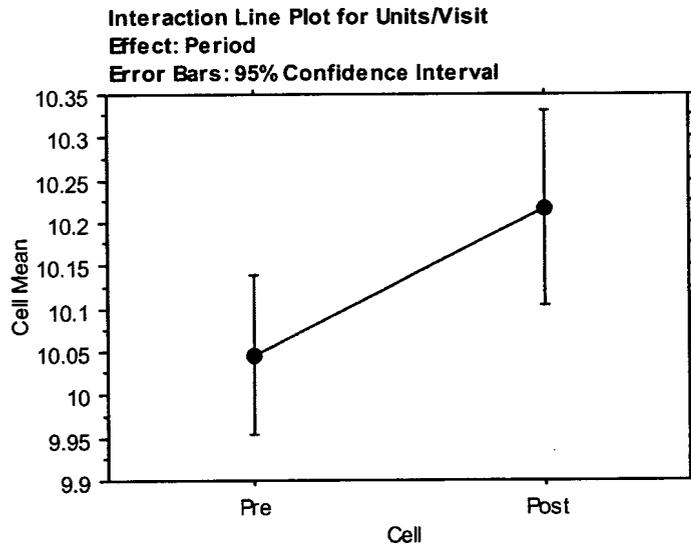
	Mean Diff.	DF	t-Value	P-Value
Pre, Post	5.267	10950	2.998	.0027

Group Info for Units
Grouping Variable: Period

	Count	Mean	Variance	Std. Dev.	Std. Err
Pre	5823	119.671	7927.595	89.037	1.167
Post	5129	114.404	8976.522	94.745	1.323

The analysis indicates a significant decrease in the average number of units reimbursed per member per month from Pre and Post IVRA implementation. The mean number of units reimbursed decreased from 119.7 to 114.4 (about 4.4% decline); or about 5.3 units less per month.

Units/Visit - Pre and Post



Unpaired t-test for Units/Visit
Grouping Variable: Period
Hypothesized Difference = 0

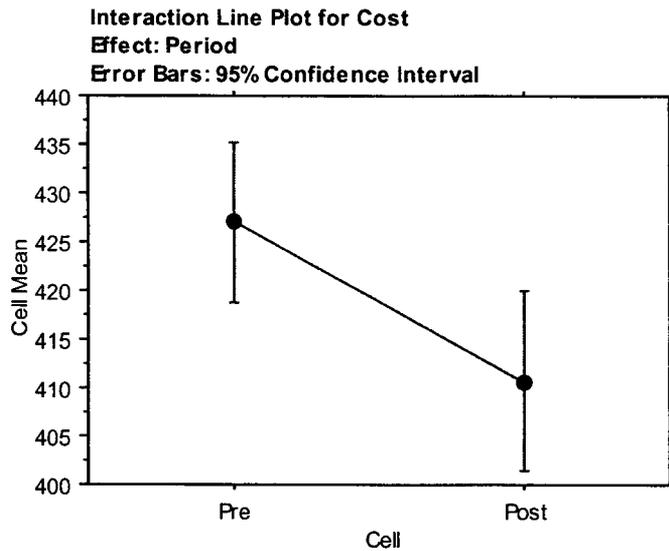
	Mean Diff.	DF	t-Value	P-Value
Pre, Post	-.171	10950	-2.308	.0210

Group Info for Units/Visit
Grouping Variable: Period

	Count	Mean	Variance	Std. Dev.	Std. Err
Pre	5823	10.046	12.861	3.586	.047
Post	5129	10.217	17.288	4.158	.058

The analysis indicates a significant increase in the average number of units delivered per visit per month from Pre and Post IVRA implementation. The mean number of units delivered per visit increased slightly from 10 to 10.2 units/visit (about 1.7% increase).

Cost - Pre and Post



Unpaired t-test for Cost
Grouping Variable: Period
Hypothesized Difference = 0

	Mean Diff.	DF	t-Value	P-Value
Pre, Post	16.305	10950	2.586	.0097

Group Info for Cost
Grouping Variable: Period

	Count	Mean	Variance	Std. Dev.	Std. Err
Pre	5823	426.990	102135.808	319.587	4.188
Post	5129	410.685	115507.313	339.864	4.746

The analysis indicates a significant decrease in the average reimbursement per member per month from Pre and Post IVRA implementation. The average total amount of reimbursement decreased from \$426.99 to \$410.67 (about 3.8% decline); or about \$16.31 less per member per month.

Measures of Operational System Performance Results

The ANOVA indicates a significant main effect of Pre to Post IVRA Period implementation for variable of Payment lag in days between service delivery and claim payment date. In addition, the ANOVA indicates a significant Provider by Period interaction effect for Claim payment lag. The following ANOVA tables and interaction graphs show means and 95% confidence intervals associated with each factor and indicate the direction and degree of these effects.

Claim Payment Lag - Pre and Post

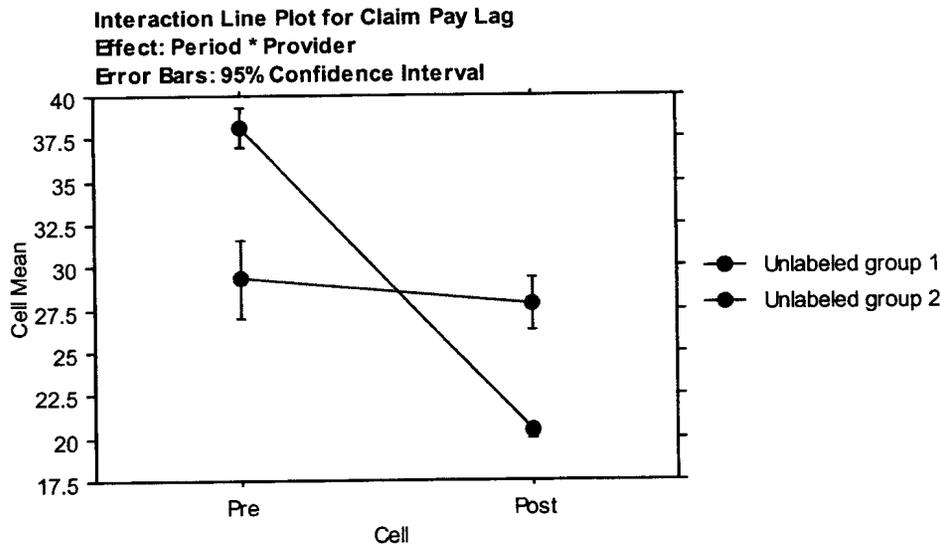
ANOVA Table for Claim Pay Lag

	DF	Sum of Squares	Mean Square	F-Value	P-Value	Lambda	Power
Period	1	225247.166	225247.166	186.033	<.0001	186.033	1.000
Provider	1	1232.208	1232.208	1.018	.3131	1.018	.163
Period * Provider	1	160813.670	160813.670	132.817	<.0001	132.817	1.000
Residual	10948	13255751.830	1210.792				

Means Table for Claim Pay Lag

Effect: Period * Provider

	Count	Mean	Std. Dev.	Std. Err.
Pre, Unlabeled group 1	3685	38.122	36.632	.603
Pre, Unlabeled group 2	2138	29.282	54.627	1.181
Post, Unlabeled group 1	3516	20.373	10.866	.183
Post, Unlabeled group 2	1613	27.790	30.708	.765

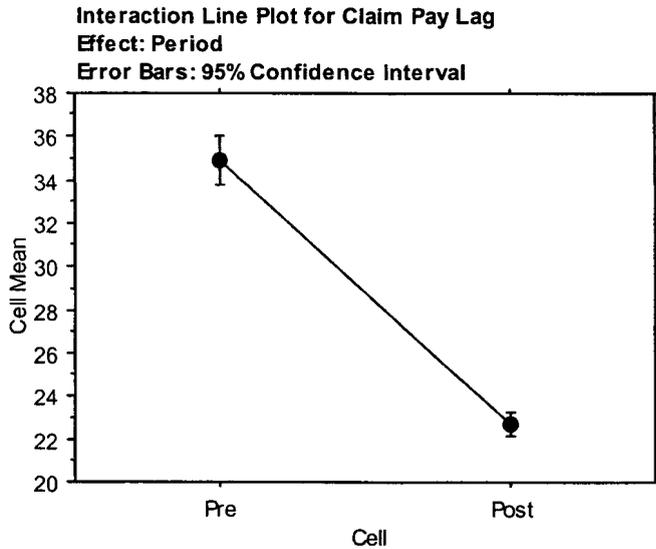


The analysis indicates the following:

- A significant decrease in the average days lag in claim payment from Pre to Post IVRA Period, and,
- A significant interaction between Period and Provider. That is the IVRA Period factor has a significant effect on payment lag but it effects the pay lag differently depending upon the Provider – although both had significant decreases in payment lag days, the Provider with the greatest delay in days wait for payment in the Pre Period experienced a significantly greater improvement in lag days reduction than the provider with less lag payment days in the Pre Period.

The following graph of means and standard deviations and t-test analysis of means indicates the direction and degree of effect associated with implementation of IVRA on reimbursement system performance.

Claim Payment Lag - Pre and Post



Unpaired t-test for Claim Pay Lag
Grouping Variable: Period
Hypothesized Difference = 0

	Mean Diff.	DF	t-Value	P-Value
Pre, Post	12.170	10950	18.153	<.0001

Group Info for Claim Pay Lag
Grouping Variable: Period

	Count	Mean	Variance	Std. Dev.	Std. Err
Pre	5823	34.876	1962.624	44.302	.581
Post	5129	22.706	389.219	19.729	.275

The analysis indicates a very significant decrease in the average days lag in reimbursement per member service claim per month from Pre and Post IVRA implementation. The average days lag between service delivery date and claim payment date decreased from 34.9 days to 22.7 days (about 35% decline); or about 12.2 days less delay in wait for payment per member claim per month.

Measures of Provider Operational Efficiency

In addition to measures derived from claims data, the providers gathered several measures of business operation including Mailing Cost and, for the Group2 Provider that reimburses workers separately for travel time and mileage, travel expenditures. The data for these measures are not as detailed as claims based variables for which a measure for each variable was derived for each participant receiving services per month. Providers provided summary data such as total cost amount per month per variable. Normalized variables for comparison across providers were derived by dividing total mailing cost by members served in the month and travel reimbursement expense by total service visits in the month.

Mailing Cost/Member - Pre and Post

ANOVA Table for postage/member

Row exclusion: IVR Provider Pre_Post summary.svd

	DF	Sum of Squares	Mean Square	F-Value	P-Value	Lambda	Power
IVR	1	8.801	8.801	20.564	.0006	20.564	.992
Provider	1	26.300	26.300	61.452	<.0001	61.452	1.000
IVR * Provider	1	12.773	12.773	29.846	.0001	29.846	1.000
Residual	13	5.564	.428				

Means Table for postage/member

Effect: IVR * Provider

Row exclusion: IVR Provider Pre_Post summary.svd

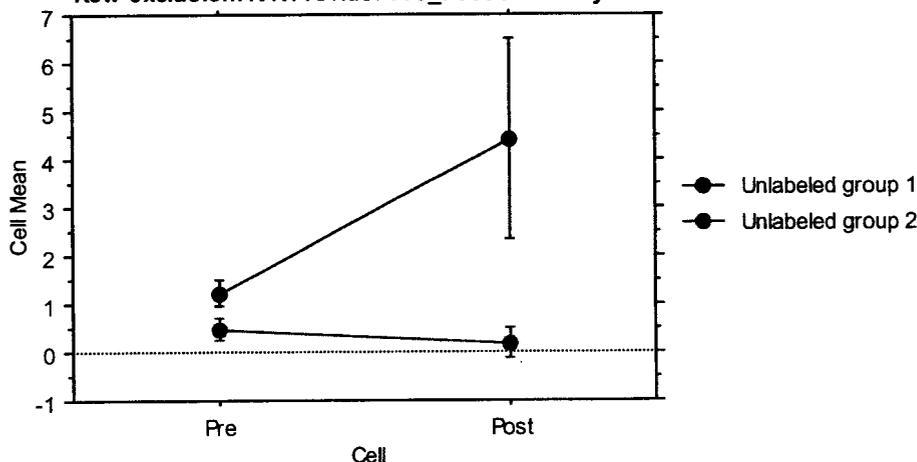
	Count	Mean	Std. Dev.	Std. Err.
Pre, Unlabeled group 1	4	1.228	.171	.085
Pre, Unlabeled group 2	4	.470	.141	.070
Post, Unlabeled group 1	4	4.415	1.311	.656
Post, Unlabeled group 2	5	.174	.254	.114

Interaction Line Plot for postage/member

Effect: IVR * Provider

Error Bars: 95% Confidence Interval

Row exclusion: IVR Provider Pre_Post summary.svd



The analysis indicates the following:

- A significant increase in the average mailing cost per member per month from Pre to Post IVRA implementation;
- A significant difference in the average mailing cost per member per member per month between Group1 and Group2 Providers, regardless of Period; and,
- A significant interaction between Period and Provider. That is the IVRA Period factor has a significant effect on Mailing Cost per Member but it effects Mailing Cost differently depending upon the Provider – a significant Post IVRA increase in mailing cost per member per month for the Provider with more mailing cost per member per month in the Pre Period and a decrease in mailing cost per member per month in the Post IVRA Period for the Provider with less mailing cost per member per month in the Pre Period.

Travel Cost/Visit - Pre and Post

Unpaired t-test for Mileage Cost/Visit

Grouping Variable: IVR

Hypothesized Difference = 0

Row exclusion: IVR Provider Pre_Post summary.svd

	Mean Diff.	DF	t-Value	P-Value
Pre, Post	1.366	8	2.459	.0394

Group Info for Mileage Cost/Visit

Grouping Variable: IVR

Row exclusion: IVR Provider Pre_Post summary.svd

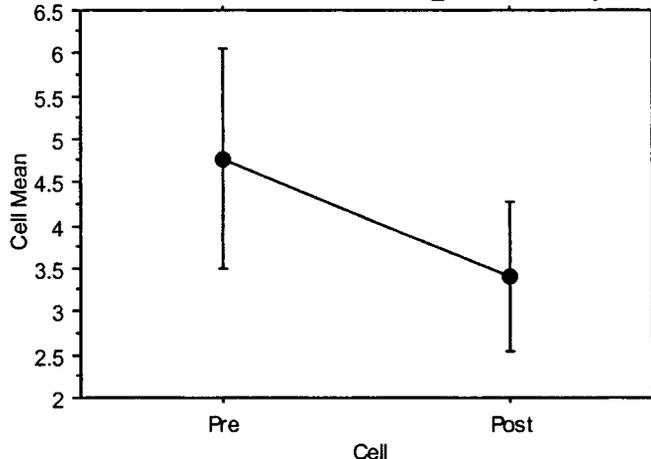
	Count	Mean	Variance	Std. Dev.	Std. Err
Pre	5	4.770	1.058	1.029	.460
Post	5	3.404	.485	.696	.311

Interaction Line Plot for Mileage Cost/Visit

Effect: IVR

Error Bars: 95% Confidence Interval

Row exclusion: IVR Provider Pre_Post summary.svd



The analysis indicates a significant decrease in the average reimbursement cost per visit from Pre to Post IVRA implementation. The average per visit travel reimbursement decreased from \$4.77 per visit to \$3.40 per visit (about a 29% decline) – a decrease of about by \$1.37 per visit from the Pre IVR to Post IVR period.

Interpretation and Discussion of Results

The main conclusions that may be drawn from this study are:

- The IVRA intervention to service delivery time and attendance tracking significantly impacts service delivery visits and reimbursed units and improves system operational efficiency;
- The impact of IVRA on service delivery and change in business efficiency is significantly different depending on provider and provider characteristics.

Mailing Cost per Member

Measures of provider business processes illustrate most clearly these provider differences which become even more pronounced in interaction with IVRA. Take for example Mailing Cost per Member. The provider labeled Group1 is a relatively large provider. Only one of the two Group1 provider branch offices participated in the IVRA pilot and only data from that branch was included in the study; however, this one branch of Group1 served almost three times as many members as the Group2 provider operating from 3 branch offices. The Group2 provider communicates with workers more directly person-to-person at branch office locations and by phone; whereas, Group1 relies more heavily on mail to communicate with workers. Consequently, in the Pre IVRA period Group1 Mailing Cost per Member was more than twice Group2 Cost (\$1.23 to \$0.47 Mailing Cost per member per month). In the Post IVRA period mailing costs increased very dramatically for Group1 (from \$1.23 Pre to \$4.42 Post cost per member per month) but declined slightly for Group2 (from \$0.47 Pre to \$0.17 Post).

The differences in communication and worker training styles between Group1 and Group2 providers may explain these differences. Group2 invested significant time in planning for the transition to IVRA. The Group2 communication with workers and person-to-person training of workers on IVRA procedures began before the transition period. For Group2 IVRA transition took four months mainly because of this prior preparation and direct training of workers. Communication about IVRA to participants receiving services was primarily achieved through Group2 written information provided directly to the participant by their worker during a service visit and through interaction with the worker. In addition to more time committed to IVRA training by Group2 in the IVRA Transition Period, one of the Group2 branch offices had already had prior experience providing service using another IVR telephony product on a trial basis prior to IVRA participation.

Group1, on the other hand, did relatively little planning for the transition to IVRA and executed the transition in one month. Group1 provided few opportunities for face-to-face training of workers but instead relied upon detailed instructions communicated by mail to both workers and participants receiving services. For several months after IVRA implementation, Group1 believed it necessary to continue to mail reminders to workers and participants about IVRA system procedures. Consequently, mailing costs increased dramatically for Group1 with IVRA implementation; whereas, they decreased for Group2.

Travel Cost per Visit

For in-home health care service delivery, travel expenses are a major cost component the importance of which has been high-lighted recently by the rapid increase in gas prices. The Group1 provider factors travel cost into each worker's wage and does not track this data separately; consequently, these costs are only available for the Group2 provider. The Group2 provider reimburses workers for both travel time and for mileage and the travel costs reflect these components combined into a single cost variable. From Pre to Post IVRA Group2 Travel reimbursement costs per visit decreased significantly (by \$1.37/visit). The Group2 provider associated this reduction with the IVRA system's ability to more accurately track travel time from one visit to the next. Prior to IVRA, workers manually reported time and mileage manually on paper forms. Group2 administrators conjectured that workers reporting in the period prior to the precisely timed and tracked visits by IVRA often must have approximated the travel times and sometime inflated travel time reports.

Days Lag in Service Delivery to Payment

The average decrease in days lag between dates of service delivery to receipt of payment for that service delivery was probably the most statistically significant IVRA effect observed. However, review of this effect by provider illustrates again the importance of provider factor considerations. The Group1 provider demonstrated an average decrease in lag time in delivery to payment date from Pre to Post IVRA of 18 days (almost a 2.5 week improvement in performance). By contrast, the Group2 provider demonstrated an average per member decrease in this payment lag time of only 1.5 days. Part of this difference is most likely associated with the Group1 provider processing all business transactions through its corporate business office which is located out of state. By contrast, Group2 processes claims transactions through its branch offices.

Visits, Units per Visit and Total Units & Cost per Member per Month

A summary of the service delivery analyses is that the main impact of IVRA on service delivery is that visits per month decline while units per visit increase slightly and total reimbursed units and cost per member per month decrease for Pre to Post IVRA intervention periods. However, this interpretation does not do justice to observed provider effects and interaction effects which are important and substantial.

From Pre to Post IVRA periods the analysis indicates on average an 8% decrease in number of visits per member per month (about 1 visit less per month). In concert with slightly less visits per member per month from Pre to Post IVRA, the number of units per visit increases slightly. The most pronounced IVRA effect on visits is associated with Group1 provider having the most visits per member in the Pre IVRA period and for whom average number of visits per member decline from Pre to Post IVRA by almost 2 visits per month. However, for Group2 provider which had less visits per member per month than Group1 in the Pre IVRA period, visits per member per month increased slightly from Pre to Post IVRA periods.

The reimbursed units per member per month and cost per member per month show effects consistent with the effects for visits and units per visit analyses. That is the Group1 provider with two less visits per member per month in the Post IVRA period and only slightly more units per visit demonstrated a significant decrease in units per member and likewise a decrease in cost per member per month from the Pre to Post IVRA period. In contrast, the Group2 provider with on average 0.5 more visits per member per month and with slightly more units per visit demonstrated a significant increase in units per member and likewise an increase in cost per member per month from the Pre to Post IVRA period. Similar to South Carolina's experience with *Care Call*, providers in the IVRA pilot had different outcomes from the Pre to Post IVRA period – the Group1 provider experienced a loss in revenue from units reimbursed and the Group2 provider experience a gain in revenue from units reimbursed. It is probable that the IVRA effect is due to the IVRA system's capability to more accurately track and report service delivery time data and restrict payment to actual delivery service time. As South Carolina found, hours reported manually are approximated and sometimes inflated. However, the specifics of the IVRA pilot results suggest that the Group1 provider may have had certain workers reporting visits that, although scheduled, did not occur in the Pre IVRA period.

Based on administrator's anecdotal description of how IVRA helped improve service delivery function, a possible explanation of the Group2 increase in visits in the Post

IVRA period is that the IVRA system allowed Group2 administrators to monitor more closely service delivery failures in real-time and respond “on the fly” to re-assign workers to provide services to a member whose worker had failed to show up for whatever reason. Such a functional improvement would effectively increase visits per member and units per member per month from Pre to Post IVRA periods as was observed for the Group2 Provider.

IVRA Summary and Conclusions

Based upon these analyses, implementation of an IVRA system appears to offer potential benefits to providers and to the state. Specifically, Providers may benefit from improved efficiency of operation including more timely turn around in claims payment from the state (an average 12 days reduction in delay between delivery of service and payment). The IVRA system provides a more verifiable means to assure the public that tax dollars are being expended only for services that are delivered. Over participating providers, the IVRA system had the effect of reducing the average number of reimbursed units and thus the cost per member per month.

However, the finding of significant Provider effects and Provider by IVRA Period interactions effects indicates that IVRA direction of effect depends on particular provider characteristics. The question may be posed as to how much one can generalize the results of this study to the population served by the ADvantage and SPPC programs.

Although a definitive answer can not be provided without additional research, characteristics of the providers participating in the study when compared with characteristics of the general population of providers suggest that the main IVRA effects would carry over to the entire population. A review of the average number of reimbursed ADvantage Personal Care units per member per month in State Fiscal Year 2007 indicates that the Group1 provider in the IVRA study was more similar to the population average provider than the Group2 provider in the study (Authorized units/member/mo: Group1 = 136, Group2 = 120 and the Population = 134). To test whether this comparison of likeness and difference was statistically valid, claims with date of service between 7/1/07 and 9/30/07 were analyzed for all members who had claims for service delivery in each of the three analysis months. The t-test analysis of mean paid units per member per month for the providers participating in the IVRA study and all other providers is given below.

Unpaired t-test for Pd Units/Mo

Grouping Variable: Provider

Hypothesized Difference = 0

	Mean Diff.	DF	t-Value	P-Value
Agency1, Agency2	24.617	1104	2.718	.0067
Agency1, Agency3	-3.860	6988	-1.158	.2469
Agency2, Agency3	-28.477	6140	-3.314	.0009

Group Info for Pd Units/Mo

Grouping Variable: Provider

	Count	Mean	Variance	Std. Dev.	Std. Err
Agency1	977	150.041	9379.917	96.850	3.099
Agency2	129	125.424	9071.206	95.243	8.386
Agency3	6013	153.901	9329.550	96.590	1.246

In the analysis, Agency1 is the same Provider as IVRA Group1, Agency2 is the same as IVRA Group2 and Agency3 is a group composed of all other providers and their members. Basically the analysis supports the proposition that the IVRA Group1 provider and their members are, in terms of service units delivered per member per month, more similar to the general ADvantage population than the IVRA Group2 provider.



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