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# Differences in Mail and Telephone Responses to the CAHPS In-Center Hemodialysis Survey

John D Peipert<sup>1\*</sup>, Julie A Brown<sup>2</sup>, Mike Cui<sup>2</sup> and Ron D Hays<sup>3</sup><sup>1</sup>Department of Medical Social Sciences, Feinberg School of Medicine, Northwestern University, Chicago, IL, USA<sup>2</sup>RAND, 1776 Main Street, Santa Monica, CA, USA<sup>3</sup>Department of Medicine, Division of General Internal Medicine and Health Services Research, University of California Los Angeles, Los Angeles, CA, USA**\*Corresponding author:** John D. Peipert, Department of Medical Social Sciences, Feinberg School of Medicine, Northwestern University, 625 N. Michigan Ave, Suite 2700, Chicago, IL, 60611, USA, Tel: +1 847-491-3741; E-mail: [john.peipert@northwestern.edu](mailto:john.peipert@northwestern.edu)**Rec date:** Dec 17, 2017; **Acc date:** Dec 27, 2017; **Pub date:** Dec 29, 2017**Citation:** Peipert JD, Brown JA, Cui M, Hays RD (2017) Differences in Mail and Telephone Responses to the CAHPS In-Center Hemodialysis Survey. *Ann Clin Nephrol* Vol.1 No.1: 1.

## Abstract

To date, no published study has compared modes of survey administration for the Consumer Assessment of Healthcare Providers and Systems In-Center Hemodialysis (ICH-CAHPS<sup>®</sup>) survey. We conducted a randomized experiment comparing response rates, item missingness, reliability, and mean scores between phone-only administered and mixed phone and mail (mixed mode) administered ICH-CAHPS surveys.

Patients were randomized to be administered the ICH-CAHPS by telephone only mode (n=1,781) or mixed mail and telephone mode (n=1,362). Since some patients did not complete the survey in the mode they were randomized to, analysis was conducted as intent-to-treat [(ITT); as randomized] and as actually completed. The response rate was significantly higher (p<0.001) for mixed mode (56%) than for telephone only mode (39%). Small differences in internal consistency reliability were observed; e.g., the Nephrologist Communication/Caring composite differed slightly between mixed ( $\alpha=0.90$ ) and telephone-only ( $\alpha=0.88$ ) modes (p<0.01) (ITT analysis). ICH-CAHPS means were higher (more positive) for mixed mode compared to telephone-only mode for 2 of the measures: Doctor Communication and Caring (77.8 vs. 74.7; p=0.02) and Global Doctor Rating (84.7 vs. 80.7; p<0.001). However, there were also significant differences in the opposite direction (telephone-only more positive than mixed mode) for the Global Staff Rating (85.6 vs. 83.5; p=0.03) and Global Center Rating (88.4 vs. 83.4; p<0.001) measures (ITT analysis).

Dialysis administrators can use these results to maximize response rates to ICH-CAHPS surveys, and public reports of ICH-CAHPS should adjust for mode of administration.

**Key words:** Health care surveys; Renal dialysis; United States Centers for Medicare and Medicaid Services

## Abbreviations

AAPOR: American Association of Public Opinion Research; CMS: Centers for Medicare and Medicaid Services; ICH-CAHPS: In-Center Hemodialysis Consumer Assessment of Healthcare Providers and Systems; ITT: Intent-to-Treat; MC: Mode Completed; QIP: Quality Incentive Program

## Introduction

There are currently over 420,000 individuals on hemodialysis in the United States (US), and 98% of these receive treatment in a dialysis clinic vs. home-based dialysis care [1]. These patients receive treatment multiple times per week, with each session lasting several hours and entailing multiple interactions with dialysis providers and staff. Though lifesaving, hemodialysis has a significant, often negative, impact on patients' quality of life [2-4]. Given the large impact hemodialysis has on its patients' lives, it is important that experience with hemodialysis be well understood and improved when it is suboptimal [5].

The Consumer Assessment of Healthcare Providers and Systems (CAHPS<sup>®</sup>) In-Center Hemodialysis (ICH-CAHPS<sup>®</sup>) is the primary survey instrument used to assess experience with hemodialysis care. The ICH-CAHPS was developed in 2004 by the Centers for Medicare and Medicaid Services (CMS) and the Agency for Healthcare Research and Quality [6,7]. In 2007, the ICH-CAHPS survey was endorsed by the National Quality Forum. Starting in 2011, the ICH-CAHPS survey instrument has been incorporated into CMS's Quality Incentive Program (QIP) to monitor care. Through this requirement, the ICH-CAHPS survey instrument is mandated to be assessed bi-annually with every hemodialysis patient.

CMS allows ICH-CAHPS survey data to be collected using 3 modes of administration: mail only, telephone only, and mail

with telephone follow-up for non-respondents. For each mode, a pre-notification letter is sent to the patient 1 week before the survey to help prepare the patient. For the mail- and telephone-only modes, survey data collection is concluded after 11 weeks, including attempts to follow-up for non-responders. For mixed-mode, data collection is concluded after 12 weeks. Previous studies have found mode of administration effects for CAHPS surveys in non-dialysis settings [8,9]. For example, in a report of a randomized mode of administration experiment using the CAHPS Hospital (H-CAHPS) measures, Elliot and colleagues found that phone-administered surveys had significantly higher scores than mail and mixed-mode surveys [8]. Mode of administration is one of the variables included in case-mix adjustment for public reporting of CAHPS surveys by CMS.

Despite its increasing usage in dialysis centers throughout the USA, there are no published comparisons of modes of administration for the ICH-CAHPS survey. Therefore, we conducted a randomized experiment to compare the response rates, item missingness, reliability, and mean scores between phone-only and mixed mail/phone (mixed mode) administered ICH-CAHPS surveys.

## Materials and Methods

### Participants and procedure

The sample selection procedure used in this study was designed to obtain a geographically representative sample of dialysis centers from throughout the USA. Additionally, the patient case mix of centers was considered in sampling to ensure that a sufficient number of Spanish-speaking patients would be included. The details of this procedure have been published elsewhere [6].

Two data collection modes, randomly assigned to patients (patient is the unit of randomization), were used: telephone only and a mailed survey followed by a telephone call to non-respondents (mixed mode), which reflects a protocol sanctioned by CMS and often employed in dialysis. Patients who received only telephone administration were provided with a notification letter prior to the telephone call. Those assigned to the mixed mode were also provided with a notification letter before receiving a survey in the mail. An

additional reminder letter was sent about two weeks after the mailing of the survey. Another copy of the survey was sent to patients in the mixed mode group about two weeks after this reminder letter. Following the second mailing of the survey, telephone follow-ups were conducted among patients in the mixed mode group who did not complete a mail survey. A toll-free number was included with the mailings and letters providing an option to complete the survey in either telephone or mail mode.

Surveys mailed in English were accompanied with a note in Spanish listing a toll-free telephone number to request a Spanish survey. In addition, patients who determined to be as Hispanic in the sample frame were provided with both English and Spanish versions of both the notification letter and survey.

### Survey instruments

The ICH-CAHPS survey assesses reports about care experiences in 3 areas: Nephrologist Communication and Caring (6 items; e.g., "In the past 3 months, how often did your kidney doctors listen carefully to you?"), Quality of Dialysis Center Care and Operations (17 items e.g., "In the last 3 months, how often did the dialysis center staff show respect for what you had to say?"), and Providing Information to Patients (9 items e.g., "Do you know how to take care of your graft, fistula, or catheter?"). These items are administered using response options ranging from "Never" to "Always" or "Yes" and "No." The full list of items (questions) with question numbers is provided in **Table 1**, where abbreviations are also given. In addition, the survey includes 3 global rating items that assess care from dialysis providers and facilities: Doctor ("Using any number from 0 to 10, where 0 is the worst kidney doctors possible and 10 is the best kidney doctors possible, what number would you use to rate the kidney doctors you have now?"), Dialysis Center Staff ("Using any number from 0 to 10, where 0 is the worst dialysis center staff possible and 10 is the best dialysis center staff possible, what number would you use to rate your dialysis center staff?"), and Dialysis Center ("Using any number from 0 to 10, where 0 is the worst dialysis center possible and 10 is the best dialysis center possible, what number would you use to rate this dialysis center?"). For all analyses, we transformed the CAHPS items and multi-item scales (composites) linearly to a 0-100 possible range, with higher scores indicating more positive experiences with care.

**Table 1** Question numbers, abbreviations, and text of items.

Question Number and Abbreviation	Text of items
<b>Nephrologist's Communication and Caring Composite</b>	
Q3:Nephrologist Listened <sup>a</sup>	In the last 3 months, how often did your kidney doctors listen carefully to you?
Q4:Nephrologist Explained	In the last 3 months, how often did your kidney doctors explain things in a way that was easy for you to understand?
Q5:Nephrologist Respect	In the last 3 months, how often did your kidney doctors show respect for what you had to say?

Q6:Nephrologist Spend Time	In the last 3 months, how often did your kidney doctors spend enough time with you?
Q7:Nephrologist Cared	In the last 3 months, how often did you feel your kidney doctors really cared about you as a person?
Q9:Nephrologist Informed	Do your kidney doctors seem informed and up-to-date about the health care you receive from other doctors?
<b>Quality of Dialysis Center Care and Operations Composite</b>	
Q10:Staff Listened	In the last 3 months, how often did the dialysis center staff listen carefully to you?
Q11:Staff Explained	In the last 3 months, how often did the dialysis center staff explain things in a way that was easy for you to understand?
Q12:Staff Respect	In the last 3 months, how often did the dialysis center staff show respect for what you had to say?
Q13:Staff Spend Time	In the last 3 months, how often did the dialysis center staff spend enough time with you?
Q14:Staff Cared	In the last 3 months, how often did you feel the dialysis center staff really cared about you as a person?
Q15:Staff Made Patient Comfortable	In the last 3 months, how often did dialysis center staff make you as comfortable as possible during dialysis?
Q16:Staff Kept Info. Private	In the last 3 months, did dialysis center staff keep information about you and your health as private as possible from other patients?
Q17:Comfortable Asking Staff	In the last 3 months, did you feel comfortable asking the dialysis center staff everything you wanted about dialysis care?
Q21:Staff Insertion of Needles	In the last 3 months, how often did dialysis center staff insert your needles with as little pain as possible?
Q22:Staff Checked on You on Machine	In the last 3 months, how often did dialysis center staff check you as closely as you wanted while you were on the dialysis machine?
Q24:Staff Manage Problems	In the last 3 months, how often was the dialysis center staff able to manage problems during your dialysis?
Q25:Staff Professional	In the last 3 months, how often did dialysis center staff behave in a professional manner?
Q27:Staff Explained Tests	In the last 3 months, how often did dialysis center staff explain blood test results in a way that was easy to understand?
Q26:Staff Talked Diet	In the last 3 months, did dialysis center staff talk to you about what you should eat and drink?
Q33:Timely Access to Machine	In the last 3 months, when you arrived on time, how often did you get put on the dialysis machine within 15 minutes of your appointment or shift time?
Q34:Center Clean	In the last 3 months, how often was the dialysis center as clean as it could be?
Q43:Handled Problems	In the last 12 months, how often were you satisfied with the way they handled these problems?
<b>Providing Information to Patients Composite</b>	
Q19:Graft/Fistula/Catheter Care	The dialysis center staff can connect you to the dialysis machine through a graft, fistula, or catheter. Do you know how to take care of your graft, fistula, or catheter?
Q28:Written Info on Rights	As a patient you have certain rights. For example, you have the right to be treated with respect and the right to privacy. Did this dialysis center ever give you any written information about your rights as a patient?
Q29:Staff Reviewed Rights	Did dialysis center staff at this center ever review your rights as a patient with you?
Q30:Staff Educ. on Home Problem	Has dialysis center staff ever told you what to do if you experience a health problem at home?
Q31:Staff Educ. on Emergency Problem	Has any dialysis center staff ever told you how to get off the machine if there is an emergency at the center?
Q36:Talked about Treatments	You can treat kidney disease with dialysis at a center, a kidney transplant, or with dialysis at home. In the last 12 months, did your kidney doctors or dialysis center staff talk to you as much as you wanted about which treatment is right for you?
Q38:Talk about Kidney Transplant	In the last 12 months, has a doctor or dialysis center staff explained to you why you are not eligible for a kidney transplant?

Q39:Talk about Peritoneal Dialysis	Peritoneal dialysis is dialysis given through the belly and is usually done at home. In the last 12 months, did either your kidney doctors or dialysis center staff talk to you about peritoneal dialysis?
Q40:Involved Choosing Treatment	In the last 12 months, were you as involved as much as you wanted in choosing the treatment for kidney disease that is right for you?
<b>Global Rating Items</b>	
Q8:Global Rating of Doctor	Using any number from 0 to 10, where 0 is the worst kidney doctors possible and 10 is the best kidney doctors possible, what number would you use to rate the kidney doctors you have now?
Q32:Global Rating of Staff	Using any number from 0 to 10, where 0 is the worst dialysis center staff possible and 10 is the best dialysis center staff possible, what number would you use to rate your dialysis center staff?
Q35:Global Rating of Center	Using any number from 0 to 10, where 0 is the worst dialysis center possible and 10 is the best dialysis center possible, what number would you use to rate this dialysis center?

## Data analysis

We compared survey responses in two ways. First, we compared responses between groups as they were randomized to receive surveys by telephone or mixed mode regardless of the mode in which they actually completed the survey—that is, intent-to-treat (ITT). Second, we compared responses between the groups as they actually completed the survey, either by mail or telephone [mode completed (MC)]. Some patients randomized to complete the survey by telephone wound-up completing it only by mail. We compared survey response rates using Fisher's exact tests. Response rates were calculated according to an American Association of Public Opinion Research (AAPOR) standard definition [10]. This response rate definition included both "item not applicable" and "failure to answer applicable items" responses. In addition, we compared item missingness rates using between group t-tests. Internal consistency reliabilities (coefficient alphas) were estimated and compared using methods developed by Feldt et al. [11] Mean differences on the ICH-CAHPS composites and global rating items by mode were evaluated, adjusting for factors similar to those used by CMS for case-mix adjustment of the ICH-CAHPS, including age, language of survey completed, language spoken at home, race/ethnicity, education, overall rating of health, and whether a proxy provided help in completing the survey. A p-value of 0.05 was considered statistically significant for all tests. We also comment on the effects of adjusting for multiple comparisons using the Benjamini-Hochberg method [12].

## Ethics statement

This study was reviewed and approved by the RAND Human Subjects Protection Committee (#h0088-02-01).

## Results

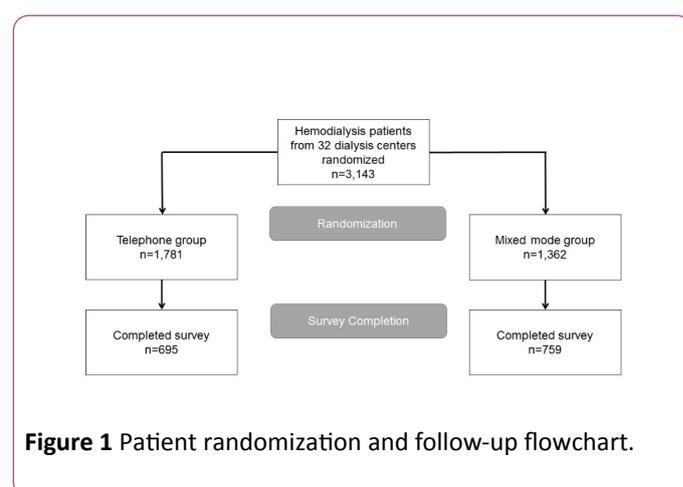
### Participants

A total of 3,143 patients enrolled in the study and were randomized to receive either phone only administered or mixed mode surveys (**Figure 1**). A response rate of 46% (n=1,454 completes) was obtained overall (**Table 2**), with 96 completes (7% of completes) in Spanish. Response rates were significantly higher ( $p < 0.001$ ) for those randomized to mixed

mode (56%, 759 completes) than for those randomized to the telephone mode (39%, 695 completes). Among those assigned to mixed mode, 596 ultimately completed the survey by mail and 163 completed by telephone. Among those assigned to complete by phone, 655 ultimately did so while 40 asked for and completed the survey by mail.

**Table 2** Number of completed surveys by assigned mode and actual mode of completion.

Assigned Mode (intent to treat)	Mode of actual survey completion (Mode Completed)		Totals	Response Rate
	Mail	Telephone		
Mixed (mail-telephone)	596	163	759	56%
Telephone	40	655	695	39%
Totals	636	818	1,454	46%



**Figure 1** Patient randomization and follow-up flowchart.

The participants were most often 65-75 years of age, identified as Non-Hispanic or as both Latino and White, had a high school degree or GED as their highest level of education attainment, and self-reported their health as "Good". More details about the sample are published in a previous report on this field test [6].

## Item missingness

For most items, the levels of item missingness were similar between those randomized to mixed mode vs. telephone-only mode (ITT analyses). There were 14 total significant differences between the items, with 11 differences where those in the mixed mode had significantly higher item missingness (**Table 3a**). There was 1 item for which item missingness was larger for the telephone mode (Q24: Staff Responded to Problems). The level of missing data for 2 items differed significantly but the rate was less than 1% for both modes (Q12: Staff Respect, Q15: Staff Made Patient Comfortable); for both of these, the p-value was very close to 0.05. After adjusting for multiple comparisons (Benjamini-Hochberg), the number of significant differences in missingness by mode decreased to 6 for the ITT analyses (Q10, Q13, Q24, Q38, Q39, Q40). The magnitude of the proportional

differences for most items, even the statistically significant differences, was in the range of 1%-2%.

Missing data for the comparison of those in the mixed mode who completed a mail survey (mixed-mail), in the mixed mode who completed the telephone survey (mixed-telephone) and telephone only modes (MC analyses) were generally similar with 16 total significant differences between items. There were 13 items where mixed-mail had a small but significantly higher rate of more missing data, and 3 items where mixed-telephone had more missing data (**Table 3b**). After adjusting for multiple comparisons (Benjamini-Hochberg), the number of significant differences in missingness by mode decreased to 11 differences for the MC analyses. Like the ITT analyses, the magnitude of proportional difference tended to be fairly small, even when statistically significant.

**Table 3a** Item missing data by randomized mode (intent-to-treat).

Composite/Item	Mixed Mode (N=759)	Telephone-Only Mode (N=695)	p-value
<b>Nephrologist's Communication and Caring Composite</b>			
Q3: Nephrologist Listened <sup>a</sup>	<1%	<1%	0.669
Q4: Nephrologist Explained	<1%	<1%	0.889
Q5: Nephrologist Respect	<1%	<1%	0.901
Q6: Nephrologist Spend Time	<1%	<1%	0.477
Q7: Nephrologist Cared	2%	1%	0.336
Q9: Nephrologist Informed	1%	<1%	0.030
<b>Quality of Dialysis Center Care and Operations Composite</b>			
Q10: Staff Listened	1%	0%	<b>0.004<sup>b</sup></b>
Q11: Staff Explained	1%	<1%	0.077
Q12: Staff Respect	<1%	<1%	0.045
Q13: Staff Spend Time	1%	0%	<b>0.007</b>
Q14: Staff Cared	1%	<1%	0.016
Q15: Staff Made Patient Comfortable	<1%	<1%	0.045
Q16: Staff Kept Info. Private	3%	2%	0.105
Q17: Comfortable Asking Staff	1%	<1%	0.171
Q21: Staff Insertion of Needles	23%	25%	0.315
Q22: Staff Checked on You on Machine	<1%	<1%	0.075
Q24: Staff Manage Problems	46%	57%	<b>&lt;0.001</b>
Q25: Staff Professional	1%	<1%	0.016
Q27: Staff Explained Tests	1%	1%	0.930
Q26: Staff Talked Diet	1%	<1%	0.016
Q33: Timely Access to Machine	<1%	<1%	0.195
Q34: Center Clean	<1%	<1%	0.307
Q43: Handled Problems	0%	1%	0.20

Providing Information to Patients Composite			
Q19: Graft/Fistula/Catheter Care	3%	2%	0.306
Q28: Written Info on Rights	3%	3%	0.515
Q29: Staff Reviewed Rights	3%	2%	0.317
Q30: Staff Educ. on Home Problem	2%	<1%	0.036
Q31: Staff Educ. on Emergency Problem	1%	<1%	0.047
Q36: Talked about Treatments	2%	1%	0.079
Q38: Talk about Kidney Transplant	7%	<1%	<b>&lt;0.001</b>
Q39: Talk about Peritoneal Dialysis	4%	<1%	<b>&lt;0.001</b>
Q40: Involved Choosing Treatment	3%	<1%	<b>0.001</b>
Q8: Global Rating of Doctor	2%	1%	0.431
Q32: Global Rating of Staff	1%	<1%	0.260
Q35: Global Rating of Center	1%	<1%	0.498

<sup>a</sup>Question number and abbreviated item text given for each item. Question numbers correspond to current version of ICH-CAHPS survey.  
<sup>b</sup>Bolded p-values are significant after adjusting for multiple comparisons [12].

**Table 3b** Item missing data by mixed (mail vs. telephone) and telephone only mode (mode completed).

Composite/Item	Mixed-Mail (n=596)	Mixed-Telephone (n=163)	Telephone-Only (n=655)	p-value
Nephrologist's Communication and Caring Composite				
Q3: Nephrologist Listened <sup>a</sup>	1%	1%	<1%	0.116
Q4: Nephrologist Explained	1%	<1%	<1%	0.705
Q5: Nephrologist Respect	<1%	1%	<1%	0.604
Q6: Nephrologist Spend Time	<1%	2%	<1%	0.026
Q7: Nephrologist Cared	<1%	1%	<1%	0.117
Q9: Nephrologist Informed	2%	4%	1%	0.094
Quality of Dialysis Center Care and Operations Composite				
Q10: Staff Listened	1%	<1%	0%	<b>0.012<sup>b</sup></b>
Q11: Staff Explained	1%	0%	<1%	0.048
Q12: Staff Respect	1%	0%	<1%	0.033
Q13: Staff Spend Time	1%	0%	0%	<b>0.004</b>
Q14: Staff Cared	1%	1%	<1%	0.069
Q15: Staff Made Patient Comfortable	1%	0%	0%	<b>0.008</b>
Q16: Staff Kept Info. Private	3%	3%	2%	0.175
Q17: Comfortable Asking Staff	1%	<1%	<1%	0.076
Q21: Staff Insertion of Needles	21%	31%	25%	<b>0.010</b>
Q22: Staff Checked on You on Machine	1%	0%	0%	<b>0.016</b>
Q24: Staff Manage Problems	41%	64%	58%	<b>&lt;0.001</b>
Q25: Staff Professional	1%	0%	0%	0.13
Q27: Staff Explained Tests	1%	<1%	<1%	0.787
Q26: Staff Talked Diet	1%	<1%	0%	<b>0.012</b>

Q33: Timely Access to Machine	1%	0%	<1%	0.151
Q34: Center Clean	<1%	0%	<1%	0.257
Q43: Handled Problems	0%	0%	1%	0.84
<b>Providing Information to Patients Composite</b>				
Q19: Graft/Fistula/Catheter Care	3%	<1%	1%	0.047
Q28: Written Info on Rights	3%	2%	2%	0.594
Q29: Staff Reviewed Rights	4%	1%	2%	0.112
Q30: Staff Educ. on Home Problem	2%	2%	<1%	0.074
Q31: Staff Educ. on Emergency Problem	2%	<1%	<1%	0.036
Q36: Talked about Treatments	3%	0%	1%	<b>0.006</b>
Q38: Talk about Kidney Transplant	8%	0%	0%	<b>&lt;0.001</b>
Q39: Talk about Peritoneal Dialysis	4%	<1%	0%	<b>&lt;0.001</b>
Q40: Involved Choosing Treatment	4%	1%	<1%	<b>&lt;0.001</b>
Q8: Global Rating of Doctor	2%	1%	1%	0.481
Q32: Global Rating of Staff	1%	2%	<1%	0.176
Q35: Global Rating of Center	1%	<1%	<1%	0.522
<sup>a</sup> Question number and abbreviated item text given for each item. Question numbers correspond to current version of ICH-CAHPS survey. <sup>b</sup> Bolded p-values are significant after adjusting for multiple comparisons [12].				

## Reliability

Internal consistency reliability (coefficient alpha) estimates were similar by mode, but there were statistically significantly higher reliabilities for mixed mode than telephone mode on

the Nephrologist's Communication and Caring (0.90 vs. 0.88,  $p < 0.01$ ; ITT analyses) composite, and significantly higher for mixed-mail than mixed-telephone on the Quality of Care composite (0.92 vs. 0.89,  $p = 0.02$ ; MC analyses) (**Tables 4a and 4b**).

**Table 4a** Internal consistency reliability (coefficient alpha) by randomized mode (Intent-to-treat).

Composite	Mixed Mode	Telephone only Mode	p-value
Nephrologist's Communication/Caring	0.09	0.88	<0.01
Providing Information to Patient	0.79	0.71	0.06
Quality of Care	0.91	0.91	0.05

**Table 4b** Internal consistency reliability (coefficient alpha) by mixed (mail vs. telephone) and telephone mode (mode completed).

Composite	Mixed-Mail Mode	Mixed-Telephone Mode	Telephone Only Mode	p-value
Nephrologist's Communication	0.09	0.09	0.88	0.31
Providing Information to Patient	0.68	0.71	0.71	0.09
Quality of Care	0.92	0.89	0.91	0.02

## Mean ICH-CAHPS scores

Case-mix adjusted means for the 3 multi-item composites and the global rating items appear in **Tables 5a and 5b**. Significant differences between those randomized to mixed mode versus telephone mode ranged from 2.1 points for global rating of staff (Q32) to 5.0 points for the global rating of dialysis center (Q35). The means were higher for those

randomized to the mixed mode for 3 of the measures [Nephrologist's Communication and Caring composite, Providing Information to Patients composite, and Global Rating of the Doctor(Q8)] and higher for those randomized to telephone-only mode for 2 measures [Global Rating of Staff (Q32) and Global Rating of the Center (Q35)]. Significant differences between those with mixed-mail, mixed-telephone and telephone only ranged from 5.3 [Global Rating of Doctor

(Q8)] to 8.4 (Providing Information to Patients composite) and the subgroup with the largest mean varied by measure. The means were higher for mixed-mail on the Providing Information to Patients composite, for mixed-telephone for the Global Rating of the Doctor (Q8), and for telephone only on the Global Rating of the Center (Q35).

**Table 5a** ICH-CAHPS composite and global item means by randomized mode (intent to treat).

Composites and Global Ratings	Randomized to Mixed Mode (n)	Randomized to Telephone Mode (n)	p-value for difference in mode means
Nephrologist Communication/Caring	77.8 (729)	74.7 (689)	0.02
Quality Dialysis Care/Operations	79.7 (729)	81.3 (689)	0.09
Providing Information to Patients	75.7 (729)	73.2 (689)	0.05
<b>Global Doctor Rating</b>			
Q8 Global Doctor Rating	84.7 (717)	80.7 (680)	<0.001
Q32 Global Staff Rating	83.5 (720)	85.6 (684)	0.03
Q35 Global Center Rating	83.4 (722)	88.4 (684)	<0.001
Adjusted for age, language of survey, language spoken at home, race/ethnicity, education, overall health rating, and proxy help.			

**Table 5b** ICH-CAHPS means by mixed (mail vs. telephone) and telephone only mode (mode completed).

Composites and Global Ratings	Mixed-Mail Mode (n)	Mixed-Telephone Mode (n)	Telephone Only Mode (n)	p-value for difference in group means
Nephrologist Communication/Caring	77.4 (567)	76.4 (162)	75.6 (650)	0.47
Quality Dialysis Care/Operations	79.1 (567)	80.5 (162)	81.2 (650)	0.14
Providing Information to Patients	78.0 (567)	69.6 (162)	73.4 (650)	<0.001
<b>Global Rating Items</b>				
Q8 Global Doctor Rating	82.1 (557)	87.4 (160)	81.9 (642)	0.008
Q32 Global Staff Rating	83.0 (561)	84.6 (159)	85.6 (647)	0.06
Q35 Global Center Rating	81.7 (561)	87.2 (161)	88.5 (646)	<0.001
Adjusted for age, language of survey, language spoken at home, race/ethnicity, education, overall health rating, and proxy help.				

## Discussion

This randomized experiment compared the performance of telephone and mixed mode (mail and telephone) administration of the ICH-CAHPS. Since dialysis centers are required to administer the ICH-CAHPS to all dialysis patients, consideration of mode of administration is critical. In this study, the response rate for mixed administration was higher than telephone administration. These results were similar to a previous mode of administration experiment with the CAHPS instrument [8]. Mixed mode administration is common within dialysis centers and reflects typical survey administration practice. CMS has a specific protocol for mixed mode administration of ICH-CAHPS surveys that includes telephone follow-up after an initial survey mailing similar to the mixed mode protocol in this study. This study provides evidence to support mixed mode administration. Because the ICH-CAHPS is most often administered by a vendor, dialysis administrators should be aware that fewer patients may respond to telephone survey protocols and consider this in discussions with their vendor. Additionally, we recommend that case-mix

adjustment to ICH-CAHPS scores include mode of administration, and that presentation of ICH-CAHPS scores include this case-mix adjustment when possible.

For most items, missing data rates were generally similar between modes of administration. When significant differences were present, the direction of differences varied by items, indicating no discernable pattern in differences between modes around missingness. Further, even when there were significant differences, the size of differences were small. For the few items with comparatively higher differences (e.g., Q21, Q24), the reasons for higher rates of missingness are tied to appropriate missingness due to responses to previous questions. For example, Q21 is only asked of those who have graft or fistula dialysis access, and the rate of missingness is actually higher for mixed mode when those individuals are removed from the analyses. For Q24, this question is only answered if the patient responds "yes" to the preceding question, "In the last 3 months, did any problems occur during your dialysis?" Therefore, Q24 will be missing for anyone answering "no" to Q23. For items on which there were appreciable differences in rates of missingness, the higher

rates tended to be mixed mode (ITT) or mixed-mail mode (MC). Given that the overall response rates were higher for mixed-mode compared to telephone mode, future study must pay special attention to why these items were more likely to be skipped by patients responding by mail or mixed mode.

Internal consistency reliabilities exceeded 0.70 for all composites by mode of survey administration except one scale, Providing Information to Patients, and only when administered under mixed-mode: ( $\alpha=0.68$ ). These results are similar to previous analyses of the ICH-CAHPS survey [7]. There were two statistically significant differences in reliability, but the magnitude of the differences was small. Taking the results of the current paper as well as previous analyses into consideration, most of the ICH-CAHPS composites are sufficiently reliable for use with hemodialysis patients, regardless of the mode of survey administration.

Previous studies have shown that different modes capture different mixes of respondents [8]. Hence, we compared means by mode controlling for age, language of survey, language spoken at home, race/ethnicity, education, overall health rating, and whether a proxy provided help. We found some mean differences on CAHPS composites and global rating items by mode, but the direction varied by measure and they tended to be small in magnitude. Nonetheless, it is important to adjust for these effects in comparisons of dialysis centers when the data have been collected using different modes of administration, because these patient-level effect sizes translate into larger facility-level effect sizes with potentially substantial effects on facility ranks. When mode differences have been found in previous studies, it has generally been the case that more positive responses were obtained for telephone than mail [8,9,13,14]. This has been attributed to greater social desirability in the face of an interviewer than when answering privately without another person present and to recency effects—that is, a greater tendency to endorse the last response option in auditory than visual presentations. Because the most positive response options on CAHPS survey appear last, a greater tendency to endorse the last option in a list translates into more positive responses in telephone than mail (and mixed) modes [15]. This study did not find a systematic difference in the direction of effects for mail and telephone administration. It serves as an initial step in understanding mode effects with the ICH-CAHPS survey, but further research is needed to evaluate the robustness of the mode effects found here.

## Conclusion

Like any study, this study had important limitations that must be acknowledged when interpreting its results. These limitations have been acknowledged in detail elsewhere [6], but they will be summarized here. Primarily, the characteristics of patients who did not respond were not ascertained. Previous studies of CAHPS surveys have found that patients' characteristics (e.g., race, gender) are significantly associated with nonresponse [9]. Related to this concern, this study featured relatively few participants who completed the survey in Spanish, a characteristic that may be associated with the

likelihood of nonresponse. Additionally, since incidence of kidney failure among Hispanics is higher than for non-Hispanics [1], understanding the experience on dialysis of Spanish-speaking patients is critical. Finally, the variables used for case-mix adjustment were similar to, but not exactly the same as, those used by CMS for the ICH-CAHPS. This could have some impact on the mean score estimates from this study.

In conclusion, this randomized experiment found that mode of administration has a significant impact on ICH-CAHPS survey response rate and, to a lesser extent, item response missingness and mean composite scores. Dialysis administrators should use this information to maximize response rates to ICH-CAHPS surveys, and public reports of ICH-CAHPS scores and norms should adjust for mode of administration to ensure these scores are accurate.

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## Conflict of Interest

All authors declare no conflict of interest.

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