

Predictors of missed appointments in prospective hand surgery research

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Abstract

Background Missed research appointments may bias the outcome of prospective clinical trials if the participants that miss appointments differ in important ways from those that do not. The purpose of this study was to determine the predictors of missed research appointments in patients enrolled in clinical trials.

Methods We retrospectively evaluated 665 participants enrolled in ten prospective clinical trials conducted at our outpatient office between 2001 and 2010. Demographic data (sex, race, date of birth, date of enrollment, age at enrollment, educational level, and work status), study coordinator, and study type were analyzed for association with missed a research appointment in bivariate and multiple logistic regression analyses.

Results One hundred and forty-four (21.7 %) participants missed research appointments during their follow-up. There were no statistical differences between those who missed appointments and those who did not, regarding sex, race, and age at enrollment. Educational level and work status were independent predictors of missed appointments.

Conclusions This study suggests that educational level and work status are predictors of missed appointments in prospective clinical research.

Keywords Hand surgery research · Missed appointments

Introduction

Missed research appointments affect the quality of prospective clinical research. If the patients that skip research appointments are different from those who keep appointments, it may bias the study and make it less generalizable [6].

Neuner and colleagues [3] found that patients that were younger, male, and had no high school diploma were more likely to miss medical appointments among patients being treated for acute trauma at the emergency department; however, only lack of a high school diploma was predictive in a multivariable statistical model. de Graaf and colleagues [2] found in a longitudinal, general population survey of psychopathology that persons not located at the 1-year follow-up are younger, undereducated, and unemployed. In contrast, Thomas and colleagues [5] found that among older patients involved in a 20-year follow-up examination in a cardiovascular cohort study, older age was associated with missed appointments. The aim of this study is to determine the factors predictive of missed research appointments in prospective studies addressing various arm illnesses conducted in a large academic hospital.

Methods

We retrospectively evaluated 665 patients enrolled in ten IRB-approved prospective studies to determine predictors of missed research appointments (appointments with critical data acquisition) (Table 1). All studies were performed at our outpatient office between 2001 and 2010.

The average number of study follow-ups required by each study was 2.1 (range 1–4). Each database and enrollment log was analyzed to identify participants that missed one or more research appointments. Demographic data were collected for

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Table 1 Participating studies

Study topic	Number of participants	Number of research appointments	Time of final research appointment (months)	Missed appointments (%)
Distal radius fractures 1	51	2	6	6 (12)
Trapeziometacarpal arthrosis	98	2	3	34 (35)
Proximal humerus fractures	31	2	6	13 (42)
Radial head fractures 1	11	1	1	1 (9)
Distal radius fractures 2	87	3	6	17 (20)
Minor hand surgery	175	2	3	40 (23)
Radial head fractures 2	76	1	1	11 (14.5)
De Quervain syndrome	48	1	1.5	9 (19)
Lateral epicondylitis	64	3	8	8 (13)
Distal radius 3	24	4	24	5 (21)
Total	665			144

all study participants using a form completed by the patient and reviewed by a research assistant. All studies collected information on work status and education. However, not all forms were completely filled in. For those that did not, data on work status and education were acquired from the hospital registration. Study coordinator and type of study were also collected for all study participants (Table 2).

There were missing data in the hospital registration for work status, educational level, and race. Missing data were scored as unavailable. “Unavailable” was included in the statistical analysis as a separate category.

Statistical Analysis

Bivariate Analysis

The response variable was “missed research appointment.” The explanatory variables were age, sex, race, educational level, work status, and specific study. Dichotomous variables were evaluated using a chi-square test. We created dummy variables for each category of race, work status, educational level, specific study, and enrollment period and used chi-square analysis to determine the significance. Continuous variables were evaluated using a point biserial correlation test. A *p* value of less than 0.05 was considered significant.

Multivariable Analysis

The factors with *p*<0.05 in the bivariate analysis were entered in a multiple logistic regression analysis.

Results

The mean age of the study subjects was 54 years (range 19–88). There were 456 women (68.6 %) and 209 men enrolled in one

of the ten studies. Five hundred and twenty-one participants (78.3 %) completed the study in which they enrolled. Demographic details are presented in Table 2.

In the bivariate analysis, there were no significant differences between patients that missed a research appointment and patients that did not with respect to age, sex, or race (Table 2). Subjects that did not miss a research appointment had significantly higher educational levels and were more likely to be employed, compared to those that missed a research appointment. Two studies had significantly higher rates of missed research appointments (trapeziometacarpal arthritis splint comparison, neoprene vs. thermoplast; and proximal humerus fractures, early vs. late mobilization; *p*<0.05). The patients enrolled by one pair of study coordinators were significantly more likely to miss a research appointment (*p*<0.05).

A logistic regression model, including all dummy variables of educational level, work status, specific study, and study coordinator, had a Nagelkerke *R*-square of 0.32 which means that 32 % of missed research appointments can be predicted by these four variables. Significant factors associated with not missing an appointment (negative odds ratio) in the logistic regression model were “college/postgraduate” (β =−0.88, odds ratio 0.41, confidence interval (CI) 0.20–0.86), “employed” (β =−2.3, odds ratio 0.10, CI 0.06–0.19), “retired” (β =−1.3, odds ratio 0.27, CI 0.15–0.47), and “unemployed” (β =−1.4, odds ratio 0.24, CI 0.10–0.61).

Discussion

Work status and education level were the only independent predictors of missed research appointments in our study. Higher education levels (college/postgraduate) showed to be significantly related to less missed research appointments. Being employed also showed to be a significant

Table 2 Demographic parameters

Parameter	Missed appointments (<i>n</i> =144)	No missed appointments (<i>n</i> =521)	Total (<i>n</i> =665)
Age (mean)	53.8	54.0	54.0
Sex			
Male	45 (31.3)	164 (31.5)	209 (31.4)
Race, <i>n</i> (%)			
White	135 (93.6)	465 (89.3)	600 (90.2)
Latino	1 (0.7)	19 (3.6)	20 (3.0)
African–American	4 (2.8)	16 (3.1)	20 (3.0)
Asian	1 (0.7)	10 (1.9)	11 (1.7)
Pacific Islands	0 (0)	2 (0.4)	2 (0.3)
American–Indian	1 (0.7)	0 (0)	1 (0.2)
African	0 (0)	1 (0.2)	1 (0.2)
Other	0 (0)	2 (0.4)	2 (0.3)
Unavailable	2 (1.4)	6 (1.2)	8 (1.2)
Education level, <i>n</i> (%)			
College/postgraduate	56 (38.9)	291 (55.9)	347 (52.2)
High school graduate	39 (27.1)	106 (20.3)	145 (21.8)
Vocational/technical program	22 (15.3)	55 (10.6)	77 (11.6)
Eighth grade or less	2 (1.4)	4 (0.8)	6 (0.9)
Unavailable	25 (17.4)	65 (12.5)	90 (13.5)
Work status, <i>n</i> (%)			
Employed	18 (12.5)	248 (47.6)	266 (40.0)
Retired	26 (18.1)	107 (20.5)	133 (20.0)
Unemployed	7 (4.9)	36 (6.9)	43 (6.5)
Disabled	10 (6.9)	24 (4.6)	34 (5.1)
Student	2 (1.4)	4 (0.8)	6 (0.9)
Unavailable	81 (56.3)	102 (19.6)	183 (27.5)

predictor for less missed research appointments. However, being unemployed or retired was also significantly related to less missed research appointment. Age was not associated with missed research appointments, perhaps because the inclusion of several study topics and designs balanced the effect of age observed in prior studies, some of which found youth [2–4], and some, advanced age [5] to be risk factors for missed research appointments. Likewise, sex was not associated with missed research appointment in our study, perhaps for similar reasons. The finding that participants with higher educational levels were less likely to miss research appointments is consistent with several other studies [1–3]. The effect of work status on missed research appointments is partially consistent with previous findings [2]. However, our study also showed being unemployed or retired is related to less missed research appointments.

Study type and enrollment period were significant in bivariate, but not multivariable analysis, indicating that these may be confounding factors, with certain studies and study coordinators associated with underemployed and undereducated patients. It is also possible that certain study coordinators were better at helping patients keep research

appointments, but that the effect of those efforts was relatively unimportant relative to the other factors.

This study should be interpreted in light of several limitations. The retrospective design of this study allows for introduction of bias. Missing data in educational level and work status may have affected the results. Ninety patients (13.5 %) had an unknown educational level and 183, an unknown work status (27.5 %). These items are requested both in study specific and hospital registration surveys, so there were two opportunities for patients to provide this data. It may be that failure to complete the forms, rather than education or work status, is the more important risk factor for a missed research appointment. The inclusion of various study topics and study designs increases the generalizability of the results, but may have eliminated some factors that are important predictors of missed appointments for specific conditions or study designs.

Predictors of missed appointments in prospective hand surgery studies were lower educational level and underemployment or failure to report these factors, with work status predominating. Research protocols might include incentives or plan-specific strategies for notifying patients of upcoming

appointments and encouraging them to reschedule when appointments are missed. There may be specific contact strategies and incentives that would be effective in this subset of patients—something that merits additional study, particularly for studies with topics and patient populations at high risk of missed appointments.

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