

Informatively missing quality of life and unmet needs sexual data for immigrant and Anglo-Australian cancer patients and survivors

Running title: Missing sexual data rates

Abstract

Purpose:

Although cancer can seriously affect peoples' sexual well-being, survivors and patients may be reluctant to answer questions about sex. This reluctance may be stronger for immigrants. This study aimed to investigate missing sexual data rates and predictors of missingness in two large studies on immigrants and Anglo-Australian controls with cancer; and to investigate whether those with missing sex data may have worse sexual outcomes than those with complete data.

Methods:

We carried out two studies aimed at describing the quality of life (QoL) and unmet needs amongst Arabic, Chinese and Greek immigrants versus Anglo-Australians cancer survivors (n=596, recruited from cancer registries) and patients (n=845). Logistic regression was used to model the probability of having missing sex data in either of the questionnaires. We compared the mean of the unmet sex needs responses of those who had missing QoL sex data (but not needs) to those who had completed both, and vice versa.

Results:

Missing sexual data rates were as high as 65%, with immigrants more likely to skip sex items than Anglo-Australians (p=0.02 for registry study, p <0.0001 for hospital study). Women, older participants and participants with more advanced disease had increased odds of missingness. There was evidence that data were informatively missing. Additionally, the questionnaire which stated that the sexual questions are optional had higher missing data rates.

Conclusion:

High missing data rates and informatively missing data can lead to biased results. Using the questionnaires that state that they may skip sex items may lead to an underestimation of sexual problems or an overestimation of quality of life.

Keywords: Missing data; cancer; patient reported outcomes; immigrants; sexuality

Word count: (1497/1500)

Introduction

Cancer can seriously affect peoples' sexual well-being [1]. Cancer survivors and patients participating in studies may be reluctant to answer questions about sex in psycho-social questionnaires, resulting in missing data [2]. This reluctance has been shown to vary by ethnicity [2], possibly because of differing cultural norms [3]. Previous studies have found female sex, older age, and declining health status to also be predictors of missingness in sexual items in cancer populations [2,4]. However, there has been little work on missing sexual data with respect to immigrancy, and its potential to be informatively missing. We have found only one paper which explored this issue, which compared Chinese, Malay and Indian people in Singapore[2] . However whether these were new immigrants or established minority groups was not specified.

Missing data can lead to biased estimates both within and between groups, particularly in patient reported outcomes in the cancer setting [5,6]. Missing items are generally less problematic than whole questionnaires or subscales as many questionnaires have scoring rules for handling missing items. These include the half-mean imputation rule: if half or more of a questionnaire or sub-scale has been completed, missing items can be imputed with the mean of the complete items. This approach has been shown to be fairly robust [7], but it's validity has been questioned with respect to the sexual item [2]. If missingness is related to the value of the outcome that *would have been observed*, then these data are termed informatively missing or missing not at random, which can seriously bias results [5,6]. Clearly, it is difficult to classify whether data are informatively missing, since the data are not observed.

We carried out two studies aimed at describing the quality of life (QoL), distress and unmet needs amongst Arabic, Chinese and Greek immigrants versus Anglo-Australians cancer survivors and patients. These have been described elsewhere [8,9]. Briefly, the first was registry based (N=596, response rate=26%), and the second was hospital based (N=845, response rate=61%) and included participants with a mix of cancer diagnoses. High rates of missing data in sexual items from the QoL and the unmet needs questionnaires motivated us to consider the issue of missing sex data in depth. Because some participants completed the QoL questionnaire, but not the unmet needs questionnaire, and vice versa, we were in the unique position to be able to investigate whether these data are missing informatively, i.e., whether worse sexual outcomes are associated with missingness.

Aims

We aimed to

- 1) investigate missing data rates for sex items in two large studies on immigrants and Anglo-Australian controls with cancer;
- 2) explore predictors of missing sex data;
- 3) investigate whether those with missing sex data may have worse sexual outcomes than those with complete data.

Methods

Main Outcome Measures

The Functional Assessment of Cancer Therapy-General (FACT-G), a commonly used questionnaire to assess QoL [10], has one optional item concerning sex: 'I am satisfied with my sex life'. The response options are: 0='not at all' to 4='very much'. The instructions written above this item are: 'Regardless of your current level of sexual activity, please answer the following question. If you prefer not to answer it, please tick this box and go to question 15.' This item is included in the total score for QoL and for the social wellbeing sub-scale.

The Supportive Care Needs Survey-Short Form 34 (SCNS) [11] is a 34-item questionnaire which has three items which ask about sex, which make up the unmet sex needs subscale. They are 'Changes in sexual feelings', 'Changes in sexual relationships', and 'Information about sexual relationships' The response options are 1='not relevant to me', 2='satisfied', 3='low need', 4='moderate need' 5='high need'. **Need was also dichotomised to some need (3,4, 5) or no need (1,2).**

Statistical Analysis

We included data from all participants from the main studies whose data were largely complete except for the sex items (97%). Chi-squared tests were used to compare missingness rates between the FACT-G and the SCNS, and between the registry and the hospital study.

Logistic regression was used to model the probability of having a missing sex score. This was done separately for the FACT-G single item, the SCNS unmet sexual needs subscale score, and for the registry study and the hospital study. Age, sex, disease stage and language group were included in the models. Disease stage was patient reported for the registry study, and was based on clinical notes for the hospital study. Other candidate variables that were considered were: being on treatment, socio-economic status, education, and time since diagnosis. These variables were either not significant in univariate models, or were no longer significant in adjusted models.

Combining the two samples, we compared the mean of the SCNS unmet sex needs responses of those who had missing FACT-G but not SCNS to those who had completed both, and vice versa, using two-sample t-tests. **A chi-squared test was used to compare some need versus no need.**

All analyses were performed in SAS version 9.3. All tests were two-sided and statistical significance was considered to be $p < 0.05$.

Results

Of the 1367 participants, 651 (48%) completed both questionnaires, 275 (20%) completed only the SCNS, 95 (7%) completed only the FACT-G, and 346 (25%) completed neither. More participants declined to respond to the single sex item from the FACT-G than the 3 item unmet sexual needs subscale of the SCNS (**$p < 0.0001$ for both studies**). Higher rates of missingness occurred in the hospital study as compared to the registry study (**$p < 0.0001$ for both FACT-G and SCNS**). See Table 1.

Sex, age, disease stage and language group were associated with FACT-G sex item missingness, as shown in Table 2. Women were more likely to have missing values than men ($p < 0.0001$, both studies); older participants were more likely to not respond to the sex item ($p < 0.0001$, both studies); and those with later stage disease ($p = 0.0001$, registry study only) **were more likely to have missing values**. Chinese and Greek **participants** were least likely to respond, as compared to Anglo-Australian participants. The results were similar for the SCNS (results not shown).

Participants who did not respond to the FACT-G sex item ($N = 275$) had a SCNS unmet sex needs score of 20.6, as compared to 4.4 for those who did respond ($N = 651$) (95% CI for the 16.2 difference: 13.6, 18.8, $p < 0.0001$). This translates to 27% having some level of unmet need versus 4%, when some need versus no need was assessed ($p < 0.0001$). Similarly, participants who did not complete the SCNS unmet sex needs items ($N = 95$) had lower (worse) FACT-G sex scores as compared to participants who had completed both ($N = 651$); 1.2 versus 1.8 out of 4 (95% CI for the 0.6 difference: 0.3, 0.9, $p = 0.0004$). This difference translates to 15% of the scale's range; 10% is commonly used as a minimal important difference[12]. These results (for both questionnaires) were consistent for immigrant and Anglo-Australian **participants**, and gives evidence that these missing sex data are missing informatively.

Discussion

Our studies had high rates of missing sexual data ranging from 26 to 45% for the FACT-G, and 16 to 40% for the SCNS for cancer survivors in the registry study, and 41 to 65% for the FACT-G and 26 to 58% for the SCNS for cancer patients in the hospital study. Missingness was associated with ethnicity, female sex and older age in both studies and more advanced disease in the **registry** study (although survivors with late stage had similar missing rates to the hospital participants). Anglo-Australian **participants** had the lowest rates of missingness.

These rates are higher than those found for the FACT-G in a US based study (7%) [2], but similar to a study in Singapore with non-response rates of 44% for Chinese, 22% for Malay, and 24% for Indian participants [2]. A review of missing sex items from the UK showed missing sex item data to vary between 9 and 25% [4]. The factors we found that were associated with missingness are similar to what other studies have found [4,2,13].

Our studies were unique because they included two questionnaires with sex items, which provided an opportunity to make comparisons. Because the non-response rates were substantially higher for the FACT-G item than the SCNS sex domain, it appears that asking participants if they want to skip an item makes them more likely to do so. Importantly, we showed that the missing sex data is likely to be informatively missing, as non-responders to the FACT-G had higher unmet needs and non-responders to the SCNS had lower sexual satisfaction compared to responders.

Conclusion

Using the FACT-G, or other questionnaires that state that they may skip the sex item, may lead to an underestimation of sexual problems or an overestimation of QoL. We recommend against suggesting that items can be skipped. Rather it may be preferable to acknowledge that some items are requesting sensitive information, but as these items represent key aspects of QoL it is important to complete them if possible. Also we recommend using conservative (ie lower sexual satisfaction) estimates for imputing missing sex items.

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Table 1. Missingness rates (%) for the FACT-G sex item and SCNS unmet sexual needs subscale, **by language group and study**. N_R and N_H indicate sample size for the registry study and hospital study, respectively*.

		Arabic	Chinese	Greek	Anglo-Australian	Overall
		N _R = 55 N _H = 137	N _R =129 N _H =239	N _R =67 N _H =167	N _R = 308 N _H =265	N _R = 559 N _H = 845
Registry study	FACT-G	26	37	45	30	33
	SCNS	18	20	40	16	20
Hospital study	FACT-G	50	65	64	41	54
	SCNS	39	47	58	26	41

*where the rest of the FACT and SCNS were complete.

Table 2. Factors associated with missingness for the FACT-G sex item. Odds ratio and 95% confidence interval (CI) are shown.

Variable	Registry study (Survivors)		Hospital study (Patients)	
	Odds ratio (95% CI)	p-value	Odds ratio (95% CI)	p-value
Sex				
Male	Reference	<0.0001	Reference	<0.0001
Female	4.0 (2.6, 6.3)		2.4 (1.7, 3.4)	
Age per 10 years	2.8 (2.2, 3.6)	<0.0001	1.8 (1.6, 2.2)	<0.0001
Disease stage				
Early, unknown, missing	Reference	0.0001	Reference	0.6
Late	12.8 (3.4, 47.7)		1.1 (0.8, 1.5)	
Language group				
Arabic	1.2(0.6, 2.5)		1.6 (1.7, 3.4)	
Chinese	2.0 (1.2, 3.3)	0.02	4.1 (2.7, 6.2)	<0.0001
Greek	2.0 (1.0, 3.7)		2.1 (1.4, 3.3)	
Anglo-Australian	Reference		Reference	