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Running head: PREDICTORS OF ADHERENCE TO COLPOSCOPY

DYSPLASIA SEVERITY, BUT NOT EXPERIENCES DURING COLPOSCOPY
PREDICT ADHERENCE TO FOLLOW-UP COLPOSCOPY

Susanna Kola and Jane C. Walsh

School of Psychology, National University of Ireland, Galway

ADDRESS FOR CORRESPONDENCE:

Susanna Kola

Department of Behavioural and Social Sciences

University of Huddersfield

Queensgate

Huddersfield

HD1 3DH

Ph: + 44 161 2135085

Fax: + 44 161 2135001

Email: s.kola@hud.ac.uk

Author notes: Susanna Kola is now at the Department of Behavioural and Social Sciences, University of Huddersfield, Huddersfield

Abstract

Objective Patient adherence with treatment recommendations is an essential factor for the effectiveness of cervical cancer screening programmes. Psychological factors may play a role in patient adherence to cervical cancer screening. The present study aimed to extend knowledge of women's adherence to follow-up colposcopy, by examining possible predictive biopsychosocial variables measured at colposcopy and objective attendance rates from patients' medical files.

Methods Baseline data on psychosocial factors (e.g. demographic variables, state anxiety, and pain) was collected from 141 women prior to undergoing colposcopy for the first time (M age = 29.63, SD = 8.39). Experiences of colposcopy and adherence to follow-up (within two years) were assessed subsequently.

Results There were no associations between adherence and demographic variables. Women with severe dysplasia were more likely to adhere to follow-up colposcopy than women with other histology grades. Women who did not attend for follow-up reported significantly greater state anxiety and pain unpleasantness following colposcopy than women who did attend. A multivariate logistic regression analysis revealed that the psychological experiences of colposcopy did not predict adherence status. However, dysplasia severity made a significant contribution to the model. The odds of adhering to colposcopy for patients with severe dysplasia were 3.57 times higher than for patients with normal histology, and 4.35 times higher than for patients with moderate dysplasia ($p = .005$).

Conclusions Colposcopy-related experiences do not appear to be strong predictors of adherence, but women with dysplasia grades other than 'severe' should be targeted for follow-up recommendations and advice.

Key words: Cervical cancer; oncology; colposcopy; adherence; anxiety; pain perception

Introduction

Cervical cancer represents a major public health problem. The most recent global figures estimate that there were 493 000 new cases and 274 000 deaths from the disease in 2002 [1]. In the USA, the incidence rate is 8.1 per 100 000 women and the mortality rate is 2.4 per 100 000 women [2]. Cervical cancer can be prevented by early detection of cervical intraepithelial neoplasia (CIN) by cytological smear testing and follow-up treatment before progression into invasive disease. Colposcopy and directed biopsy provide a colposcopic impression and histologic diagnosis which forms the basis of treatment recommendations following an abnormal smear test.

At all stages throughout the cervical cancer screening cycle, from cytological screening to treatment, adherence remains a major issue; both in follow-up of abnormal smear test results and adherence to treatment recommendations after colposcopy [3, 4]. Adherence at colposcopy clinics is an essential factor for effectiveness of a cervical cancer screening program, as progression of CIN is most likely to occur in those women who do not attend each stage of the screening cycle [5-7]. A recent study suggested that 13% of invasive cervical cancers were attributable to non-adherence to follow-up of abnormal cervical smear test results [8]. Women may default at any stage of the screening cycle, and for colposcopy it has been reported that most women default during follow-up or at the review stage [9].

Psychological factors, particularly psychological distress, may play a role in patient adherence to cervical cancer screening. Women experience significant

emotional reactions in response to colposcopy [10, 11], and psychological factors may further influence the disease process [12, 13]. Fear has been most often cited for non-adherence to colposcopy. The results from a prospective study of 40 defaulters found that women reported fear of cancer, fear of an internal examination, and fear of further pain associated with biopsy and treatment as reasons for non-attendance at colposcopy [9]. Furthermore, anxiety has been suggested as an important factor in determining adherence to colposcopy, although there is no research evidence to suggest that decreasing anxiety improves adherence rates [14]. Although it has also been suggested that pain experienced during colposcopy may contribute to non-adherence to follow-up appointments [15], there are no published accounts of studies that have explored the relationship between pain and adherence.

While some patient characteristics have been found to influence adherence to recommended care following an abnormal smear test results, such as age, smoking status, knowledge of smear test, and lesion severity [16-19], little is known about how the experience of colposcopy influences adherence to follow-up recommendations. In order to intervene appropriately and effectively to reduce negative psychological consequences of cervical cancer screening and to promote adherence to care in this patient group, it is important to understand the characteristics of the population where such intervention is planned [6]. The present study was conducted in order to further extend understanding of women's adherence to follow-up colposcopy, by examining possible predictive variables measured at first colposcopy and objective attendance rates of follow-up from patients' medical files.

Methodology

Design

This study employed a prospective design. Baseline data from 164 first-time colposcopy patients were correlated with data on adherence to follow-up treatment taken from medical files approximately two years following first colposcopy. Of these 23 (14%) were discharged following colposcopy and returned to the cytological screening cycle as their examinations revealed no abnormalities, leaving a sample of 141 women for analysis.

All procedures were reviewed and approved by the local hospital research ethics committee.

Study Setting and Participants

Participants were 141 women consecutively recruited from a colposcopy clinic in a university hospital in Ireland. All women were first-time colposcopy patients at the time of the study enrollment, having been referred with an abnormal cervical smear result. Exclusion criteria included severe cardiac, pulmonary, or liver disease, epilepsy or chronic pain, to reduce differences in health status.

Measures

Adherence rates

Data on adherence was obtained from the computer records at the clinic approximately two years from the time of the first clinic appointment. In accordance with previous research, women who had not adhered to follow-up colposcopy within

a period of 4 months of original appointment date were classified as ‘non-adherent’ [3, 20].

Demographic and medical information

The background self-report information included age, marital status, education, parity, and smoking status. From the medical charts, cytology and histology results were extracted. Cytology and histology grades are reported according to the Bethesda classification, with the British Society of Clinical Cytology (BSCC) classification in brackets. The following cytology grades were found: unsatisfactory/inadequate, atypical squamous cells of undetermined significance (borderline nuclear abnormalities [BNA squamous]), low grade squamous intraepithelial lesion (mild dyskaryosis), high grade squamous intraepithelial lesion (moderate and severe dyskaryosis). The following histology grades were found: normal, viral changes, CIN1 (mild dyskaryosis), CIN2 (moderate dyskaryosis), CIN3 (severe dyskaryosis), and carcinoma in situ. The histology grades were collapsed as follows: normal, mild (viral changes and CIN1), moderate, severe (CIN 3 and carcinoma in situ).

State-Trait Anxiety Inventory (STAI)

Trait anxiety and post-colposcopy state anxiety, as measured by the STAI [21], were used for the present analyses. The Trait form measures the frequency of respondents’ feelings in general using 20 items, while the State form assesses the frequency of respondents’ feelings at the present moment, using 20 items. Each item is measured on a four-point Likert scale ranging from ‘not at all’ to ‘very much so’.

The possible range of scores for the scales is 20-80, with a higher score indicating greater anxiety. Reliability and validity of this scale has been established, and Cronbach's alpha of .91 for the trait form, and .93 for the state form have been reported [21]. For the present sample, Cronbach's alpha was .89 for the trait form, and .92 for the state form.

Experienced pain

Immediately following the colposcopy examination, patients responded to two 100-mm visual analogue scales (VAS) assessing experienced pain intensity and pain unpleasantness during colposcopy. The VASs were anchored by 'no pain/no discomfort' and 'pain as bad as it could be/worst discomfort' at either end. To score the VASs, the distance from the 'no pain' or 'no discomfort' anchors to the respondent's mark is measured, and a higher score signifies greater pain and discomfort. Test-retest reliability have been established [22], and high correlations with other pain rating scales have been demonstrated [23, 24].

In addition, the peak pain scale of the McGill Pain Questionnaire [25] was used in the present analyses. This requires respondents to indicate their peak pain using one of the following numbers: (0) no pain, (1) mild, (2) discomforting, (3) distressing, (4) horrible, and (5) excruciating. Reliability and validity have been established [see 26].

Procedure

Women eligible for participation were individually invited into a quiet office adjacent to the colposcopy room, and invited to participate in a study on women's

experiences of their first visit to the colposcopy clinic. Each woman was administered the study questionnaire examining demographic variables and trait anxiety before the colposcopy examination. Immediately following colposcopy, experiences of colposcopy including pain and anxiety were assessed.

Statistical analysis

A series of preliminary *t*-test and chi-square analyses were conducted. For the purposes of the chi-square analyses, the following variables were collapsed: age (under 25 vs. 25 and over), marital status (single vs. married), parity (no children vs. have children), education (less than college education vs. college education), smoking status (non-smoker vs. smoker), cytology grade of referral smear (all other smear grades vs. high grade smear), and histology grade at first colposcopy (normal/mild/moderate/severe).

A multivariate logistic regression analysis was conducted, with adherence to follow-up colposcopy (coded 0 = non-adherent, and 1 = adherent) as the dependent variable in the model. Based on the results from the preliminary analyses the variables that showed significant univariate association with adherence were included in the logistic regression analysis.

Results

The final sample consisted of 141 women (*M* age = 29.63 years, *SD* = 8.39) who received follow-up colposcopy appointments, 92 women (65%) adhered, and 49 (35%) were non-adherent. There was no statistically significant difference in mean age of women who adhered or did not adhere to follow-up colposcopy

appointments at the time of initial colposcopy. However, women who were non-adherent reported significantly greater state anxiety and pain unpleasantness following colposcopy than women who adhered to follow-up colposcopy. The descriptive statistics are presented in Table 1.

Insert Table 1 about here

Chi-square results

A series of preliminary chi-square analyses revealed no significant association between adherence status and the following variables: age, marital status, parity, education, smoking status, smear grade on referral, whether patient had biopsy at first colposcopy, or whether patient had treatment at first colposcopy. However, differences in adherence were found in histology diagnosis of **dysplasia** severity, such that women with severe **dysplasia** were more likely to adhere to follow-up colposcopy than women with other histology grades. See Table 2 for summary statistics

Insert Table 2 about here

Multivariate logistic regression

The variables with significant independent associations with adherence status (post-colposcopy state anxiety, pain unpleasantness and histology grade) were entered into the logistic regression analysis. The results of the multivariate logistic

regression are summarised in Table 3. A test of the full model against a constant only model was statistically significant, indicating that the predictors as a set reliably distinguished between adherence status, $\chi^2(5) = 16.69, p = .005$. Prediction success overall was 67%. The Wald statistic demonstrated that only dysplasia severity made a significant contribution to the model. Post-colposcopy state anxiety and pain unpleasantness were not significant predictors of adherence to follow-up colposcopy. Inverted odds ratios indicated that the odds of adhering to follow-up colposcopy for women with severe dysplasia were 3.57 times higher than for patients with normal histology, and 4.35 times higher than for women with moderate dysplasia.

Insert Table 3 about here

Discussion

In this group of women who were initially assessed at their first-ever colposcopy appointment, 35% failed to adhere to recommendations to attend follow-up colposcopy within a period of four months following the original (repeat) appointment. The aim of this study was to identify factors which predict adherence to follow-up colposcopy. The results from bivariate analyses demonstrated that women with histology confirmed severe dysplasia were more likely to adhere to follow-up colposcopy than women with other dysplasia grades. In the logistic regression analysis, dysplasia severity emerged as a significant predictor of adherence. Particularly, it was found that for women with severe dysplasia the odds

of adhering to follow-up were 3.57 times higher than for women with normal histology, and 4.35 times higher than for women with moderate dysplasia. These results are in line with other studies which have found that non-adherent women are less likely to have high grade lesions than women who adhere to follow-up recommendations [27-29].

It is possible that the follow-up time intervals are shorter for women with more severe dysplasia grades, or that women with low-grade dysplasia perceive lower risk of developing cervical cancer, and therefore are less likely to adhere to follow-up recommendations. Women may perceive that the seriousness of the abnormality is conveyed by the urgency in requiring follow-up [see 29].

It has been found that the nature of the follow-up influence adherence rates, such that higher adherence rates are observed for more intensive follow-up compared to less intensive follow-up. Specifically, it was found that the adherence rate for conization was 85%, 81% for LLETZ treatment, 62% for repeat colposcopy, and 36% for repeat cytology [30]. A related factor may be the length of time between original colposcopy and follow-up appointment, with greater non-adherence with increased time intervals [31].

Furthermore, it was revealed that women who did not attend for repeat colposcopy reported significantly greater state anxiety and pain unpleasantness immediately following first colposcopy than women who attended for follow-up colposcopy. However, in the logistic regression neither pain unpleasantness experienced during colposcopy nor anxiety reported immediately following colposcopy influenced adherence rates in the present sample. The results from the present study thus suggest that anxiety and pain experiences during initial

colposcopy are not strong predictors of follow-up recommendations, when considered in combination with other variables. This is in contrast to suggestions that have been made in the literature, linking anxiety and pain experiences during colposcopy to follow-up colposcopy adherence [14, 15]. It is interesting to note that few prospective studies appear to have investigated these suggestions. Radecki Breitkopf and Pearson found that affect (fear, sadness, or rejection) was not associated with intentions to attend follow-up recommendations [32].

There were no associations between adherence to follow-up colposcopy and most of the demographic variables (i.e., age, marital status, parity, education, smoking status, or smear grade on referral). Our finding of no association between demographic variables and adherence is consistent with the majority of previous studies [27, 33]. For example, a recent Australian study found no differences in demographic variables, including age, parity, pregnancy, smoking status, immunosuppression status, presenting smear test and HPV status, of women who did or did not adhere to follow-up colposcopy [34]. This contrasts with other studies that have found that non-adherent women are more likely to be younger, unemployed or pregnant than adherent women [9]. Another study found that non-adherent women were younger than adherent women, but found no differences in parity or histology result [35].

There were no associations between adherence to follow-up colposcopy and whether or not women underwent biopsy or LLETZ treatment during colposcopy in the present study. This is in contrast to one previous study, which found that women who underwent treatment for CIN were less likely to adhere to follow-up recommendations than women who did not have treatment for CIN [36]. The

authors suggest that the reason for this may be due to women experiencing their risk of developing cervical cancer as reduced or negligible after treatment of CIN.

In studies examining adherence after colposcopy, there do not appear to be easily identifiable predictive factors that would inform us which patients will adhere to follow-up and which patients will not. Therefore, we are still unclear about the groups of women that are non-adherent to follow-up colposcopy recommendations. In the absence of identifiable predictive factors for non-adherence, and rates of non-adherence following colposcopy range from 10% to 40% [6] it would seem sensible to extend research efforts in this area to find suitable interventions to promote adherence.

The importance of finding effective interventions to promote adherence to follow-up care is evident from research that has demonstrated that non-adherence to follow-up treatment recommendations has been implicated as a contributing factor in adverse outcomes in retrospective analyses of invasive cervical cancer. For example, in a retrospective study of 60 women with abnormal smear test results, who had received no follow-up treatment, 13 women developed invasive cervical cancer, of which 5 died [37]. Women with abnormal smear test findings who do not have follow-up treatment are thus at a higher risk of developing invasive cervical cancer than women with abnormal smear test findings who receive appropriate follow-up treatment [38].

The strengths of the study include recruitment of women without previous experience of colposcopy or treatment for CIN, with one colposcopist carrying out all examinations, minimizing differences in experience. A limitation of the data is that we were unable to extract complete data of the interval of follow-up colposcopy

for women with different histology grades. In addition, it is possible that different results may have been obtained if women had been asked to reflect on their colposcopy experiences some time after the initial colposcopy, but before the follow-up colposcopy. Finally, although the sociodemographic profile of patients was similar to those reported in other studies [e.g. 39], all participants were recruited from a single institution, potentially limiting generalizability.

In summary, this study highlights the difficulty in identifying predictors of non-adherence to follow-up colposcopy. Dysplasia severity emerged as the only significant predictor of adherence, and women with severe dysplasia were more likely to adhere to follow-up colposcopy than women with normal histology results or moderate dysplasia. Furthermore, the results suggest that colposcopy-related experiences, at least when measured immediately following first colposcopy, are not strong predictors of adherence to follow-up recommendations.

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TABLE 1. Descriptive statistics of participants ($n = 141$).

| Variable | Adherence Status | | <i>t</i> |
|---------------------|--------------------|--------------------|----------|
| | Adherent | Non-adherent | |
| | Mean (<i>SD</i>) | Mean (<i>SD</i>) | |
| Age | 30.13 (8.28) | 28.69 (8.61) | .97 |
| Trait anxiety | 35.47 (7.48) | 37.45 (8.69) | .16 |
| State anxiety | 34.16 (9.44) | 38.02 (11.12) | 2.17* |
| Pain unpleasantness | 29.77 (24.10) | 39.43 (24.09) | 2.27* |
| Pain intensity | 18.03 (21.70) | 24.41 (21.07) | 1.68 |
| Peak pain | 2.34 (1.50) | 2.82 (1.27) | 1.90 |

* < .05

TABLE 2. Summary of chi-squared analyses (n = 141)

| Variable | Adherence Status | | χ^2 (df) |
|-------------------|------------------|--------------------|---------------|
| | Adherent n (%) | Non-adherent n (%) | |
| Age | | | .43 (1) |
| 25 and under | 27 (19.1) | 17 (12.1) | |
| Over 25 | 65 (46.1) | 32 (22.7) | |
| Marital status | | | .54 (1) |
| Single | 62 (44.0) | 30 (21.3) | |
| Married | 30 (21.3) | 19 (13.5) | |
| Parity | | | .49 (1) |
| No children | 45 (31.9) | 27 (19.1) | |
| Have children | 47 (33.3) | 22 (15.6) | |
| Education | | | 1.29 (1) |
| Less than college | 41 (29.1) | 17 (12.1) | |
| College education | 51 (36.2) | 32 (22.7) | |
| Smoking status | | | .75 (1) |
| Non-smoker | 63 (44.7) | 30 (21.3) | |
| Smoker | 29 (20.6) | 19 (13.5) | |
| Referral smear | | | .43 (1) |
| All other grades | 53 (37.6) | 31 (22.0) | |
| High grade | 39 (27.7) | 18 (12.8) | |
| Biopsy | | | .32 (1) |
| No | 44 (31.2) | 21 (14.9) | |

| | | | |
|-------------------|-----------|-----------|-----------|
| Yes | 48 (34.0) | 28 (19.9) | |
| LLETZ treatment | | | .78 (1) |
| No | 67 (47.5) | 39 (27.7) | |
| Yes | 25 (17.7) | 10 (7.1) | |
| Histology Results | | | 8.50 (3)* |
| Normal | 17 (12.1) | 12 (8.5) | |
| Mild | 27 (19.1) | 11 (7.8) | |
| Moderate | 14 (9.9) | 16 (11.3) | |
| Severe | 34 (24.1) | 10 (7.1) | |

* < .05

TABLE 3. Logistic regression of experience of colposcopy on adherence to follow-up colposcopy

| | β (<i>SE</i>) | 95% CI for exp <i>b</i> | | |
|---------------------|-----------------------|-------------------------|--------------|-------|
| | | Lower | Exp <i>b</i> | Upper |
| Included variables | | | | |
| Constant | 3.13 (.91)** | | 22.96 | |
| State anxiety | -.04 (.02) | .93 | .97 | 1.01 |
| Pain unpleasantness | -.01 (.01) | .97 | .99 | 1.01 |
| Histology grade | | | | |
| Normal | -1.27 (.57)* | .09 | .28 | .86 |
| Mild | -.64 (.54) | .18 | .53 | 1.52 |
| Moderate | -1.47 (.54)* | .08 | .23 | .66 |

Note: $R^2 = .09$ (Hosmer & Lemeshow), .11 (Cox & Snell), .15 (Nagelkerke). Model $\chi^2 (5) = 16.69, p = .005$.

* $p < .05$

** $p < .001$