

A Randomized Controlled Trial of Navya Patient Preference Tool- An Online Self-Administered Adaptive Conjoint Analysis Based Decision Aid, for women undergoing surgery for early breast cancer

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18 **Background**

19 There are two surgical management strategies for patients with early, operable breast cancer;
20 breast conservation therapy (which includes breast conservation surgery and radiotherapy) and
21 modified radical mastectomy. Both of these strategies are clinically equivalent in terms of
22 overall survival of patients.^{1,2,3} However, these strategies differ from one another in toxicity and
23 cost/convenience for the patient in undertaking the treatment and a perceived element of fear of
24 recurrence. The best option for a patient will depend on how she values the different treatment

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25 attributes associated with each of the two management strategies. Therefore, either of the two
26 options - Breast Conservation Therapy or Mastectomy could be superior personal preference for
27 a given patient. The potential advantages of breast conservation are better body image, a sense
28 of sexual well-being, less body consciousness, a greater sense of femininity, and psychological
29 comfort. On the other hand, there have been reports of post mastectomy depression, anxiety,
30 shame, and occasional suicidal thoughts following mastectomy.⁴ Other than that there is an
31 often perceived fear of cancer recurrence in the same breast after breast conservation, a
32 common reason for patients demanding mastectomy even for early breast cancer.

33 There is a large variation in the pattern of surgical treatment for breast cancer mainly due to
34 lack of involvement or participation of the patients in the decision making process. In the study
35 by *Katz et al*⁵, there was an increase in mastectomy rates (33%) when the patient involvement in
36 the decision making process increased. Discussion on recurrence of disease and effects of
37 radiation tilted the balance towards mastectomy. In the study by *Bleicher et al*⁶, a total of 1259
38 patients with non-invasive or localized invasive breast cancer were randomized into
39 mastectomy or breast conservation groups and the role of patient in decision making was
40 studied. The factors which proved to be significantly favoring mastectomy were active patient
41 involvement in decision making process, lower education level, number of surgeons or health
42 care providers consulted and non-white race.

43 Decision aids are “interventions designed to help people make specific and deliberative choices
44 among options by providing information about the options and outcomes that is relevant to a
45 person’s health status”. They are designed to transfer unbiased, complete, and accessible
46 information to the patient and enable her participation in decision making⁷. Over time, decision
47 aids have been validated in randomized trials and found acceptable, useful, and desirable by
48 patients and their physicians. About 40% of patients refer to internet based decision aids before
49 meeting their physician.⁸ It has been shown that decision aids are effective in improving patient
50 knowledge, patient participation in decision making, and decision quality.⁹The decisional

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51 conflict index (DCI) is designed to measure the patient's comfort with the decision making
52 process in terms of how well-informed they feel, the clarity of their values, how supported they
53 feel in the DM process and their level of uncertainty. It ranges from 1 to 5. The effectiveness of
54 a decision aid has been tested in various fields of medicine as well as oncology, in at least 34
55 randomized controlled trials, majority of them pertaining to breast and prostate cancer. In most
56 of these studies, the decisional conflict was reduced moderately.

57 There are three significant limitations to the current design of decision aids. First, they are
58 primarily designed to be used during the clinical encounter, and to be administered by a
59 physician, which is resource intensive. Second, these decision aids use methods that compare
60 treatments to each other on similar attributes (such as decision boards, or standard gamble
61 technique) and ask patients to choose a treatment based on their consideration of the attributes.
62 The limitation with this approach is that it only passively transfers knowledge of attributes such
63 as cost and quality of life, but asks the patient to holistically choose a treatment after
64 consideration of these attributes. This places the onus of the decision back on the patient who is
65 struggling with the choice in the first place.

66 In a particular study by Brace et al ¹⁰, the awareness of the physicians towards Decision aids
67 was studied and found that 69% of the respondents were aware of such aids but only 24% of
68 them actually utilized them.

69 Alternative methods such as conjoint analysis based techniques have been studied in the
70 medical context.^{11,12} Conjoint analysis emphasizes the choice of attributes themselves, and asks
71 the patient to make risk/benefit tradeoffs such as efficacy vs. side effects in an adaptive,
72 recursive way, until the patient's underlying values are clarified. These values are mapped to
73 the treatment choice, leading to a more obvious and intuitive decision making process. This is
74 similar to the way clinician's approach decision making with a patient. Currently, there are no
75 digital, web based, interactive, conjoint analysis base decision aids available for patients with
76 breast cancer that will actually drive them towards a decision.

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77 Finally, decision aids have largely been studied in the context of the patient alone, devoid of
78 family input or other key decision makers. For example, surgical decisions in breast cancer are
79 heavily influenced by family roles, gender roles, autonomy and self-image. These factors
80 heavily influence a patient's decision making, and are not accounted for in traditional patient
81 focused decision aids. All of the above limitations significantly reduce the possibility of
82 delivering effective decision aids to patients at a large scale.

83 Patient preference is an important consideration in clinical decision making, especially when
84 there is clinical equipoise. One frequent scenario in which patient preference matters is when
85 women diagnosed with breast cancer are confronted with the choice between breast
86 conservation therapy and mastectomy. Traditionally, decision aids are designed to be
87 administered by physicians, which is inefficient. Further, decision aids force the patient to pick
88 from a menu of treatment options instead of assessing the intrinsic values driving the decision.
89 Navya bridges this gap by developing an online, self-administered, conjoint analysis based,
90 interactive decision tool that assesses risk/benefit tradeoffs of the underlying decision criteria
91 like efficacy versus toxicity. The proposed randomized control trial aims to demonstrate
92 reduction in decisional conflict and improved clinical outcomes by using the Navya Patient
93 Preference Tool as compared to usual care.

94 We hypothesize that gender roles and autonomy play a significant role in a woman's ability to
95 make her own medical decisions. A secondary aim of the trial is to determine whether the
96 optimal use of a decision aid includes participation by both the woman and her key family
97 member. The proposed trial randomizes the use of the conjoint analysis decision tool to a
98 woman alone or in conjunction with her key family member (who in most Indian families may
99 be a male family member such as husband, father or brother).

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102 The Navya Patient Preference Tool (Navya PPT)

103 The Navya Patient Preference Tool, (Navya PPT) jointly developed in an endeavor between
104 Tata Memorial Center, Navya Network, and Harvard Business School, conveys the evidence
105 behind each of the management strategies or treatment options, and helps the informed patient
106 assess their preferences for each of the attributes (such as side effects, cost and convenience and
107 the cosmetic aspect of keeping the breast) by using a conjoint analysis technique. It offers an
108 interactive, digital, online interface such that the decision making process can happen without
109 requiring excessive time involvement from the physician. Yet, it is designed to be at the level of
110 quality that is necessary for the patient to understand her treatment options, assess her decision
111 making criteria (attributes), be guided on what her underlying decision making values or risk
112 preferences are, and ultimately lead to a treatment decision that makes her feel comfortable,
113 reassured, and empowered. Finally, the proposed trial of the Navya Patient Preference Tool
114 (PPT) is designed to study the influence of family role, gender role, and autonomy in decision
115 making to better inform who would be the best consumer of this decision aid (patient vs. patient
116 and key family member). In the Indian context, for decisions in breast cancer, the woman patient
117 and her key family member (who is likely to be a male family member such as husband, father
118 or son) are studied.

119 Hypothesis

120 1. The online survey i.e Navya PPT (patient preference tool) (decision making aid) will reduce
121 the “decisional conflict index” (DCI) of patients diagnosed with early breast cancer while
122 choosing between mastectomy and breast conservation.

123 2. Participation of a woman’s self-identified key family member will reduce decisional conflict,
124 especially in women highly embedded in the family, with traditional gender identity or limited
125 sense of autonomy.

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127 Objectives

128 The proposed randomized control trial will study the use of the Navya Patient Preference Tool
129 (Navya PPT) in the above mentioned scenario in which women with early breast cancer are
130 confronted with the equivocal choice of Breast Conservation Therapy (BCT) or Mastectomy. In
131 this scenario, patient preference matters; and therefore the effectiveness of the Navya Patient
132 Preference Tool (Navya PPT) will be studied. This trial will test the following two hypotheses:

133 Primary objective

134 To study the change in Decisional Conflict Index (DCI) of women undergoing surgery for
135 primary, operable breast cancer after administering a decision making tool which is the Navya
136 Patient Preference Tool (PPT)

137 Secondary objectives

138 1) To study its effect on clinical outcomes such as patient satisfaction rate, breast conservation
139 rate

140 2) To study the concordance with Navya's PPT, concordance with physician's recommendation,
141 and follow through of decision by patient

142 3) To study the effect of Navya PPT on clinical outcome and DCI stratified by their Autonomy
143 Preference Index (API), by Traditional Egalitarian Gender Role (TEGR) and by Family
144 embeddedness

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148 **Exhibit-** A version of the Navya Patient Preference Tool is attached which includes,

149 1) **Online Conjoint survey-** a version of the questions presented in a survey format by the
150 Sawtooth Software that uses the conjoint analysis technique to determine the survey takers
151 values for each of the attributes represented by the survey questions

152 2) **Research questionnaire-** the questions to determine a patient's autonomy and her and her
153 key family member's behavioral attributes and influences in decision making

154 The survey as well as the Research questionnaire has been translated in Hindi and Marathi,
155 which are also attached.

156

157 Methodology

158 The proposed trial is a randomized controlled trial. Patients will be randomized into 3 arms.

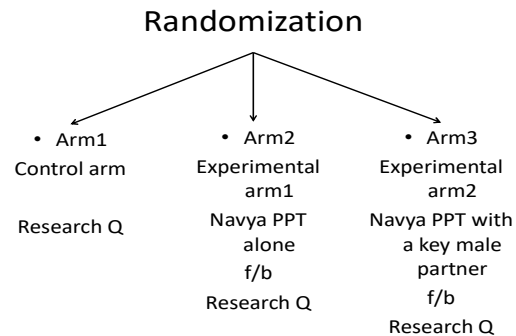
159 1) **Arm 1-** Control arm- Usual care- where the patient will be explained pertinent points
160 regarding her choices of breast conservation and mastectomy for the surgical management of
161 her breast cancer, by the treating doctors.

162 2) **Arm 2-** Experimental arm1- women will be asked to take the online conjoint analysis based
163 decision aid (which is the Navya PPT) alone.

164 3) **Arm 3-** Experimental arm 2- women will take the online conjoint analysis based decision aid
165 with a self-identified key family member.

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167 *We have conducted a pilot study where 15-20 individuals (health care professionals and*
168 *patients) have answered the survey and they were able to understand the questionnaire. Also to*
169 *validate the internal consistencies, an analysis will be carried out at the end of 50 patients*
170 *being recruited.*

171 All women in all three arms will be given a research questionnaire to calculate their “decisional
172 conflict index” and understand other aspects such as “autonomy preference index” or
173 “traditional gender role”.

174

175 **Eligibility**

176 **Inclusion Criteria**

- 177 1. Women with histologically proven breast cancer (by core biopsy/FNAC/excision
178 biopsy)
- 179 2. Upfront operable cT1,T2 N0 breast cancer
- 180 3. Eligible for Breast Conservation (absence of multicentricity, or extensive
181 microcalcifications in mammogram), as deemed at surgical planning evaluation of the
182 patient after complete diagnostic data is gathered
- 183 4. Written, informed consent

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184 **Exclusion criteria**

- 185 1. Patients under 18 of years of age
- 186 2. Patients who are pregnant
- 187 3. Patients who cannot comprehend the questionnaire due to psychiatric illness or inability
- 188 to understand the study consent

189

190 **Sample Size and Power Estimates**

191 A moderate Cohen's effect size of 0.2-0.5 has been validated in published literature as a
192 meaningful difference between control and intervention group.¹¹

193 With a power of 80% and a 2-sided alpha of 0.01 (to allow for correction for multiple
194 comparisons), to detect a difference on 0.25 (effect size, Cohen's d) in the DCI, with
195 randomization into 3 arms, the sample size would be a total of 228 patients (F test- ANOVA,
196 fixed effects). To compensate for loss of data and patients, we would include 85 patients in each
197 arm making a total of 255 patients. Randomization will be done centrally using block-
198 randomization.

199 Patients will be randomly assigned to either control arm- usual care (only the research
200 questionnaire will be administered to calculate the DCI) or experimental arm 1- Navya PPT on
201 their own or experimental arm 2- Navya PPT with a self-identified key family member, using
202 stratified block randomization with varying block sizes (two and four). Stratification factors
203 will include patients' socio-economic status which will be calculated using the Kuppuswamy
204 index (16 and above versus 15 and below), age (<50 versus above 50) and educational
205 qualification ($\leq 12^{\text{th}}$, graduation & above).

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208 Data Analysis and Outcome Measures

209 **Outcome Variables:** The primary outcome is the Decisional Conflict Index (DCI). Secondary
210 outcomes are Patient Satisfaction Scale, Rate of BCT Vs Mastectomy, Concordance with Navya
211 Patient Preference Tool, Concordance with Physician, Follow through with Decision
212 (Compliance).

213 **Study/Independent Variables:** Demographic Screen, Conjoint Analysis (utilities and
214 importance of the patient's preference), Autonomy Preference Index (API), Gender Role Index
215 (Traditional Egalitarian Gender Role (TEGR), Appearance Scale, Care-giving Scale, Resiliency
216 Scale)

217 Sawtooth Software uses Adaptive Conjoint Analysis methodology to measure/rank the
218 importance of each attribute (Side Effects, Breast Retention, Local Recurrence, Cost/
219 Convenience of Treatment) in decision making. This is interpreted as patient's preference for
220 BCT or Mastectomy.

221 Gender Role Index will be analyzed using a multivariate linear regression model to assess
222 relationships between Gender Role, Intervention (Woman vs Joint) and Decisional Conflict.

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258

259

260 Kuppuswamy socio-economic status scale calculation

261 For ease of stratification, we have clubbed <16 (middle/lower middle, lower/upper lower and
262 lower) and \geq 16 (upper, upper middle) as 2 categories. Please find the table provided below
263 for the reference.

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(A) Education Score				
1	Profession or Honours	7		
2	Graduate or post graduate	6		
3	Intermediate or post high school diploma	5		
4	High school certificate	4		
5	Middle school certificate	3		
6	Primary school certificate	2		
7	Illiterate	1		
(B) Occupation Score				
1	Profession	10		
2	Semi-Profession	6		
3	Clerical, Shop-owner, Farmer	5		
4	Skilled worker	4		
5	Semi-skilled worker	3		
6	Unskilled worker	2		
7	Unemployed	1		
(C) Monthly family income in Rs		Score	Modified for 1998 ² in Rs	Modified for 2012 in Rs
1	≥ 2000	12	≥ 13500	≥ 32050
2	1000-1999	10	8750 - 13499	16020 – 32049
3	750-999	6	6050 - 8749	12020 – 16019
4	500-749	4	3375 - 6049	8010 – 12019
5	300-499	3	2025 - 3374	4810 – 8009
6	101-299	2	875 - 2024	1601 – 4809
7	≤ 100	1	≤ 875	≤ 1600
Total Score	Socioeconomic class			
26-28	Upper (I)			
16-25	Upper Middle (II)			
11-15	Middle/Lower middle (III)			
6-10	Lower/Upper lower (IV)			
<5	Lower (V)			