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The Societal Cost Impact of Oncotype DX® Testing in an Irish Healthcare Setting

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BACKGROUND

- Breast cancer (BC) is the most-commonly diagnosed female cancer with over 3500 cases diagnosed in Ireland annually.[1]
- The treatment landscape of hormone receptor-positive (HR+) HER2-negative (HER2-) BC is evolving, with a reduction in chemotherapy use because of Oncotype DX Breast Recurrence Score® testing.
- Our previous studies have identified a **reduction in the use of chemotherapy of over 70%** in node-negative (N0) and **over 50%** in patients with 1-3 lymph nodes positive (N1).[2,3]
- This has substantial direct economic benefits for the third-party payer, and for the patient in the avoidance of chemotherapy.
- An area which is often overlooked is the **considerable societal costs** that are associated with chemotherapy, and there is a paucity of studies that have included an evaluation of these costs for early-stage breast cancer.
- These costs include **lost productivity** due to work absence, **caregiver** productivity losses, and **out-of-pocket expenses**.
- The objective of this study was to examine the societal cost implications of Oncotype DX® testing in N1 patients at a national level in 5 Irish cancer centres over an 11-year period.

METHODS

- From March 2011 to October 2022, a retrospective, cross-sectional observational study was performed of HR+, HER2-, N1 pts who had Oncotype DX® testing across five of Ireland's cancer centres.
- A survey of Irish Breast Oncologists provided the assumption that all patients in our study with N1 disease who underwent Oncotype DX® testing would be recommended adjuvant chemotherapy without testing.
- Data were collected via electronic records and clinical chart review.
- This study is registered with and approved by the Clinical Audit Committee at St Vincent's University Hospital, Dublin 4, Ireland, and has been approved by the Clinical Audit Committees at each hospital site.
- The economic analysis was adjusted for changing costs over the study time-period.
- The societal costs of chemotherapy were based on UK cost-estimates from a report published by Parsekar *et al.* from the University of East Anglia.[4]
- This model incorporated an incidence-based-cost-of-illness model and interviews with stakeholders.

RESULTS

Baseline Characteristics

Table 1: Clinical characteristics and treatment received by RS

IDC,invasive ductal carcinoma; ILC,invasive lobular carcinoma; LN,lymph node; BCS,breast conserving surgery; RT,radiotherapy; CT,chemotherapy

	Total	RS 0-13 n (%)	RS 14-25 n (%)	RS >25 n (%)
Histology				
IDC	639	236 (37)	305 (48)	98 (15)
ILC	121	50 (41)	67 (56)	4 (3)
Mixed	34	18 (53)	13 (38)	3 (9)
Other	34	15 (44)	11 (32)	8 (24)
Grade				
1	92	52 (57)	39 (42)	1 (1)
2	530	226 (43)	263 (49)	41 (8)
3	206	41 (20)	94 (46)	71 (34)
LN Status				
Micromets	277	110 (40)	121 (44)	46 (16)
1 LN	378	135 (36)	199 (53)	44 (11)
2 LN	126	54 (33)	56 (44)	16 (13)
3 LN	47	20 (42.5)	20 (42.5)	7 (15)
AJCC staging				
IB	129	59 (46)	49 (38)	21 (16)
IIA	312	111 (36)	163 (52)	38 (12)
IIB	339	132 (39)	159 (47)	48 (14)
IIIA	48	17 (34)	25 (52)	6 (14)
Surgery				
BCS	561	203 (36)	279 (50)	79 (14)
Mastectomy	267	116 (43)	117 (44)	34 (13)
RT received	730	270 (37)	359 (49)	101 (14)
CT received	328	46 (14)	181 (55)	101 (31)

- A total of **828 patients** with HR+, HER2- breast cancer underwent Oncotype DX® testing and were suitable for inclusion in this analysis.
- The mean age was **58 years** (range 22-81).
- 171 patients (21%) were <50 years at diagnosis, and 657 (79%) were ≥50 years.
- With the use of Oncotype DX® testing **60% of patients avoided chemotherapy**. As previously published, this resulted in **savings of over €6 million in treatment costs**, leading to net savings of over €3.3 million euro when the assay cost was deducted.
- 607 patients (73%) were <65 years (national retirement age in Ireland) and 328 (54%) of these patients avoided chemotherapy
- For this analysis, we estimated potential societal costs per patient with early-stage breast cancer undergoing chemotherapy to be **€43,628** (Table 2)

Cost Analysis

Table 2: Societal cost calculation per patient

Parameter	Cost
Lost Productivity	
Long term work absence	€38,450
Short term work absence	€4,008
Lost productivity for caregivers	€1,170
Total	**€43,628**
Out of pocket (OOP) expenses	€1,287
Total including OOP expenses	**€44,915**

RESULTS

Productivity Losses

€21,229,500

This includes:
- Long term absence and ability to return to work
- Reduced working hours
- Short term sick leave
- Changed employment status (e.g., early retirement)

Caregiver costs

€585,125

This includes:
- Costed using weighted median hourly wage
- Distribution of wage types was used

The average time spent caring is 2 hours per week[5]

Out of Pocket Expenses

€643,500

This includes:
- Travel to/from appointments
- Parking
- OTC medications
- Dietary Supplements
- Private homecare
- Wigs, hairpieces
- Fabric supports
- Clothing
- OOP costs likely under-reported

€22,458,125 estimated total societal cost savings

CONCLUSIONS & FUTURE DIRECTIONS

- Societal costs are often overlooked as they are not as easily calculated as direct costs, however, it is evident that chemotherapy use carries considerable indirect costs for society.
- These wider costs alongside a comprehensive consideration of benefits and harms should be incorporated when deciding on a patient's treatment paradigm.
- The use of Oncotype DX® testing in N1 patients has led to an estimated societal cost saving of over **22 million euro** across 5 of Ireland's oncology centres for the period of our study.

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