Feasibility Study for Patient Journey Mapping for Ovarian Cancer Using Electronic Health Record Data

RWD94

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Background and Objectives

- Understanding a patient journey is essential for patients' decision-making and improvement in the care process for better patient outcomes.
- Electronic Health Record (EHR) is a promising data source reflecting diverse treatment pathways in oncology.
- However, in Japan, EHR is still underutilized for secondary use due to the complexity of quantitative analysis (e.g., unstructured and unstandardized data).
- This study aimed to clarify how the patient journey of ovarian cancer (OC) can be visualized by extracting and analyzing EHR information.

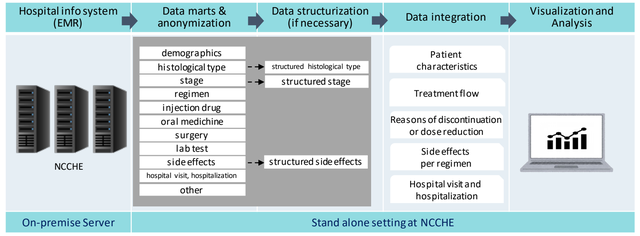
Methods

Data Source

- Patients with a definite diagnosis of OC between May 2013 and October 2020 at NCCHE in Japan were identified using EHR.
- Informed consent was obtained in the form of opt-out on the website of NCCHE according to Ethical Guidelines for Medical and Health Research Involving Human Subjects.

National Cancer Center Hospital East (NCCHE)

Beds: 425. **Outpatient visits (2021): first**, 10,001; **return**, 309,484. **Clinical trials (CT):** 720 and 190 patients were enrolled in 411 company sponsored CT and 59 investigator-initiated CT, respectively.



Population

- 574 female patients with a definitive diagnosis of OC (defined based on ICD-10) were specified and classified into three groups (see details in Figure 1):
  - visit with treatment (n=185),
  - only visit for medical examination, including second opinion without treatment (n=359), or
  - participation in clinical trials (n=30).
- Of 96 patients with a visit for treatment, including surgery and/or chemotherapy, 85 patients who started any treatment for OC as first line before the end of May 2020 were further analyzed.

Analysis

- Hospital visits and duration(days) for pre, during, and post-treatment and the number of lines of therapy were summarized as a patient journey with their mean (SD) and median (Q1 – Q3).
- Patient characteristics and toxicity were summarized as the frequency with percentage.
- Longitudinal treatment pathway and first line treatment were visualized using Sankey diagram.

Results

- The entire patient journey captured that 60% of the patients who visited NCCHE only for second opinion or examination and 40% of the patients who received treatment with a variety of visits/duration for treatment (Figure 1).
- Two-thirds of the patients who received first line treatment was sixty years or older (Table 1).
- As a longitudinal treatment sequence, patients received paclitaxel and carboplatin combination (TC) therapy such as TC and dose-dense (dd) weekly TC regimen for first line treatment. Gemcitabine, Doxorubicin, and Topotecan were additional options for recurrent OC (Figure 2).
- During the first line treatment, the Sankey diagram revealed the changes in initial regimen or early discontinuation in 47% and 25% of the patients by the end of six cycles of TC and dd weekly TC regimen, respectively (Figure 3). Also, 22% and 60% of patients experienced dose reduction in both regimens (Data not shown).
- The three most frequent any grade adverse events during first line treatment were peripheral sensory neuropathy (12.9%); malaise (11.8%); nausea and anorexia (10.6%) as non-hematologic toxicity, and hemoglobin decreased (95.3%); neutrophil decreased (89.4%); ALT increased (77.6%) as hematologic toxicity based on blood testing (Table 2).

Figure 1. Entire patient journey for patients with a definitive diagnosis of OC at NCCHE

Visited NCCHE with a definitive diagnosis of OC (from May 2013 to Oct 2020) N=574

Visit with treatment N = 185

	From initial to last visit	
	Visits	Days
Mean (SD)	41.9 (31.5)	747.8 (731.5)
Median(Q1-Q3)	33 (17-58)	509 (206-946)

Only visit for medical examination, including second opinion without treatment N = 359

	From initial to last visit	
	Visits	Days
Mean (SD)	3.8 (7.6)	216.4 (463.6)
Median(Q1-Q3)	2 (1-3)	2 (1-157.3)

Participated in clinical trials N = 30

Treatment for OC at NCCHE N= 135

Started from first line treatment N=96

	From initial visit to first line treatment		First line treatment† Duration		Surgery (n=44)	Chemotherapy†	From end of first line treatment to last visit†	
	Visits	Days	Visits	Days	Hospitalization days	Total lines	Visits	Days
Mean (SD)	8.3 (13.0)	154.6 (466.8)	20.0 (11.8)	145.9 (71.9)	22.4 (15.5)	1.5 (0.9)	22.4 (22.2)	397.3 (440.3)
Median(Q1-Q3)	5 (3-8)	25 (14-40)	18 (10-27)	148 (115-183)	17.5 (13 -24)	1 (1-2)	14 (8-29)	281 (85-532)

†: 85 patients started treatment by the end of May 2020

Started from treatment of recurrent OC N=20

	From initial visit to initial chemotherapy at NCCHE		From initial to end of last chemotherapy		Chemotherapy	From end of last chemotherapy to last visit	
	Visits	Days	Visits	Days	Total lines	Visits	Days
Mean (SD)	8.6 (14.0)	151.1 (274.8)	26.2 (24.5)	283.9 (318.8)	1.5 (0.7)	9.9 (10.2)	136.6 (232.2)
Median(Q1-Q3)	3.5 (2-7)	20.5 (14–119.5)	22.5 (4-38)	126 (30.4-430.8)	1 (1-2)	6 (3-13)	54 (21.7-107.1)

Surgery only N = 19

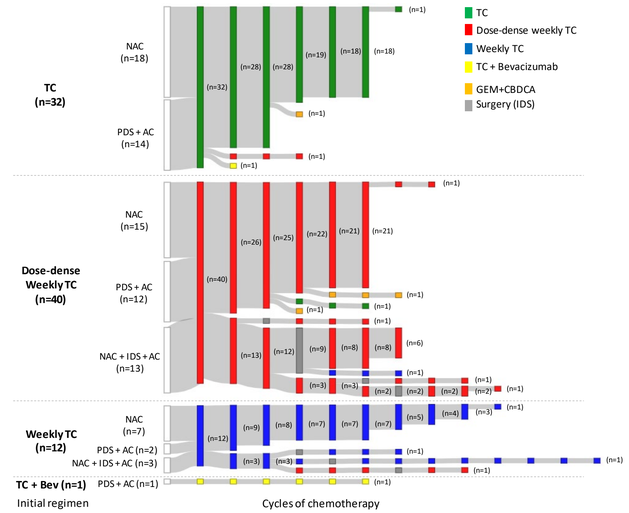
	From initial visit to surgery		Surgery§	From surgery to last observation§	
	Visits	Days	Hospitalization days	Visits	Days
Mean (SD)	18.9 (37.1)	448.6 (851.2)	11.7 (11.2)	14.9 (20.5)	350.1 (234.2)
Median(Q1-Q3)	5 (4-11)	31 (17-45)	11 (9-12.8)	10.5 (5-12)	284.5 (195-570)

§ : 14 patients underwent surgery by the end of May 2020

Treatment only for other cancer n= 50 (e.g., Breast cancer, colon cancer, gallbladder cancer)

	From initial visit to initiation of treatment		From initiation of treatment to last observation	
	Visits	Days	Visits	Days
Mean (SD)	6.3 (3.9)	126.9 (336.2)	33.2 (28.4)	901.7 (831.1)
Median(Q1-Q3)	6 (3-8)	41.5 (27-75)	23 (13-38)	555 (219-1400)

Figure3. Cycles of chemotherapy and timing of surgery during first line treatment (n=85)

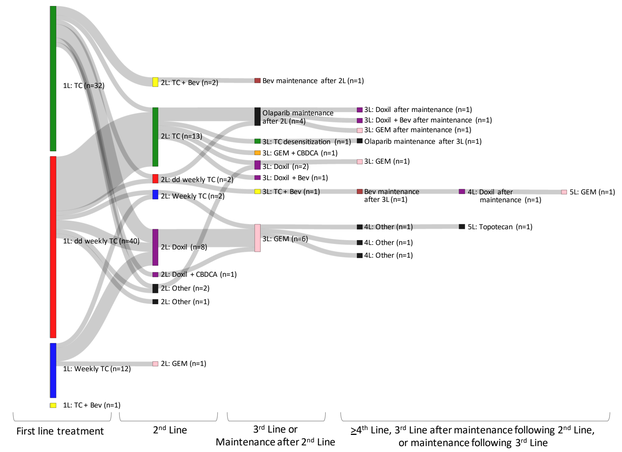


NAC: Neoadjuvant chemotherapy. AC: Adjuvant chemotherapy. PDS: Primary debulking surgery. IDS: Interval debulking surgery.

Table1. Patient characteristics (first line treatment, n=85)

	n	%
Age at the initiation of first line treatment		
<30	1	1%
30 - 39	3	4%
40 - 49	9	11%
50 - 59	16	19%
60 - 69	24	28%
70 - 79	21	25%
>=80	11	13%
Primary tumor site		
Ovarian	73	86%
Peritoneal	12	14%
Histological type		
High-grade serous carcinoma	16	19%
Low-grade serous carcinoma	2	2%
Serous (no grade specified) carcinoma	10	12%
Clear cell carcinoma	7	8%
Mucinous carcinoma	3	4%
Endometrioid carcinoma	4	5%
Not specified	43	51%
Stage		
I	10	12%
II	0	0%
III	9	11%
IV	2	2%
Not specified	64	75%
Performance status		
0	26	31%
1	9	11%
2	5	6%
3	1	1%
Not specified	44	52%
Timing of Surgery		
Primary debulking	29	34%
Interval debulking	15	18%
No operation at NCCHE	41	48%
Medical history		
Neoplasm	23	27%
Endocrine, nutritional and metabolic diseases	31	36%
Diseases of the circulatory system	29	34%
Diseases of the digestive system	25	29%
Mental and behavioral disorders	4	5%

Figure2. Longitudinal treatment sequence of chemotherapy among the patients who received first line treatment (n=85)



Definition of regimens for chemotherapy

Regimen	Paclitaxel	Carboplatin (CBDCA)	Bevacizumab (BV)	Gemcitabine (GEM)	Doxorubicin (Doxil)
TC	day1, q3w	day1, q3w	–	–	–
Weekly TC	day1, qw	day1, qw	–	–	–
Dose-dense(dd) weekly TC	day1,day8,day15; q3w	day1, q3w	–	–	–
TC + BV	day1, q3w	day1, q3w	day1, q3w	–	–
GEM + CBDCA	–	day1, q3w	–	day1,day8; q3w	–
Doxil + CBDCA	–	day1, q4w	–	–	day1, q4w

Table2. Toxicity during first line treatment (n=85)

	n	%
Non-hematologic toxicity (Top 10)		
Peripheral sensory neuropathy	11	12.9%
Malaise	10	11.8%
Nausea	9	10.6%
Anorexia	9	10.6%
Alopecia	8	9.4%
Constipation	5	5.9%
Diarrhea	4	4.7%
Pain	4	4.7%
Stomatitis	3	3.5%
Myalgia	3	3.5%
Hematologic toxicity based on blood testing		
Neutrophil decreased	76	89.4%
Hemoglobin decreased	81	95.3%
Platelet decreased	58	68.2%
ALT increased	66	77.6%
AST increased	53	62.4%
Creatinine increased	22	25.9%

Conclusions

- The less frequent toxicity compared with previous clinical trials[1,2] might be due to longer monitoring intervals in daily practice.
- The patient journey of OC revealed the wide range of visits and duration for examination and treatment, including surgery and chemotherapy.
- Patient-level analysis visualized the diverse longitudinal treatment sequence and first line treatment. Further detailed analysis of factors associated with the diversity may improve the patients care and treatment outcomes.
- To achieve more comprehensive and generalized view of patient journeys, further research needs to apply the developed approaches to more hospitals and encompass more information from multiple sources besides EHR.
- Hence, there is a growing need for data standardization techniques and secure analytical environments.

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Reference:

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