Conflict of Interest

Study results presented in these slides are from a non-sponsored project that was performed via a research collaboration between Cytel Inc. and Guardian Research Network. Rachel Knapp and Fraence Hardtstock are employees of Cytel and have no conflicts of interest to declare. Thomas Wilke participated in this study as a member of IPAM e.V. and has received honoraria from several pharmaceutical/ consultancy companies, e.g., GSK, Bayer, AstraZeneca, NovoNordisk, Boehringer Ingelheim, AbbVie, and Roche. Andrea McCracken, Charlie Hurmiz and Brant Boner participated in this study as members of Guardian Research Network and have no conflicts of interest to declare.

Evaluating the impact of COVID-19 on the diagnosis and staging of new breast cancer cases: a retrospective analysis of medical chart data from the United States

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ISPOR 2022 ***Studies on COVID-19 Healthcare Impacts***

Gaylord National Resort & Convention Center
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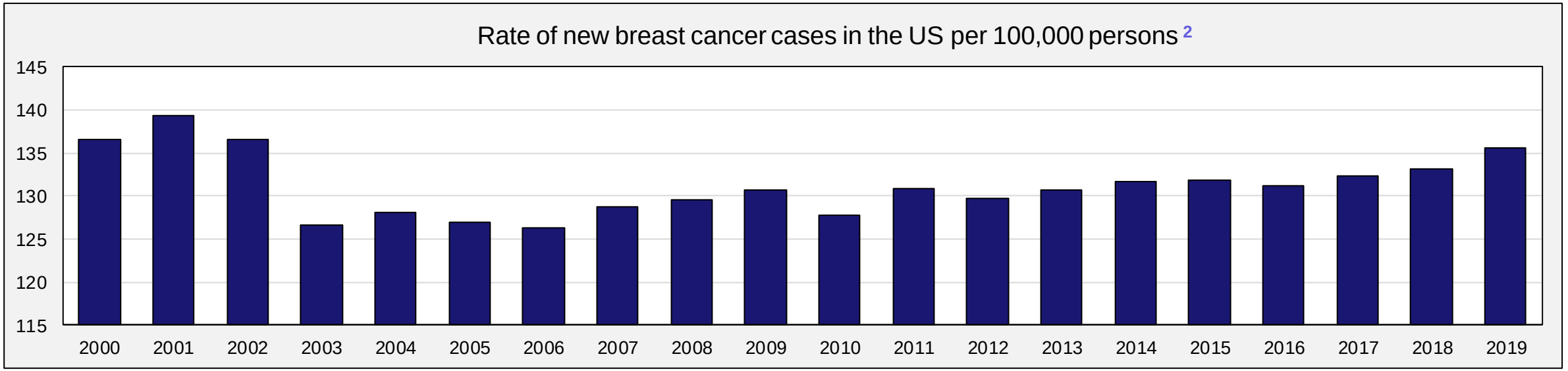
Breast Cancer Overview

Contextualizing the global burden of breast cancer and its diagnosis



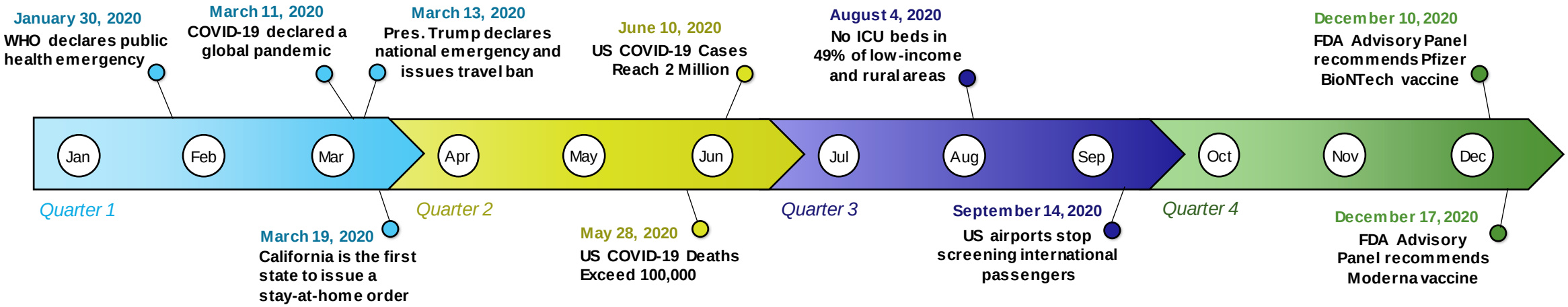
- Breast cancer is the **most common form of cancer globally**, accounting for approximately 11.7% of all new cancer diagnoses in 2020, and the **highest number of cancer-related deaths in women** worldwide.[1]
- In 2019, there were an estimated **3,771,795 women** in the United States (US) living with breast cancer.[2]
- Around **12.9% of women in the US** will be diagnosed with breast cancer during their lifetime.[2]
- Despite this, over the past 20 years, the 5-year relative survival rate among breast cancer patients in the US has continued to increase, largely due to **therapeutic developments and the availability of new targeted treatments**.

[1] Global Cancer Observatory. GLOBOCAN 2020. Accessed 04.12.2022
[2] National Institutes of Health; National Cancer Institute. Surveillance, Epidemiology, and End Results Program. Cancer stat facts: female breast cancer. https://seer.cancer.gov/statfacts/html/breast.html. Accessed 12.04.2022

An evolving global climate:

Healthcare capacity constraints & the COVID-19 global pandemic

- During the initial stages of the COVID-19 global pandemic, hospitals throughout the US and the rest of the world faced an influx of patients, resulting in a **shortage of healthcare workers**, **hospital beds**, **ventilators** and **personal protective equipment**.
- Due to the **concentration of critically ill patients in emergency rooms**, the world observed an **unprecedented trend towards task-shifting in the healthcare field**, aimed at reducing the burden on emergency care facilities, which lacked the necessary personnel and equipment to respond to the crisis.



AJMC (2021). "A Timeline of COVID-19 Developments in 2020." 2022, from https://www.ajmc.com/view/a-timeline-of-covid19-developments-in-2020.

Feeling sick? Stay at home!

Questions regarding the potential impact of stay-at-home measures on the diagnosis and staging of breast cancer in the United States during the early stages of the COVID-19 global pandemic

CONTEXTUAL OVERVIEW:

According to the Centers for Disease Control (CDC), **42 US states and territories issued mandatory stay-at-home orders** from March 1-May 31, 2020, implicating **73% of US counties**. Alaska was the first state to rescind a stay-at-home order on **April 24.**

RESEARCH QUESTION:

How have the COVID-19 global pandemic and resultant lockdown measures impacted the **diagnosis**, **setting,** and **staging** of breast cancer diagnoses in the US?

HYPOTHESIS:

We hypothesized that COVID-19 would have a **negative impact on the willingness of undiagnosed patients to seek care for potential cancer symptoms**, translating to lower levels of diagnostic testing within the general population, fewer diagnoses overall, and delayed cancer diagnoses with advanced staging.

Moreland A, Herlihy C, Tynan MA, et al. Timing of State and Territorial COVID-19 Stay-at-Home Orders and Changes in Population Movement — United States, March 1–May 31, 2020. MMWR Morb Mortal Wkly Rep 2020;69:1198–1203. DOI: http://dx.doi.org/10.15585/mmwr.mm6935a2external icon

Methodological Overview

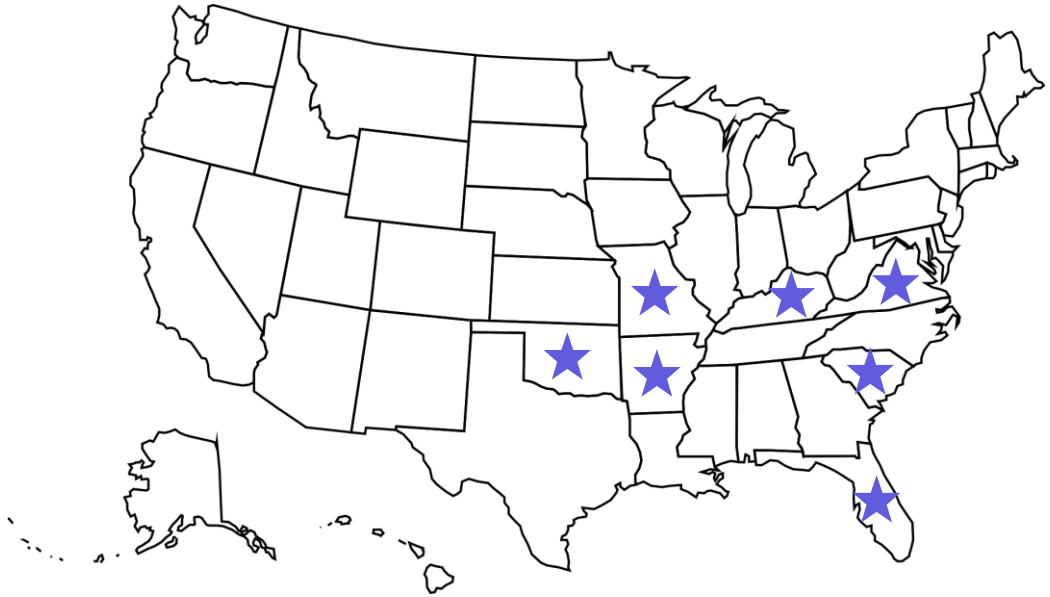
Study design and data source

STUDY DESIGN:

We conducted a retrospective analysis of medical chart data provided by **Guardian Research Network** (GRN), featuring records for **oncology patients** from **seven states in the southern US** (e.g., SC, VA, KY, FL, MO, OK, AR).

DATA SOURCE:

- GRN is a non-profit nationwide consortium of regional community health systems with experienced cancer research programs. The oncology database used in this study features data from over **2 million patients** with **21 different types of cancer.**
- The oncology database includes comprehensive data on **patient demographics**, **clinical characteristics**, **longitudinal treatments**, **surgery**, **radiation** and other procedures.

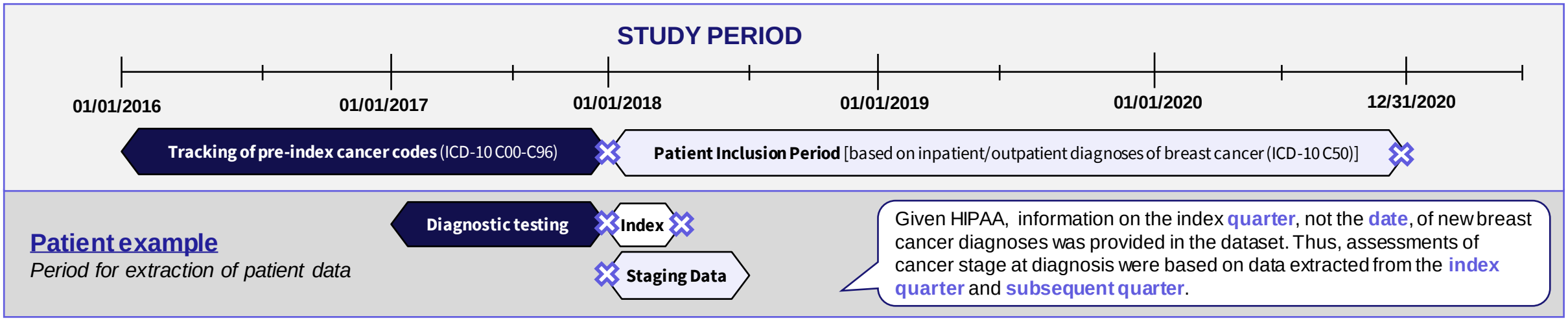


Methodological Overview

Study period, patient identification and primary outcomes

PATIENT IDENTIFICATION:

- GRN extracted data for patients with **incident breast cancer diagnoses** that received an inpatient/outpatient breast cancer code (**ICD-10 C50**) from **01/01/2018-12/31/2020**.
- Patients with pre-existing cancer diagnoses (**ICD-10 C00-C96**) recorded within two years of the incident breast cancer code were excluded.



REPORTED OUTCOMES:

Number, setting and staging of new breast cancer diagnoses reported quarterly from 2018-2020 and patient characteristics (e.g., age, sex)

Methodological Overview

Summary of breast cancer staging assessments

- AJCC cancer stage was delineated based on TNM measurements according to the National Comprehensive Cancer Network (NCCN) guidelines.
- Patients with an ICD-10 C77 code (and no C78/C79 codes) were allocated to the **Stage II or III category**, while patients with a C78 and/or C79 codes were allocated to the **Stage IV category**.
- The **most recent measurements** of staging data during the index and subsequent quarter were considered in the analysis.
- Where multiple readings were available, **AJCC staging assessments were given precedence** over other variables, followed by TNM codes.

Triangulation of Cancer Staging Information	
AJCC Anatomic Stage Groups	**Stages:** 0, IA, IB, IIA, IIB, IIIA, IIIB, IIIC, IV
TNM Readings	**Tumor:** T_0, T_1, T_2, T_3, T_4 **Node:** N_0, N_1, N_2, N_3, N_X **Metastasis:** M_0, M_1, M_X
ICD-10 Codes	**C77:** Secondary and unspecified malignant neoplasm of lymph nodes **C78:** Secondary malignant neoplasm of respiratory and digestive organs **C79:** Secondary malignant neoplasm of other and unspecified sites

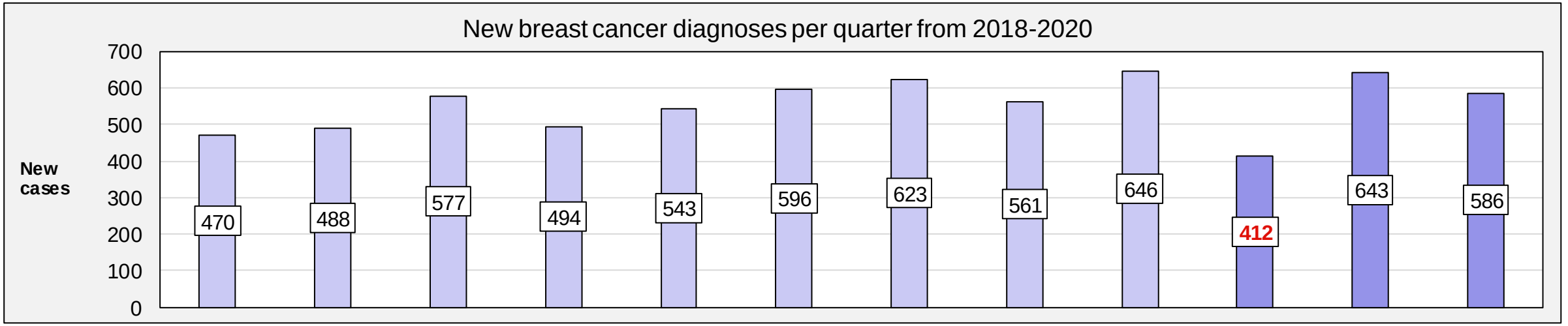
AJCC Anatomic Stage Groups

Stage 0	Tis	N0	M0	**Stage IIIA**	T0	N2	M0
Stage IA	T1	N0	M0		T1	N2	M0
Stage IB	T0	N1mi	M0		T2	N2	M0
	T1	N1mi	M0		T3	N1	M0
Stage IIA	T0	N1	M0		T3	N2	M0
	T1	N1	M0	**Stage IIIB**	T4	N0	M0
	T2	N0	M0		T4	N1	M0
Stage IIB	T2	N1	M0		T4	N2	M0
	T3	N0	M0	**Stage IIIC**	Any T	N3	M0
				Stage IV	Any T	Any N	M1

AJCC Cancer Staging Manual, Eighth Edition (2017) published by Springer International Publishing

Results

Descriptive analysis of new breast cancer diagnoses over time



Age of new cancer patients (years)	2018				2019				2020			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Mean age (at diagnosis)	61.51	62.60	64.62	62.43	63.25	62.62	62.90	62.46	62.70	62.18	63.18	62.01

- Overall, **6,639 patients** with a mean age of **62.75 years** (99.16% female) were identified.
- A drop in new diagnoses was detected during the **second quarter of 2020** (while most stay-at-home measures were active).
- Nevertheless, relatively stable numbers were observed during all other quarters in 2020 (mean: 625; range: 586-646).
- No difference in the mean age at diagnosis was observed in the months after COVID-19 began.

Results

Distribution of new breast cancer cases by diagnostic setting

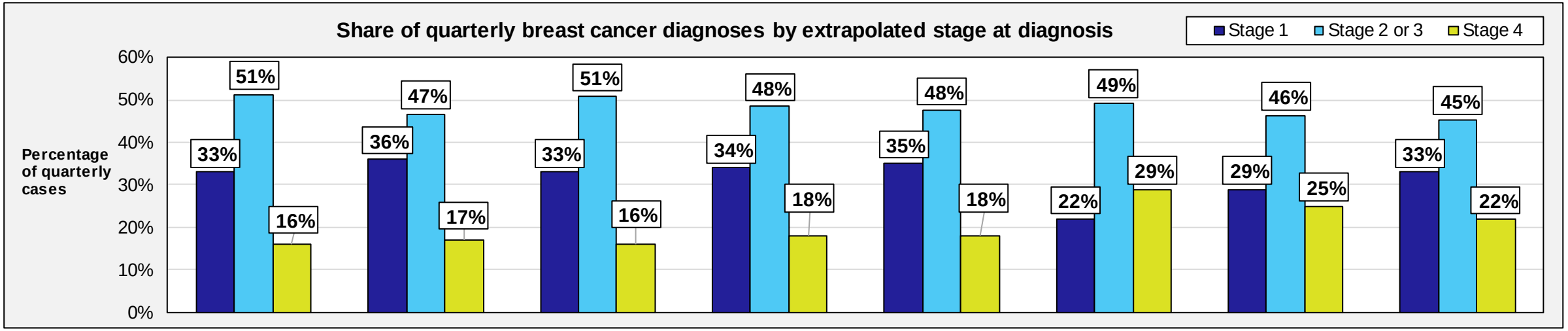
Year	Quarter	Inpatient (N)	Outpatient (N)	Inpatient (% of total)	Outpatient (% of total)
2018	Q1	353	117	75%	25%
	Q2	359	129	74%	26%
	Q3	419	158	73%	27%
	Q4	368	126	74%	26%
2019	Q1	412	131	76%	24%
	Q2	470	126	79%	21%
	Q3	499	124	80%	20%
	Q4	435	126	78%	22%
2020	Q1	517	129	80%	20%
	Q2	327	85	79%	21%
	Q3	515	128	80%	20%
	Q4	477	109	81%	19%

- No significant difference in the distribution of new diagnoses across inpatient and outpatient settings was observed when comparing data from the pre-COVID and COVID periods.
- Generally, the share of diagnoses made within outpatient settings was higher throughout 2018, than during subsequent years (2019 and 2020).

Results

Distribution of new breast cancer cases by stage at diagnosis

- A total of 587 and 491 patients from 2019 and 2020 were included in follow-up cancer staging analyses.
- The share of patients with metastatic (Stage 4) diagnoses in the index or subsequent quarter increased dramatically after the start of COVID in March 2020, while the share of stage 2/3 diagnoses remained relatively consistent.



New cases by cancer stage	2019				2020			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Stage 1	38	50	40	44	49	15	32	39
Stage 2 or 3	59	64	62	63	67	34	51	54
Stage 4	18	23	20	23	25	20	27	26

Conclusion

- The pandemic's impact on breast cancer diagnoses was particularly pronounced during the second quarter of 2020, corresponding with fewer overall cases and more severe prognoses, with potential links to delayed care and/or constricted access to healthcare services.
- Within the context of future pandemics, further measures must be taken to guarantee uninterrupted access to critical diagnostic testing and treatment, in order to ensure that patients with severe diseases receive prompt and comprehensive care during the early stages of their disease.
- Otherwise, the burden of constrained access to critical healthcare services may outweigh the benefits of pandemic-related protective measures, aimed at subduing future outbreaks.

Thank you.

For any further queries regarding this research, please feel free to reach out to Rachel Knapp via email at rachel.knapp@cytel.com