

Financial Toxicity in Cancer Care

A Systematic Review by Cancer Type
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Breast · Head & Neck · Colorectal · Prostate · Thyroid · Adolescent/Young Adult

Objectives



Explore the impact of financial toxicity on oncology care



Identify the cancer types and patient groups at risk for financial toxicity



Utilize the data to impact patient care and planning



Discuss the impact of recent industry changes on the future of drug development

What Is Financial Toxicity?

Financial Toxicity (FT): The combined objective financial burden (out-of-pocket costs, income loss, asset depletion) and subjective financial distress (worry, anxiety, behavioral changes) experienced by cancer patients as a direct result of their diagnosis and treatment.

Objective Burden

- Direct medical costs
- Surgery, chemo, radiation
- Drugs & follow-up care
- Indirect: travel, lodging

Indirect Costs

- Lost wages / income
- Reduced work hours
- Caregiver productivity loss
- Long-term earning impact

Subjective Distress

- Financial worry & anxiety
- Delayed/foregone treatment
- Reduced medication adherence
- Impaired quality of life

The Scale of the Problem

Financial toxicity affects millions of cancer patients worldwide

42%

depleted life assets within 2
years of diagnosis

38%

were financially insolvent after 4
years

3%

of survivors file for bankruptcy
within 5 years

49%

probability of financial burden
post-diagnosis

Measuring Financial Toxicity

Key validated instruments used across cancer types

COST

COMprehensive Score for Financial Toxicity

Most widely used; validated in solid tumors; covers psychosocial + material dimensions

FIT

Financial Index of Toxicity

Developed & validated specifically for head & neck cancer patients

SFDQ

Subjective Financial Distress Questionnaire

14-item; covers all 6 subdomains; validated in radiation oncology patients

FDQ

Financial Distress Questionnaire

Quick 2-item screen; financial spending subdomain only

CHE

Catastrophic Health Expenditure

Objective measure; used in LMICs and colorectal/breast studies

MEPS CSAQ

Medical Expenditure Panel Survey

National US dataset; captures employment, insurance, and spending impacts

Breast Cancer & Financial Toxicity

Global FT Rates (Meta-analysis, JAMA 2023)

35.3%

High-income
countries

78.8%

Low/middle-income
countries

Risk Factors for Higher FT

- Younger age at diagnosis
- Black or minority race/ethnicity
- Lower socioeconomic status
- Lack of insurance or underinsurance
- Advanced stage requiring multimodal treatment

Key Findings from Qualitative Evidence

Coping Emotions

Anxiety, guilt, fear, and future financial uncertainty are dominant emotional responses

Coping Behaviors

Patients reduce discretionary spending, borrow money, sell assets, or take on extra work

Treatment Avoidance

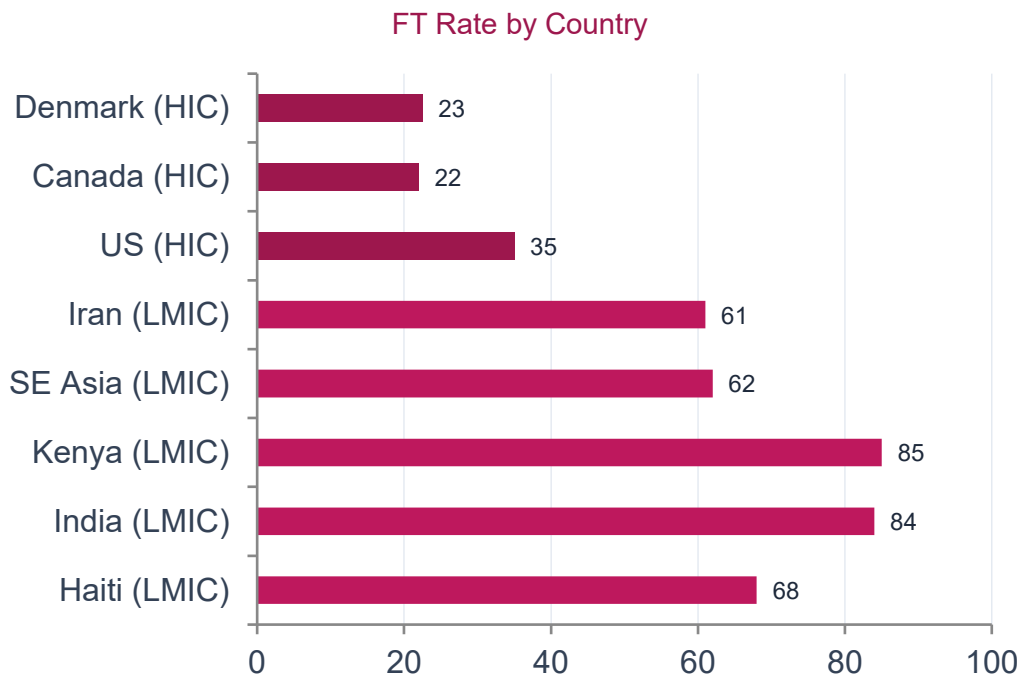
Some patients delay, modify, or discontinue treatment due to cost constraints

Unmet Needs

Insurance navigation, transparent cost info, and financial counseling are frequently requested

Breast Cancer: Economic Burden

Direct costs, employment impacts, and behavioral responses to financial stress



Economic Impact Facts

- **Global breast cancer economic cost 2020–2050: \$196.4 billion (3rd costliest)**
- **Direct medical costs can exceed \$100,000 USD per patient**
- **31.8% of US patients forgo medical care due to cost**
- **Universal health coverage associated with lower FT rates**
- **FT persists for decades after initial diagnosis**
- **Lymphedema care rarely covered by insurance, adding long-term costs**

Head & Neck Cancer & Financial Toxicity

Higher OOP costs than any other cancer type; FT worsened in the COVID era

3.9% vs 3%

Higher OOP expenses
vs other cancers

34–52%

Working patients left
job due to treatment

40–45%

High FT by FDQ
(financial spending
domain)

34%

Suffered catastrophic
health expenditure
(India)

Most Reported FT Subdomains in H&N Studies:

Financial Spending (18 studies) · Financial Resources (15 studies) · Psychosocial Affect (14 studies) · Support Seeking (10 studies) · Coping Care (3 studies) · Coping Lifestyle (3 studies)

H&N Cancer: Treatment, Prognosis & FT

Treatment & Cost Findings

Multimodality = More FT

Surgery + chemoradiation linked to highest FT; chemoradiation alone higher than surgery alone in Indian cohorts

Advanced Stage Risk

Stage III-IV and node-positive disease significantly associated with higher FT levels

OOP Cost Drivers

OOP costs include medical tests, travel, dental treatment post-radiation, drugs. 62% used savings; 25% sold property

COVID-19 Effect

Mean COST scores worsened: 21.1 pre-COVID vs 15.6 post-COVID (lower = worse)

H&N Cancer: Treatment, Prognosis & FT

Outcomes & Interventions

Survival Impact

High FT at baseline → worse overall survival AND cancer-specific survival (Ma et al.)

Quality of Life

Lower COST scores correlated with worse QoL across multiple validated measures (FACT-G, PROMIS, UW-QOL)

Financial Counseling Works

Patients without financial counseling had significantly higher financial difficulty at treatment end ($p=0.002$)

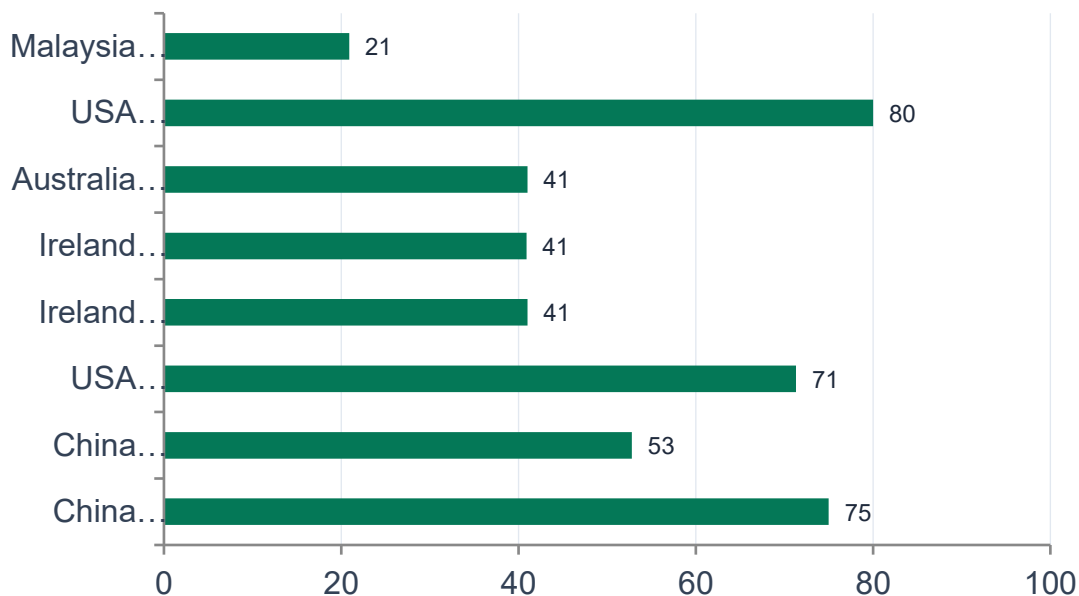
Cost Transparency Gap

25% of thyroid cancer patients not adequately informed about treatment costs; fewer than 20% discussed costs with physician

Colorectal Cancer & Financial Toxicity

#3 cancer worldwide (2 million cases/year); #2 cause of cancer death

Subjective FT Prevalence by Study



Direct Medical Costs

- Annual direct cost: \$2,045–\$10,772 USD
- Indirect costs: \$551–\$795 USD annually
- CHE: 47.8% in Malaysia; 68.5% in Iran
- US: \$4.5 billion total hospital charges/year
- China: \$8,285–\$12,205 per patient by stage
- Ireland OOP avg: €1,589 per CRC survivor
- Non-medical: \$704–\$901 per patient

Prostate Cancer: New Technology & FT

New technologies may exacerbate FT by replacing less costly but equally effective alternatives

Robotic Prostatectomy

85% of cases by 2013

OOP perioperative costs: \$2,888 (robotic) vs \$3,151 (open) at 365 days — but market pricing varies widely; largely replaced open approach without clear superiority evidence

Proton Beam Therapy

\$15K–\$25K+ out-of-pocket

61% of provider websites claimed superior disease control without scientific references — misleading marketing driving patient expectations

PSMA PET Imaging

Changed decisions in 64%

FDA-approved; shifted 24% of patients from observation to treatment. Potential for overtreatment in men with PSMA+ but conventional imaging-negative disease

Novel Oral Targeted Agents

\$3,500/month OOP

Abiraterone/enzalutamide: 2/3 of men without low-income subsidies face \$3,500/month OOP; many reach catastrophic coverage annually

Thyroid Cancer & Financial Toxicity

Fastest-growing cancer type; 98% 5-year survival yet among highest FT rates of all cancers

43%

Reported financial difficulties (n=1743)

46%

Worse psychological FT vs other cancers

9.3

Bankruptcies per 1,000 person-years

3.5x

Higher bankruptcy risk vs other cancer types

Young Age at Diagnosis

Median age 51 — predates Medicare eligibility; 80% diagnosed while still working and without government coverage

Long-Term Surveillance Burden

5+ years of follow-up visits; surveillance costs \$1,225–\$2,774/patient over 3 years by risk tier; long-term costs can reach \$900,000

High Opportunity Costs

Annual opportunity costs among highest of all cancers; 59% lost income; 74% took time away from work; 18% became unemployed

Up-front Cost Concentration

Most OOP expenses (~\$15,000) occur in year 1; thyroid surgery costs rose 38.8% over 9 years; malignant disease costs more than benign

Adolescent & Young Adult (AYA) Cancer

1.19 million AYA diagnoses globally in 2019 (ages 15–39); FT occurs during formative career years

Education

Educational attainment generally NOT impacted — AYAs complete degrees despite diagnosis

Delays occur but resilience & institutional support help; no significant difference vs cancer-free peers in most studies

Employment

SIGNIFICANT unemployment & labour market detachment — 1.3x higher unemployment risk

Brain cancer survivors at highest risk; female sex, CNS tumors, and neuropsychological late effects are key risk factors

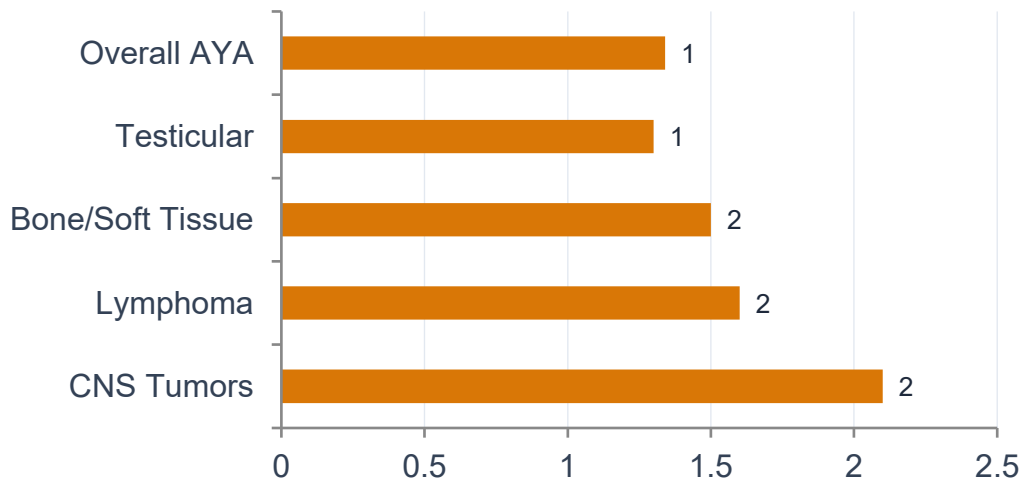
Income

LOWER earnings & greater reliance on social security benefits for income supplementation

Annual indirect income losses twice as large (\$3,645 vs \$1,828 USD); female AYAs at specific low-income risk

AYA: Risk Factors & Unique Vulnerabilities

Relative Unemployment Risk by Cancer Type



Unique AYA Challenges

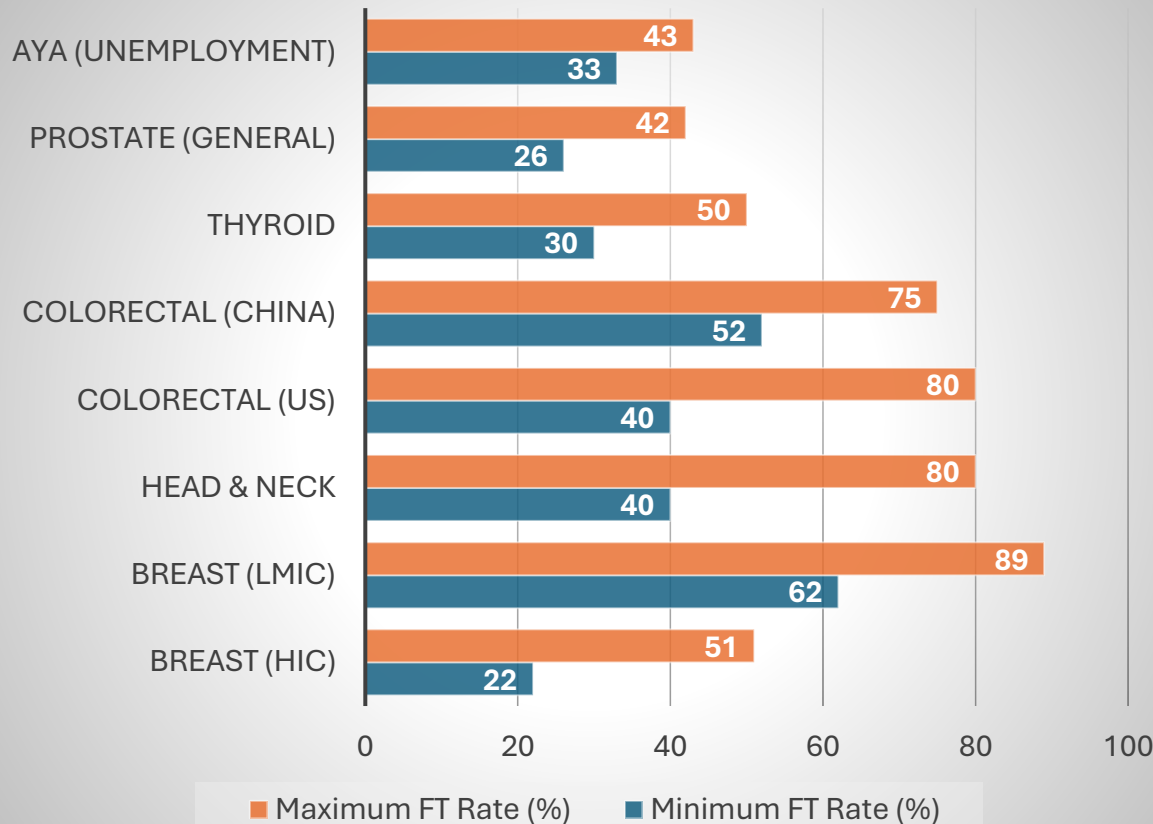
- Entry-level jobs with low security
- Educational derailment (temporary delays)
- Difficulty disclosing cancer history to employers
- 'Job lock', staying in jobs for insurance
- Lower savings, higher student debt exposure
- Decision-regret if treatment exceeds expectations
- Life transition disruption: career, family planning

Key Evidence Gap:

No studies provided age-stratified analyses within AYA survivors. Long-term longitudinal data on socioeconomic trajectories vs cancer-free peers is lacking. Most studies are of moderate-to-critical risk of bias (ROBINS-I assessment).

Comparative FT Rates Across Cancer Types

Prevalence ranges by cancer type and measurement method (selected studies)



High-Risk & Vulnerable Populations

Consistent risk factors for severe financial toxicity across cancer types

Age

Younger patients (AYA) face highest risk

Sex / Gender

Female patients consistently show higher FT risk.

Race / Ethnicity

Black, Hispanic, and minority patients f

Insurance Status

Uninsured patients have 2x the risk for financial burden.

Underinsurance is equally problematic

Income Level

LMIC patients face catastrophic health expenditure at rates of 60–85% vs 22–51% in HIC.

Poverty is a direct barrier to cancer care access and completion.

Cancer Characteristics

Advanced stage, CNS tumors, lymphomas, multimodality treatment, and presence of late effects

FT Impact on Clinical Outcomes

Financial toxicity is not merely a quality-of-life concern — it affects survival and treatment adherence

Mortality

Cancer patients who file for bankruptcy have higher all-cause mortality (Ramsey et al. 2016, n=231,596).
Thyroid cancer bankruptcy → 1.71x increase in mortality.
High H&N FT at baseline → worse overall AND cancer-specific survival.

Treatment Adherence

Patients with high FT have ~2x the odds of noncompliance with medications. 31.8% of breast cancer patients forgo medical care due to cost. 7–9% of H&N cancer patients skip follow-up visits or refuse tests.

Quality of Life

Higher FT consistently correlated with worse QoL across all cancer types (FACT-G, PROMIS, UW-QOL). FT is 3x more likely associated with depression and psychological distress. Employment loss linked to fatigue, pain interference, and worse functioning.

Treatment Modification

Patients select treatment based on financial circumstances rather than clinical optimality. Some modify follow-up schedules; others choose less effective but cheaper alternatives or delay reconstruction.

Healthcare Systems & FT Disparities

The structure of national healthcare financing significantly modulates financial toxicity

National Health Service (UK, Norway, Denmark)

Lower FT overall; employment-linked costs still present; welfare benefits available (63% applied in UK)

National Health Insurance (Canada)

Lower FT than US; OOP still present for non-covered services; 10% troubled paying costs; universal coverage protective

Mixed Public-Private (Ireland, India, Malaysia)

Wide variation (7–80%); uninsured rate 35–85%; 34% suffered CHE in India despite mixed coverage

Private Insurance (United States)

Highest FT rates in HICs (22–84%); 4–9% uninsured still incur catastrophic costs; cost-sharing, deductibles, narrow networks all contribute

Strategies to Mitigate Financial Toxicity

Evidence-based and patient-recommended approaches across cancer types

Clinical / Provider

- Integrate FT screening into routine care
- Proactively discuss costs before treatment starts
- Financial counseling referral at diagnosis, proven to reduce FT scores
- Oncology social worker and nurse navigator integration

Policy / Population

- Expand health insurance coverage and reduce cost-sharing
- Protect employment for cancer patients in treatment
- Include non-medical costs in support programs
- Universal health coverage associated with lower FT rates globally

Strategies to Mitigate Financial Toxicity

Evidence-based and patient-recommended approaches across cancer types

Institutional / Health System

- Streamline insurance reimbursement processes
- Insurance navigation services for complex cases
- Transparent cost communication before procedures
- Optimize care delivery to minimize unnecessary indirect costs

Patient-Directed

- Financial planning prior to treatment if possible
- Engage with patient advocacy and social support organizations
- Utilize online platforms for financial assistance navigation
- Insurance navigation specialists for complex claims

Research Gaps & Future Directions

Critical knowledge gaps across cancer types that require investigation

Measurement Standardization

Critical

No universal FT tool. COST most used but incomplete. Urgent need for a validated, cross-cultural standard instrument covering all 6 subdomains.

Longitudinal Studies

High

Cross-sectional studies dominate — cannot capture FT trajectories over time. Need repeated-measures designs to understand how burden evolves.

Intervention Trials

High

Very few RCTs or prospective studies testing FT mitigation strategies. Financial counseling evidence is largely observational.

Research Gaps & Future Directions

Critical knowledge gaps across cancer types that require investigation

LMIC Data Deficiency

Critical

Most evidence comes from US and Europe. Very limited data from sub-Saharan Africa, South Asia, and Latin America where FT burden is highest.

Causal Mechanisms

High

Education, employment, and income studied in isolation. Causal mediation methods needed to understand how cancer disrupts socioeconomic pathways in AYAs.

Technology-FT Linkage

Medium

Limited patient-level data on how new technologies (PSMA PET, proton therapy, robotics) change individual OOP burden — most data is payer-level.



Drivers of Cost

Cost of getting a drug to market



Drug discovery & preclinical research:

- Can take 3–20 years and cost billions, involving target identification, lead optimization, and animal testing



Clinical trials:

- Phase 1 & 2
- Phase 3:
A single drug may require multiple trials in each phase.



Regulatory approvals & post-marketing studies

- Estimated Success rates: 12% or less to FDA approval

Failed programs

Trends in Pharmaceutical Industry



Artificial Intelligence may help in

in Drug Development
in Clinical Trial Design
In supply chain
In manufacturing efficiency
In additional areas



Outsourcing Clinical Trials

Outside the United States

- Faster patient accrual
- China is the largest contractor for Clinical Trial Research

Trends in Business Development in Pharmaceutical Industry



Pharmaceutical Industry Drug Development Outside the US

China (\$55 Billion in pharma deals
in 2026 in 2 months)

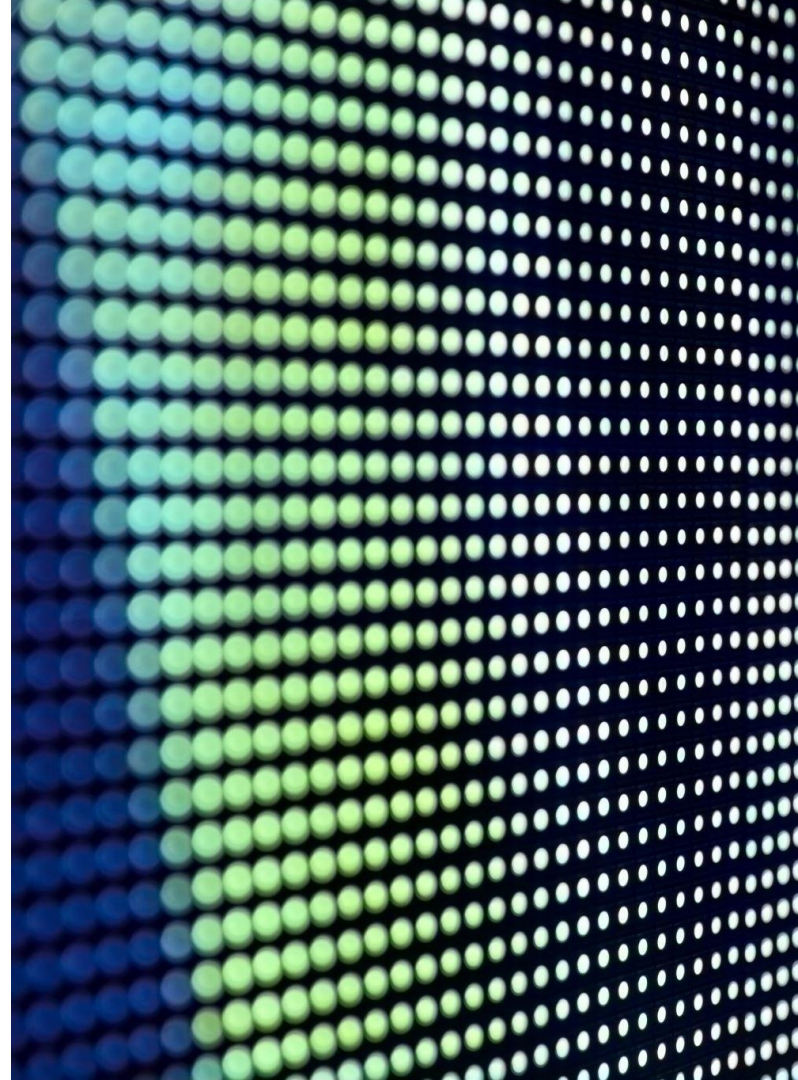
Switzerland

United Kingdom, Germany, Japan

Emerging: India, France, South
Korea



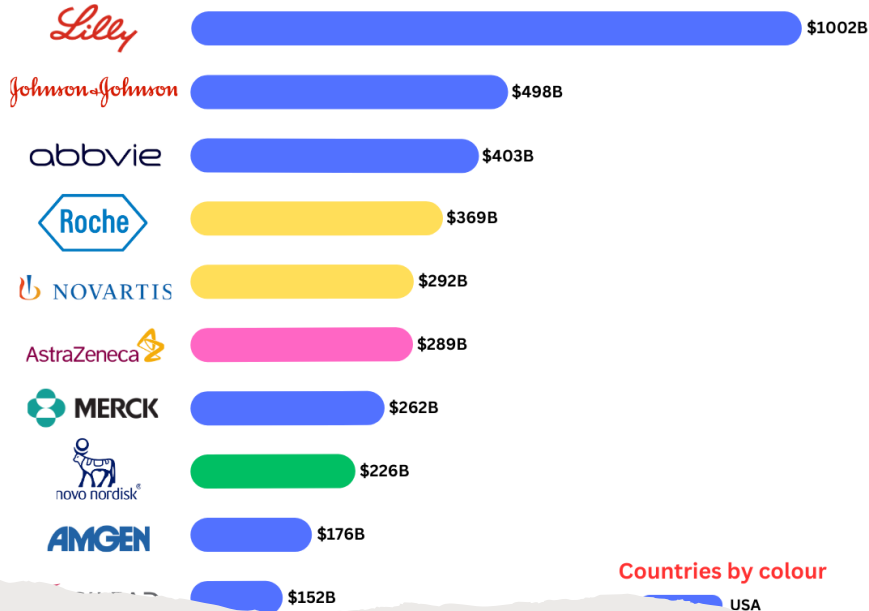
Pharma Deals in 2025 Totalled \$250 Billion



Top 10 Pharma by Market Cap in 2026

(As of January 2nd, 2026 - in USD, \$B)

Source : Capital IQ



Eli Lilly is now bigger than the next two combined

The world's ten biggest pharma and biotech companies by market cap, August 2026



Largest Pharmaceutical Companies

Drivers of the Biggest Revenue

- Oncology Products
 - PD-1 Inhibitors & MM
- GLP-1
 - Weight loss
 - Oral Agents
- Immune Modulators
 - Monoclonal antibodies
 - Dermatology, GI
- Anticoagulant
 - Anti-Xa oral agent
- HIV



Costs of New Drugs and Most Expensive in the US



TOP 10 MOST EXPENSIVE CANCER DRUGS IN THE U.S. (2025)

RANK	DRUG	COST
1	Keytruda	\$150,000–\$225,000
2	Enhertu	\$150,000–\$220,000
3	Trodelvy	\$120,000–\$190,000
4	Rybrevant	\$120,000–\$180,000
5	Tukysa	\$100,000–\$160,000
6	Imfinzi	\$110,000–\$170,000
7	CAR-T & Gene/Cell Therapies	\$373,000–\$500,000
8	Antibody-Drug Conjugates	\$120,000–\$210,000
9	Monoclonal & Targeted Biologics	\$90,000–\$200,000
10	Ultra-high-cost Gene Therapies	\$500,000–\$4,000,000+

Sales versus patent Cliff 2026

Top 10 Drugs Expected to Lead US Sales in 2026

Projected US Revenue (in USD Billions) • Source: Statista / Becker's Hospital Review



PHARMA PATENT CLIFF

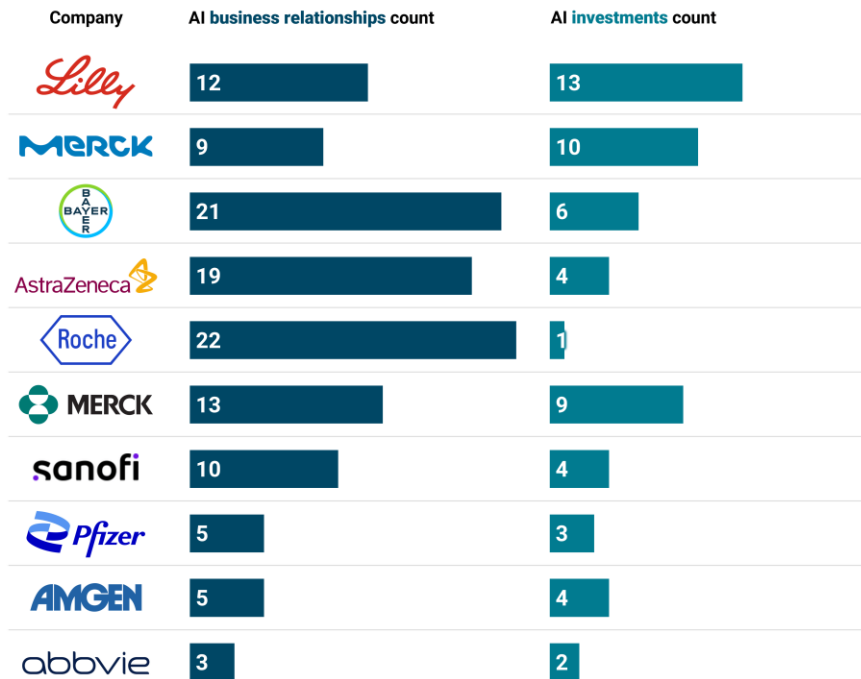
Which drugs will lose exclusivity in the coming years?



Pharmaceutical Industry Acquisitions: Reinvesting the Revenue

External partnerships and investments separate leaders from the pack in AI readiness rankings

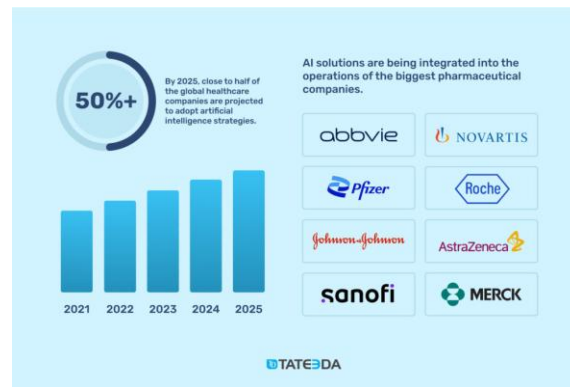
Business relationship and investment activity of the top 10 AI-readiness pharma companies



Source: CB Insights. Data between 8/1/23 – 5/1/25 considered.

Pharma and AI deals 2025-2026

- **Platform & Infrastructure Access**
 - **Isomorphic Labs** –
 - Lilly: \$1.7B+ milestone deal
 - Novartis: ~\$1.2B
 - J&J: undisclosed.
 - **Lilly–NVIDIA**: Up to \$1B infrastructure deal
 - **Noetik–GSK**: \$50M upfront for licensing AI models
- **High-Value Upfronts & Milestones**
 - **AbbVie–Gilgamesh Pharma**: \$65M
 - **Merck KGaA–Biologic Design**: €346M milestone pact, cutting biologic design timelines by 50%
 - **GSK–Ochre Bio**: \$37.5M data-licensing deal for organ-level human data
 - **AstraZeneca–Tempus–Pathos**: \$200M for curated, disease-specific datasets



Consequences

Artificial Intelligence

- Has not led to any drug approvals to date
- Investment is large
- Awaiting benefits
- Efficiency in operations expected

Impact of AI is awaited

- Reduction in costs through efficiency, and decreased needs of manpower
- Increase in Drug approval and Enhanced revenue is the goal

If AI does not increase efficiency and increase drug development outputs the costs of these deals will fall on the drug price as additional development costs.

Financial Toxicity

- Major concern in the US and worldwide
- Out of pocket costs are not limited to oncology patients
- New Drug Development
 - Higher cost points in chronic conditions leading to higher out of pocket costs for chronic conditions
- Financial Toxicity and insurance maximums may be concerns for the future

Interventions & Financial Toxicity



Interventions to Mitigate Financial Toxicity

Villalona et al. (2024) · Scoping Review · 8 US Studies (2019–2022)

PATIENT

Financial Counseling

RCT of financial counseling in medical oncology. Acceptable to patients but no significant reduction in financial distress. Higher emotional functioning & married status → lower distress. *Kircher 2019*

PATIENT

Insurance Decision Aid

"I Can PIC" RCT improved insurance knowledge & confidence. No significant effect on financial toxicity or delayed care at 3–6 month follow-up. *Politi 2020*

PATIENT

PATIENT + PROVIDER

Mobile Health App

RCT: app facilitated access to financial assistance programs. Intervention arm more likely to apply for assistance. Limited by missing follow-up data. *Tarnasky 2021*

PATIENT

Comprehensive Navigation

Nurse navigators + pharmacists + financial planners for hematologic malignancies. Improved QoL ($p < 0.001$) and reduced mortality (aHR 0.44, $p = 0.03$). *Knight 2022*



Patient-Level

Interventions to Mitigate Financial Toxicity

Villalona et al. (2024) · Scoping Review · 8 US Studies (2019–2022)

HEALTH SYSTEM

Proton Therapy Coverage

Insurance pre-authorization pilot cut approval time from 17 days to <1 day ($p < 0.01$). No significant difference in total 3-year medical costs.

Ning 2020

HEALTH SYSTEM

Financial Toxicity Tumor Board

FTTB + Patient Assistance Program served 3,568 patients. Saved USD \$50–60M in personal expenditures; >\$1.3M in co-pay assistance over 2 years.

Raghavan 2021

PATIENT + PROVIDER

DISCO App

App to improve patient–provider cost discussions. Associated with higher self-efficacy for managing treatment costs. Sample was 100% non-Hispanic White women.

Hamel 2022

PATIENT + PROVIDER

CostCOM Intervention

OOP cost identification + patient–provider communication + remote financial navigation. Decreased financial concerns ($p < 0.01$); high patient satisfaction.

Sadigh 2022



Health-System-Level



Patient + Provider

Key Findings, Gaps & Implications

What Worked

- Comprehensive navigation (Knight 2022) improved QoL AND reduced mortality
- Financial Toxicity Tumor Board (Raghavan 2021) \$50–60M saved over 2 years; co-pay assistance
- CostCOM (Sadigh 2022): reduced financial concerns & high satisfaction via remote financial navigation
- DISCO app (Hamel 2022): improved self-efficacy for managing costs and patient–provider cost communication
- Proton therapy pilot (Ning 2020) pre-authorization cut from 17 days to <1 day

Critical Gaps

Implications

- Race/ethnicity: 75% of study participants identified as non-Hispanic White
- Gender: majority female participants
- Cancer type: predominantly solid malignancies
- Geography: Midwestern/Southern US urban settings
- Evidence base: only 8 studies all published 2019 or later

Key Findings, Gaps & Implications

Implications

- Multidisciplinary programs (nurses, pharmacists, social workers, financial planners) show the most promise for reducing both FT and mortality.
- Screening tools (COST, LIFT program) are prerequisite, interventions cannot be targeted without identifying who needs help.
- Future trials must intentionally recruit racial/ethnic minorities, rural patients, males, and patients with hematologic cancers.
- Health-system-level approaches (tumor boards, PAPs) may produce savings at a scale that offsets their cost of implementation.
- Cost communication between patients and providers is underpracticed and addressable through low-cost digital tools.

Key Takeaways

Financial toxicity is a universal burden across cancer types — with distinct patterns by cancer and patient population

- 1** **Financial Toxicity is Universal**
Every cancer type studied shows significant FT, ranging from 22% to 84% in HICs and up to 89% in LMICs. No cancer patient population is immune.

- 2** **Clinical Outcomes Affected**
FT is linked to worse survival, reduced treatment adherence, and impaired quality of life. It must be treated as a clinical — not administrative — concern.

- 3** **Measurement Heterogeneity**
Lack of a universal measurement standard limits cross-study comparison. COST is most widely used but incomplete. Standardization is urgently needed.

Key Takeaways

Financial toxicity is a universal burden across cancer types — with distinct patterns by cancer and patient population

Worse in Low/Middle Income Countries

- 4** Patients in low/middle-income countries face 2–3x higher FT rates. Poverty is both a cause and consequence of cancer care costs.

Young Patients Most Vulnerable

- 5** AYA and thyroid cancer patients face unique financial toxicity due to age-related lack of safety nets, high opportunity costs, and long treatment timelines.

Interventions Exist

- 6** Financial counseling, insurance navigation, and cost transparency are evidence-based interventions. Early integration into oncology workflows is essential.



Questions?
