Pharmaceutical assistance programs for cancer patients in the era of orally administered chemotherapeutics

Aaron Mitchell[1,2,3], Benyam Muluneh[4], Rachana Patel[4] and Ethan Basch[1,2]

Abstract

Introduction: The rising cost of cancer drugs may make treatment unaffordable for some patients. Patients often rely on drug manufacturer-administered Pharmaceutical Assistance Programs (PAPs) to obtain drugs and reduced or no cost. The overall usage of PAPs within cancer care delivery is unknown.

Methods: We included all cancer patients across an academically affiliated, integrated health system in North Carolina during 2014 ($N = 8591$). We identified the subset of patients receiving PAP assistance to afford one or more cancer drugs, in order to calculate the proportion of patients receiving PAP assistance, and the retail value of the assistance.

Results: Among 8591 cancer patients, 215 unique patients submitted a total of 478 successful PAP requests for cancer drugs. 40% of PAP-utilizing patients were uninsured, 23% had Medicaid coverage, 20% had Medicare coverage, 2% were dual Medicare/Medicaid eligible, and 14% were commercially insured. Among all cancer patients who received medical treatment, 6.0% required PAP assistance, whereas 10.6% receiving an oral agent required PAP assistance. The proportion receiving PAP assistance varied substantially by drug, ranging from $<1\%$ of patients (e.g. carboplatin, methotrexate) to 50% of patients (e.g. ponatinib, temsirolimus). The majority of the retail value obtained was for oral agents, including \$1,556,575 of imatinib and \$1,449,633 of dasatinib, which were the two drugs with the highest aggregate retail value.

Conclusions: A substantial proportion of cancer patients receive private charitable assistance to obtain standard-of-care treatments. This includes patients with federal and private insurance, suggesting an inability of patients to meet cost-sharing requirements.

Keywords

Pharmaceutical foundations, charity care, financial assistance, oral drugs

Date received: 8 March 2017; revised: 11 June 2017; accepted: 12 June 2017

Introduction

The high cost of prescription medications is a well-known problem in the US health care system, with increasing media and regulatory scrutiny as drug prices and health entitlement spending continue to rise.[1] Oncology is well acquainted with this problem,[2] as the prices of new cancer drugs have been increasing exponentially in recent decades.[3] As a result of the increasing number of orally available, highly priced chemotherapeutics along with increasing consumer out-of-pocket costs through higher deductibles and co-insurance,[4] many cancer patients experience "financial toxicity" and may be unable to afford treatment.[5]

[1]Department of Hematology/Oncology, University of North Carolina at Chapel Hill School of Medicine, Chapel Hill, NC, USA
[2]Lineberger Comprehensive Cancer Center, Chapel Hill, NC, USA
[3]Cecil G. Sheps Center for Health Services Research, Chapel Hill, NC, USA
[4]University of North Carolina Eshelman School of Pharmacy, Chapel Hill, NC, USA

Corresponding author:
Aaron Mitchell, Department of Hematology/Oncology, UNC Hospital, 3rd Floor, Physicians Office Building, 170 Manning Drive, Chapel Hill 27599, NC, USA.
Email: aaron.mitchell@unchealth.unc.edu

In response, many pharmaceutical companies offer various forms of financial assistance, either directly or through affiliated non-profit entities known as Pharmaceutical Foundations.[6] These forms of assistance include copay assistance and copay coupons,[7] direct grants to patients, pricing discounts, and in-kind gifts of drug supplies free of charge.[6] Their combined financial impact is difficult to assess, but is likely to be substantial, with copay coupons alone comprising $4 billion in subsidies in 2011.[7]

One mechanism by which companies deliver in-kind drug supplies free of charge is Pharmaceutical Assistance Programs (PAPs). PAPs are programs administered by pharmaceutical manufacturers that provide drugs to patients who demonstrate sufficient financial need. While providing essential access to treatment for some patients, PAPs have gained a reputation for being a time-consuming, opaque, and difficult-to-navigate source of assistance.[8–10] While PAPs have been increasing in recent decades, clarity on their administration and approval processes, patient volume, and scope of operations has been difficult to obtain.[11] A prior single-center description of PAPs in 2006–2007 found that patients at a large tertiary center obtained a net total of cancer drugs valued at $55,000 monthly,[12] but the treatment landscape has changed dramatically over the ensuing decade with unclear changes in the role these programs play.

We decided to study PAPs, a form of industry-run financial assistance distinct from patient assistance foundations or copay coupons. Patients qualifying for these PAPs receive their supply of medication free of charge during the duration of their eligibility. Our goal was to quantify and characterize the number of and monetary value of drugs obtained through privately administered pharmaceutical company PAPs by cancer patients treated at an academic, state-supported, public hospital network. Studying the patients served by this institutional program offers an opportunity to examine current areas of need in financing cancer care, and the impact of PAPs in meeting that need.

Methods

The setting for this study was The University of North Carolina (UNC) Health Care system, a state-supported public hospital network including nine hospitals and numerous affiliated community practices in the state. UNC Health Care provides care for a large number of financially needy patients, and hence requires a streamlined process helping these patients obtain needed drugs.

UNC Health Care administers an institutional medication assistance program to assist patients with prohibitive drug costs. The UNC medication assistance program is staffed by 18 pharmacy financial assistants (PFA) with backgrounds as pharmacy assistants or financial counselors, four of whom are dedicated to PAP applications specifically. Patients with potentially prohibitive drug costs are identified and referred to the medication assistance program by their clinical pharmacist.

For insured patients, the PFA first attempts to meet the financial need through copay assistance, including copay coupon programs, and/or foundational grants. In the case of uninsured patients, or insured patients whose needs are unmet after searching for available copay and foundational assistance, the PFA next applies for assistance from a manufacturer-run PAP. The application process is conducted in its entirety by the UNC medication assistance program, without additional effort on the part of the patient. We decided to focus on PAPs after learning that the large majority of charity assistance to UNC cancer patients comes through PAPs rather than copay assistance, foundational support, or other mechanisms.

For each approved PAP application, the following information is recorded electronically in a MedData system: the drug requested/received, manufacturer, dose, prescribing physician, and patient name. From MedData, we downloaded all approved PAP requests during calendar year 2014, which was the most recent year with complete information. For our analysis, we included drugs used to treat cancer and its complications. Cancer drugs with non-oncologic indications (e.g. cyclophosphamide) were included only when prescribed by an oncologist, identified manually. Supportive drugs were included only if they are used exclusively as an adjunct to cancer treatment (e.g. pegfilgrastim was included due to its use as an adjunct to cancer treatment, while ondansetron was not included due to its multiple indications other than chemotherapy-induced nausea).

MedData contains drug 340b and retail prices, as provided by Amerisource Bergin, a drug wholesale company. Retail prices were equivalent to Average Wholesale Price (AWP), which estimates what an uninsured patient would pay out-of-pocket for a medication. For each approved PAP request, we calculated the dollar value of the drug provided to the patient by multiplying the unit drug price by the quantity obtained. We report AWP prices unless otherwise stated.

For each patient, the indication for a given drug was derived from the medical record. Quantity of drug obtained was missing in 25 of 478 (5.2%) approved requests; in these cases we imputed quantity based on (1) the minimum amount obtained in other PAP requests for the same drug, or when unavailable (2) the quantity sufficient for a single infusion for IV

agents or a one-month supply for oral agents. Insurance status was manually abstracted from the medical record.

In order to obtain the total number of UNC patients being treated for each cancer type, we queried the Carolina Data Warehouse for Health (CDW-H), a central data repository containing clinical data from all patients in UNC's electronic medical record. We searched for patients undergoing active treatment for cancer at UNC in 2014. Specifically, we identified all adult patients who (1) had a billed diagnosis of cancer in 2014, and (2) had at least two office visits in medical oncology clinic locations, separated by at least one month, during 2014. Each cancer type was queried separately using ICD-9 codes. Leukemia was divided into chronic myeloid leukemia (CML), acute lymphoid leukemia (ALL), and all other types; gynecologic cancers (GYN) included cervical, uterine, and ovarian cancers.

We also used the CDW-H to determine the total number of patients at UNC who were treated with each drug during 2014. For each drug that any cancer patient had obtained via PAP assistance in 2014, we conducted a separate CDW-H query to find the total number of unique UNC patients who had been ordered that drug for an oncologic indication. PEG-filgrastim presented a special case; although we had accurate numbers for UNC patients who obtained this medication via PAP assistance (from MedData), we realized that our results for the total number of UNC patients who received this drug would be inaccurate because many patients have this drug ordered and administered by non-UNC providers. Therefore, we included PEG-filgrastim in calculating the total value of drugs obtained from PAPs, but not in calculating the total number of UNC patients treated with cancer drugs.

The total and average per-patient retail value of drugs obtained via PAPs were calculated with respect to cancer type, source of insurance, and the specific drug obtained. The proportion of patients with each cancer type receiving pharmaceutical financial assistance was estimated by dividing the number of people with the cancer of interest who received assistance by the total number of people treated in the health system for the cancer of interest in 2014. We calculated subtotals with and without the inclusion of several drugs with per-patient drug value of <$500, which were very rarely obtained via PAP assistance, in order to better reflect PAP usage for drugs that were obtained more commonly through PAPs. All analysis was done using Microsoft Excel.

Results

During 2014, among 8591 UNC cancer patients, there were 478 approved PAP requests for cancer drugs across 215 unique patients, from 24 different pharmaceutical companies. The median age of these 215 PAP-utilizing patients was 55.1 years. 52.1% were male and 47.9% were female. 47.9% where white, 22.3% were Black of African–American, 19.1% were Hispanic, 2.8% were Asian, 2.8% were of other races, and 0.9% had unknown race. Although 39.5% of patients were uninsured, 23.3% had Medicaid coverage, 20.4% had Medicare, 14.4% were privately insured, and 2.3% had both Medicare and Medicaid. The total value of all drugs obtained via PAPs was $9,801,088, while $461,000 was obtained by all patients through copay assistance and foundations; PAPs therefore constituted 95.5% of formal charity assistance to patients, and we focused further analysis on PAPs specifically.

Of UNC cancer patients receiving medical therapy, 6.0% of cancer drug prescriptions were obtained via PAPs (Table 1); this represented 2.5% of all UNC cancer patients (Table 2).

Most of the retail value of drugs obtained by UNC patients via PAPs was concentrated within a few, high-price drugs. UNC patients obtained $1,556,575 of imatinib and $1,449,633 of dasatinib via PAPs during 2014 (Table 1). Eighty-five unique patients received one or more oral drug via PAPs, and these totaled $7,373,741 in retail value. In contrast, 181 patients received non-oral drugs, which totaled $2,424,891 (excluding a small number of patients who received drugs that cost less than $500).

There was significant variation from drug to drug regarding the proportion of patients who obtained it via PAP assistance (Table 1). For some oral drugs such as sunitinib, over one quarter of patients received the drug via PAP assistance. This proportion was much lower for many older, generic agents such as doxorubicin (2.7%) and paclitaxel (1.4%). When excluding drugs that had a per-patient value of less than $500 (methotrexate, BCG, paclitaxel, carboplatin, epirubicin), 7.5% of cancer drugs were obtained via PAPs overall. This proportion was significantly higher at 10.6% when considering oral cancer drugs alone.

There was also variation across different cancer types with respect to the fraction of patients who needed PAP assistance to obtain one or more of their medications. For example, only 2% of breast cancer patients obtained any drugs via PAPs, compared to 18% of CML patients (Table 2); this is in line with the observation that several of the highest-value drugs obtained via PAPs, imatinib (14.3%) and dasatinib (22.6%) (Table 1), are used in the treatment of CML. The drugs comprising the highest retail value for each cancer type were mostly targeted cancer drugs still under patent protection.

The average retail value of drugs obtained per patient also had substantial variability with respect to

Table 1. Proportion of treated patients who received each drug via PAPs.

Drug name	Route	Total patients	Patients obtaining drug via PAP	Percentage of patients obtaining drug via PAP	Retail value of drug obtained via PAP (USD)[a]	Avg retail value per patient
Imatinib	Oral	84	12	14.3	1,556,575	129,715
Dasatinib	Oral	53	12	22.6	1,449,633	120,803
Pegfilgrastim	Sub-q	NA	25	NA	744,987	29,799
Pazopanib	Oral	43	11	25.6	734,719	66,793
Nilotinib	Oral	37	4	10.8	539,329	134,832
Sunitinib	Oral	11	4	36.4	538,983	134,746
Crizotinib	Oral	13	2	15.4	519,715	259,858
Sorafenib	Oral	46	11	23.9	513,020	46,638
Lenalidomide	Oral	188	4	2.1	473,309	118,327
Ipilimumab	IV	26	6	23.1	465,387	77,565
Capecitabine	Oral	123	9	7.3	239,553	26,617
Dabrafenib	Oral	33	4	12.1	230,518	57,630
Enzalutamide	Oral	55	3	5.5	224,139	74,713
Regorafenib	Oral	9	2	22.2	214,325	107,163
Panitumumab	IV	17	3	17.6	169,312	56,437
Brentuximab	IV	14	2	14.3	136,895	68,448
Trastuzumab	IV	121	13	10.7	120,428	9264
Denosumab	Sub-q	306	9	2.9	102,932	11,437
Rituximab	IV	329	15	4.6	91,268	6085
Filgrastim	Sub-q	128	13	10.2	74,124	5702
Bevacizumab	IV	128	11	8.6	70,889	6444
Bortezomib	Sub-q	98	4	4.1	65,688	16,422
Gemcitabine	IV	136	12	8.8	61,972	5164
Pertuzumab	IV	35	4	11.4	53,799	13,450
Cyclophosphamide	IV	408	15	3.7	40,827	2722
Doxorubicin	IV	188	5	2.7	37,497	7499
Bexarotene	Oral	4	1	25	35,820	35,820
Abiraterone	Oral	67	1	1.5	35,410	35,410
Ado-trastuzumab	IV	10	1	10.0	29,955	29,955
Cetuximab	IV	34	5	14.7	29,311	5862
Carfilzomib	IV	37	3	8.1	29,081	9694
Zoledronic Acid	IV	190	8	4.2	27,943	3493
Lapatinib	Oral	18	2	11.1	26,580	13,290
Bendamustine	IV	29	3	10.3	18,417	6139
Pemetrexed	IV	53	3	5.7	18,054	6018
Erlotinib	Oral	29	2	6.9	16,102	8051
Irinotecan	IV	79	13	16.5	13,125	1010
Ponatinib	Oral	2	1	50.0	12,420	12,420
Vemurafenib	Oral	3	1	33.3	9765	9765
Azacitidine	IV	22	2	9.1	7725	3863
Leuprolide	IM	314	1	0.3	5,142	5142
Fulvestrant	IM	16	1	6.3	4406	4406
Lomustine	Oral	4	1	25.0	3826	3826
Pembrolizumab	IV	12	1	8.3	1942	1942

(continued)

Table 1. Continued

Drug name	Route	Total patients	Patients obtaining drug via PAP	Percentage of patients obtaining drug via PAP	Retail value of drug obtained via PAP (USD)[a]	Avg retail value per patient
Temsirolimus	IV	2	1	50.0	1841	1841
Eribulin	IV	NA	1	NA	1198	1198
Dactinomycin	IV	11	1	9.1	746	746
Non-oral drugs		**2743**	**181**	**6.6**	**2,424,891**	13,397
Oral drugs		**822**	**87**	**10.6**	**7,373,741**	84,756
Subtotal		**3565**	**268**	**7.5**	**9,798,632**	36,562
Non-oral drugs with low per-patient value [b]		1091	12	1.1	$2458	205
Grand Total		**4656**	**280**	**6.0**	**9,801,090**	35,004

NA: not available; IV: intravenous; Sub-q: subcutaneous; IM: intramuscular.
Subtotals and totals in bold.
[a]Totals may vary slightly from Table 2 due to differences in rounding.
[b]Non-oral drugs with low per-patient value included methotrexate (one patient received via PAP, total value $11), intravesicular BCG (two patients received via PAP, total value $348), paclitaxel (four patients received via PAP, total value $475), carboplatin (two patients received via PAP, total value $750) and epirubicin (three patients received via PAP, total value $874).
[c]Shown is the number of UNC patients receiving each cancer drug, ranked by the total retail value of the drugs obtained via PAPs. "Total patients" includes all UNC cancer patients treated with each drug during 2014. "Retail value of drug obtained via PAP" includes the retail value of the total supply of that drug that was obtained via PAP assistance across all UNC patients. Patients who received more than one drug on list will be counted more than once. Peg-filgrastim and eribulin were omitted from patient totals, as these values were not available for these drugs.

Table 2. UNC patients receiving drugs via PAPs, by cancer type.

Cancer Diagnosis	Number of UNC patients with cancer type (% of total)	Number of patients with cancer type receiving cancer drugs via PAP	Percent of patients receiving cancer drugs via PAP	Single drug with greatest retail value	Total retail value of drug with greatest retail value (USD)	Total retail value of all drugs obtained via PAP (USD)
CML	93 (1.1)	17	18.3	Imatinib	963,418	2,359,952
Kidney	277 (3.2)	10	3.6	Pazopanib	68,407	774,813
Breast	1865 (21.7)	38	2.0	Pegfilgrastim	401,972	766,824
Leukemia[a]	276 (3.2)	9	3.3	Sorafenib	285,890	752,830
Melanoma	225 (2.6)	10	4.4	Ipilimumab	465,387	707,612
Lung	580 (6.8)	10	4.7	Crizotinib	519,715	672,064
Colorectal	439 (5.1)	20	4.6	Capecitabine	232,920	655,907
GIST	88 (1.0)	6	6.8	Imatinib	324,210	573,493
Lymphoma	719 (8.4)	20	2.8	Lenalidomide	205,542	528,543
ALL	89 (1.0)	8	9.0	Dasatinib	453,637	495,221
MM	398 (4.6)	9	2.3	Lenalidomide	267,766	385,172
Sarcoma	221 (2.6)	8	3.6	Sunitinib	215,357	310,306
Prostate	539 (6.3)	7	1.3	Enzalutamide	224,139	273,739
Liver	173 (2.0)	8	4.6	Sorafenib	227,130	227,130
Head & Neck	308 (3.6)	11	3.6	Pegfilgrastim	107,192	155,893
Biliary	57 (0.7)	3	5.3	Pegfilgrastim	64,315	93,392
Gynecologic	1679 (19.5)	6	0.4	Bevacizumab	11,945	24,021
Pancreatic	104 (1.2)	4	3.8	Gemcitabine	11,408	15,308
Esophageal	61 (0.7)	3	4.9	Trastuzumab	13,381	13,800

(continued)

Table 2. Continued

Cancer Diagnosis	Number of UNC patients with cancer type (% of total)	Number of patients with cancer type receiving cancer drugs via PAP	Percent of patients receiving cancer drugs via PAP	Single drug with greatest retail value	Total retail value of drug with greatest retail value (USD)	Total retail value of all drugs obtained via PAP (USD)
Bladder	261 (3.0)	5	1.9	Pegfilgrastim	5,360	8,375
Other	139 (1.6)	3	2.2	Lomustine	3,826	6,694
Overall	**8591 (100)**	**215**	**2.5**	**Imatinib**	**1,556,575**	**9,801,088**

CML: chronic myeloid leukemia; ALL: acute lymphoid leukemia; GIST: gastrointestinal stromal tumor; MM: multiple myeloma.
Totals in bold.
[a]Leukemias other than CML, ALL.
[b]"Patients requiring PAP assistance" indicates proportion of patients with each malignancy who received one or more drugs via PAPs during study period. "Single drug with greatest retail value" indicates the drug for which the total supply obtained via PAPs by patients with each cancer type had the highest retail value.

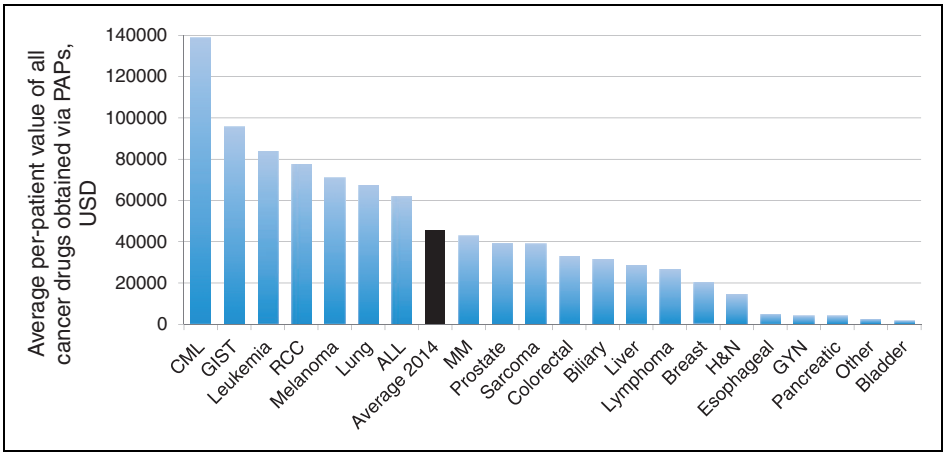

Figure 1. Average per-patient value of drugs obtained via PAP, by cancer type.
CML, chronic myeloid leukemia; ALL, acute lymphoid leukemia; GIST: gastrointestinal stromal tumor; MM: multiple myeloma.
Note: CML, ALL reported separately from Leukemia.

cancer type and source of insurance. While the average patient obtained $45,586 in drugs via PAPs, those with CML obtained an average of $138,821 (Figure 1). Privately insured patients obtained $59,749 of drugs on average, and those with Medicaid receiving slightly more than half of that at $31,636 (Figure 2).

Discussion

As the cost of pharmaceuticals has increased rapidly in recent decades, PAPs have proliferated in response to the growing number of patients unable to afford the full cost of prescribed drugs. Multiple entities, including state governments and large health care systems, have established formalized programs to help their patients navigate the complex landscape of numerous, privately administered PAPs.[8,12–14] Within our study sample, PAPs constituted 95.5% of formal charity assistance to cancer patients. PAPs now play a substantial, though poorly understood, role in the financing of cancer drugs.

Although 40% of UNC cancer patients receiving PAP assistance were uninsured, substantial portions were insured by public or private payers. This study provides further evidence that many insured patients are unable to afford the growing number of high-cost cancer drugs. Medicare patients, for example, face monthly out-of-pocket costs of thousands of dollars for many cancer treatments.[15,16] Merely having insurance is insufficient protection from the financial toxicity of cancer care.

To our knowledge, only one other similar institutional assistance program has been the subject of formal study: a program administered by the MD Anderson Cancer Center in Houston, during 2006–2007.[12] Coming nearly a decade later, our report yields several insights into shifting areas of financial vulnerability over the intervening time period.

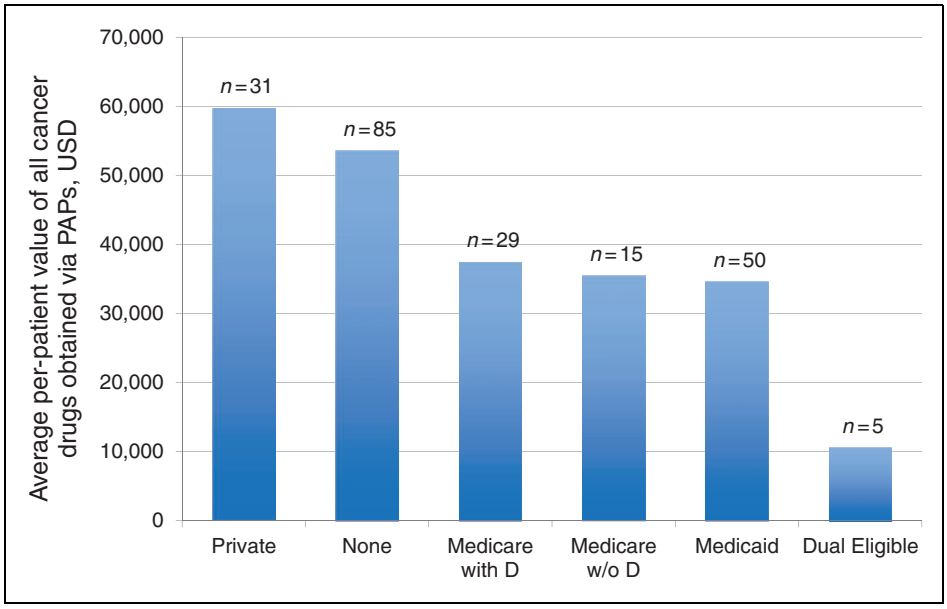

Figure 2. Average per-patient value of drugs obtained via PAP, by insurance type. [a]Number of patients with each type of insurance is shown. None, uninsured; Medicare with D, Medicare with supplemental Part D prescription drug coverage; Dual Eligible, beneficiary of both Medicare and Medicaid.

During 2006–2007, fewer than 1.1% of patients at MD Anderson obtained support for cancer drugs through PAPs. In our study, 2.5% of all UNC cancer patients obtained support for such drugs (Table 2), and 7.5% of all cancer drugs with per-patient value >$500 were obtained via PAPs (Table 1). While some of the difference may be due to demographic differences between the patient populations at each institution, this finding suggests a growing need for financial assistance in paying for cancer drugs. This may reflect a shift over the 2006–2014 time period from intravenous drugs administered in physician offices or infusion centers to orally available drugs administered as prescription drugs, as well as the increasing cost of those drugs.[17,18]

At the time of the MD Anderson study, 75% of PAP expenditures for cancer drugs went to cover the cost of three oral agents: anastrozole, temozolamide, and capecitabine, each of which was still under patent and sold as a brand-name drug. The authors of the MD Anderson study anticipated a growing need for PAP assistance for oral cancer drugs, given (1) the high level of expenditure for the few oral agents in use at that time, and (2) the observation that "these oral agents represent over 25% of cancer therapies in development." Between the MD Anderson study and the time of our analysis, two of these agents – anastrozole and capecitabine – have become available as generic drugs and were no longer areas of high PAP need. However, many new oral cancer drugs have since been approved and remain on patent, and it is these drugs that have become the dominant medication class generating patients' need for financial assistance. Our study is therefore in line with these predictions in suggesting that that oral cancer drugs have been a growing area of unmanageable patient expense over the last decade.

In some non-cancer diseases, patients who receive assistance through PAPs have been reported to benefit from this increased access to treatment, at least with regard to surrogate outcomes such as blood pressure and lipid levels,[19,20] and many clinicians support them for this reason.[21,22] However, others have concerns about the complexity and potential unreliability of PAPs, and question whether they should be considered a standard part of care delivery. Especially for essential and/or high-risk medications such as chemotherapeutics, uninterrupted access to therapy is critical. Without transparency in their application and approval processes, that may not be a standard that PAPs can meet.[8,23] Data on patients whose PAP requests are denied are not available,[9] making the reliability of PAPs difficult to measure. Additionally, approximately one-half of industry-sponsored PAPs exclude applicants who have any other form of prescription drug coverage;[9] as insured patients can still face thousands of dollars in out-of-pocket drug costs,[15] this group of patients may be left without access to these drugs.

Furthermore, the question has been raised as to whether industry-run financial assistance programs, including PAPs, have purely charitable ends, or are a profit-maximizing strategy of pharmaceutical manufacturers. For example, copay coupons enable companies

to subsidize the patient copay amount while continuing to be reimbursed by the patient's insurance payer for the remainder of the drug's price; companies can therefore maintain a profit margin even while use these coupons.[7,24] This precise mechanism would not apply to the PAPs described in this study, as drugs covered by these programs are provided free of charge. However, such programs may still lead to financial benefits through other mechanisms. For example, by allowing physicians to use more expensive drugs even for indigent patients, they may become more accustomed to using them in general, increasing usage among non-indigent patients as well.[10] Additionally, cancer patients uninsured at diagnosis may acquire insurance later in their treatment course; granting drug free of charge initially may result in greater reimbursement later once the patient and treating oncologist are set on the treatment plan.[10] PAPs also bring public relations benefits.[10,25]

Our study had limitations, several of which were related to our primary data source – the MedData database of UNC PAP approvals. MedData included AWP list prices, typically a "sticker price" that does not reflect the true price that manufacturers obtain for selling their drugs. The average manufacturer price (AMP), which factors in rebates and discounts, reflects more closely the prices that drug manufacturers actually obtain; on average, the AMP is approximately 79% of the AWP for brand-name drugs.[26] For many of the PAP approvals, the quantity of drug was not available. In order to keep our cost estimates conservative, in such cases we imputed the minimum quantity (see methods); for this reason, our resulting calculations of the retail value of drugs obtained via PAPs represent a lower limit. Additionally, UNC patients whose PAP requests are denied are not tracked systematically; having such information would have added valuable information regarding UNC's financially needy cancer patients. Drugs obtained most commonly via PAPs may not correlate with areas of highest financial need, but might instead simply reflect which pharmaceutical manufacturers have the most easy-to-access PAPs in place, which may reflect which companies benefit the most by having PAPs in place.

Conclusions

In this cross-sectional analysis of Pharmaceutical Assistance Program usage at a state-supported public hospital network, the majority of drug value obtained from PAPs was for oral cancer drugs. Our results were driven by the high price of several targeted agents, particularly the tyrosine kinase inhibitors used for certain hematologic malignancies. In comparison to prior studies, this study suggests that patient need for financial assistance to afford these medications is growing.

While uninsured patients were overrepresented among cancer patients obtaining PAP assistance, the majority had either private or public insurance; this suggests that the out-of-pocket/coinsurance costs leave many patients effectively underinsured to afford oral cancer drugs. The need for assistance for these medications will likely continue to increase, as clinical indications for their use continue to broaden and the prices for the individual drugs increase.[18] Significant barriers to access may exist for patients who do not qualify for PAP assistance, and changes to the administration of these private programs may result in loss of access for those patients that rely on them.

Acknowledgements

We would like to thank Dr Stacie Dusetzina, PhD, for her review of the manuscript, and Suzanne Francart of the UNC Medication Assistance Program for her help. This study was approved by the University of North Carolina Institutional Review Board. This manuscript is not under consideration for publication elsewhere. This study was presented in abstract form at the ASCO 2017 Quality Care Symposium.

Declaration of Conflicting Interests

The author(s) declared the following potential conflicts of interest with respect to the research, authorship, and/or publication of this article: BM has received research support (drug and placebo) from Pfizer, Inc. The rest of the authors have no conflicts of interest to disclose.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

References

1. Scalo JF and Rascati KL. Trends and issues in oncology costs. *Expert Rev Pharmacoecon Outcomes Res* 2014; 14: 35–44.
2. Bach PB. Limits on medicare's ability to control rising spending on cancer drugs. *N Engl J Med* 2009; 360: 626–633.
3. Bach P. *Monthly and median costs of cancer drugs at the time of FDA approval 1965–2015*. MSKCC Center for Health Policy and Outcomes, 2015. Available at: www.mskcc.org/research-areas/programs-centers/health-policy-outcomes/cost-drugs.
4. Claxton G, et al. Health benefits in 2015: stable trends in the employer market. *Health Aff Proj Hope* 2015; 34: 1779–1788.
5. Zafar SY. Financial toxicity of cancer care: it's time to intervene. *J Natl Cancer Inst* 2016; 108. Available at: www.ncbi.nih.gov/pubmed/26657334.

6. *Key Facts on Corporate Foundations*. The Foundation Center, 2011. Available at: foundationcenter.issuelab.org/resource/key_facts_on_corporate_foundations_2011.
7. Visante. *How copay coupons could raise prescription drug costs by $32 billion over the next decade*. Pharmaceutical Care Management Association, 2011.
8. Chauncey D, Mullins CD, Tran BV, et al. Medication access through patient assistance programs. *Am J Health-Syst Pharm AJHP Off J Am Soc Health-Syst Pharm* 2006; 63: 1254–1259.
9. Choudhry NK, Lee JL, Agnew-Blais J, et al. Drug company-sponsored patient assistance programs: a viable safety net? *Health Aff Proj Hope* 2009; 28: 827–834.
10. Carroll NV. Pharmaceutical patient assistance programs: don't look a gift horse in the mouth or there's no such thing as a free lunch. *J Manag Care Pharm* 2007; 13: 614–616.
11. Choudhry NK, Lee JL, Agnew-Blais J, et al. Patient assistance programs: information is not our enemy. *Health Aff Proj Hope* 2009; 28: 843–844.
12. Felder TM, Lal LS, Bennett CL, et al. Cancer patients' use of pharmaceutical patient assistance programs in the outpatient pharmacy at a large tertiary cancer center. *Community Oncol* 2011; 8: 279–286.
13. Crisp GD, et al. The University of North Carolina's Health Care Pharmacy Assistance Progam. *N C Med J* 2014; 75: 303–309.
14. Sarrafizadeh M, Waite NM, Hobson EH, et al. Pharmacist-facilitated enrollment in medication assistance programs in a private ambulatory care clinic. *Am J Health-Syst Pharm AJHP Off J Am Soc Health-Syst Pharm* 2004; 61: 1816–1820.
15. Dusetzina SB, Basch E and Keating NL. For uninsured cancer patients, outpatient charges can be costly, putting treatments out of reach. *Health Aff Proj Hope* 2015; 34: 584–591.
16. Dusetzina SB and Keating NL. Mind the gap: why closing the doughnut hole is insufficient for increasing medicare beneficiary access to oral chemotherapy. *J Clin Oncol Off J Am Soc Clin Oncol* 2016; 34: 375–380.
17. Raborn ML, Pelletier EM, Smith DB, et al. Patient out-of-pocket payments for oral oncolytics: results from a 2009 US claims data analysis. *Am J Manag Care* 2012; 18: SP57–SP64.
18. Bennette CS, Richards C, Sullivan SD, et al. Steady increase in prices for oral anticancer drugs after market launch suggests a lack of competitive pressure. *Health Aff Proj Hope* 2016; 35: 805–812.
19. Trompeter JM and Havrda DE. Impact of obtaining medications from pharmaceutical company assistance programs on therapeutic goals. *Ann Pharmacother* 2009; 43: 469–477.
20. Felder TM, Palmer NR, Lal LS, et al. What is the evidence for pharmaceutical patient assistance programs? A systematic review. *J Health Care Poor Underserved* 2011; 22: 24–49.
21. Johnson PE. Patient assistance programs and patient advocacy foundations: alternatives for obtaining prescription medications when insurance fails. *Am J Health-Syst Pharm AJHP Off J Am Soc Health-Syst Pharm* 2006; 63: S13–S17.
22. Chisholm MA and DiPiro JT. Pharmaceutical manufacturer assistance programs. *Arch Intern Med* 2002; 162: 780–784.
23. Buell R and Gesme D. Survey of provider perspectives on patient assistance programs. *J Oncol Pract Am Soc Clin Oncol* 2009; 5: 184–187.
24. Schencker L. Lifesavers or kickbacks? Critics say patient-assistance programs help keep drug prices high. *Mod Healthc* 2015; 45: 20–22.
25. Howard DH. Drug companies' patient-assistance programs–helping patients or profits? *N Engl J Med* 2014; 371: 97–99.
26. Rubino M, et al. *Academy of managed care pharmacy guide to pharmaceutical payment methods*, Version 1.0, 2007. Available at: www.amcp.org/WorkArea/DownloadAsset.aspx?id = 9856.