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Accuracy of Ophthalmology Clinic Follow-Up in the Incarcerated Patient Population

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Abstract

Purpose Incarcerated patients represent a uniquely vulnerable population in the outpatient ophthalmology setting, and the reliability of follow-up in this group is undetermined.

Methods This was a retrospective, observational chart review of consecutive incarcerated patients evaluated at the ophthalmology clinic of a single academic medical center between July 2012 and September 2016. For each encounter the following were recorded: patient age, gender, incarcerated status at the time of encounter (a subset of patients had encounters before/after incarceration), interventions performed, follow-up interval requested, urgency of follow-up, and actual time to subsequent follow-up. Primary outcome measures were no-show rate and timeliness, which was defined as follow-up within 1.5× the requested period.

Results There were 489 patients included during the study period, representing a total of 2,014 clinical encounters. Of the 489 patients, 189 (38.7%) were seen once. Of the remaining 300 patients with more than one encounter, 184 (61.3%) ultimately did not return and only 24 (8%) were always on time for every encounter. Of 1,747 encounters with specific follow-up requested, 1,072 were considered timely (61.3%). Factors significantly associated with subsequent loss to follow-up include whether a procedure was performed ($p < 0.0001$), urgency of follow-up ($p < 0.0001$), incarcerated status ($p = 0.0408$), and whether follow-up was requested ($p < 0.0001$).

Conclusion Almost two-thirds of incarcerated patients in our population requiring repeat examination were lost to follow-up, particularly those who underwent an intervention or required more urgent follow-up. Patients entering and exiting the penal system were less likely to follow-up while incarcerated. Further work is needed to understand how these gaps compare to those in the general population and to identify means of improving these outcomes.

Keywords
- incarcerated
- prisoner
- prison medicine
- lost to follow-up
- outpatient follow-up

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Introduction

There are more than 2 million individuals currently incarcerated in the United States, representing both the highest absolute number and highest prison population rate of any country in the world.[1] State and federal prisons are constitutionally required to provide health care,[2] although many facilities are small, isolated, and unable to provide onsite health care providers.[3] Therefore, prisons oftentimes partner with community clinics and hospitals for primary and subspecialty care.

Incarcerated patients represent a uniquely vulnerable population, with an increased prevalence of acute and chronic medical conditions compared to the general population.[4] For many, prison is the first encounter with the health care system,[5] with an estimated 80% of individuals seeing a medical provider while incarcerated.[6] However, the quality of care can be quite variable,[7] and the frequency is even less understood.

To our knowledge, no data exist evaluating follow-up patterns of incarcerated patients to out-of-facility medical appointments. This study aims to begin the process of better understanding this dynamic by evaluating both the objective follow-up rates in incarcerated patients to the ophthalmology clinic as well as factors associated with both accuracy and timeliness of follow-up. Further, no established criteria or protocol exists for assessing the accuracy or timeliness of follow-up, likely reflective of the difficult nature assessing these measures. Therefore, this article also offers a methodological approach to quantifying both timeliness and accuracy of longitudinal follow-up in a patient population.

Methods

The study was conducted as a retrospective observational chart review of outpatient ophthalmology patients at the University of Kentucky School of Medicine (Lexington, KY). The Human Subjects Division of the University of Kentucky Institutional Review Board gave approval for the study and the described research adheres to the tenets of the Declaration of Helsinki. Clinical charts of consecutive incarcerated patients between July of 2012 and September of 2016 were collected by identifying all encounters billed to a correctional facility during that period. For each eligible chart, data were then pulled from the entire time they were treated at the institution, including encounters before and after incarceration as well as before and after the study period, not exceeding 5 years prior to the known incarceration dates.

Encounters included all visits to the ophthalmology or optometry clinics and operating room; emergency room visits, hospital admissions, and satellite clinic visits were not assessed. For each encounter, data recorded included: incarcerated status at the time of the encounter as defined by billing data (a subset of patients had encounters before or after incarceration), evaluating subspecialty, primary diagnosis, record type (paper vs. electronic), operative status, interventions performed, requested follow-up interval, urgency of follow-up, and actual time to subsequent follow-up. Interventions were recorded both by name and by grouping, where groupings were defined as in-office procedures (e.g., chalazion drainage, removal of eyelid lesions), laser procedures (anterior and posterior segment), and operative procedures. Time requested to subsequent follow-up was recorded as either a discrete number of days or as one of the following categories: as needed, next available (including for consults or for specialty services), procedure needed, not applicable (none specified or illegible), or elsewhere (including follow-up to known external locations or patients being released prior to needed follow-up and scheduled elsewhere).

Urgency of follow-up was assessed as a function of the time requested until subsequent follow-up. For patients where a discrete follow-up interval was requested, it was considered urgent if the interval was less than 90 days. For patients who had categorical follow-up requested, they were considered urgent if they were for "next available" or scheduled for an operative procedure. Urgency was assessed as "not applicable" for any with unknown follow-up, as needed follow-up, or with follow-up planned at an external location. Timeliness was assessed as a binary "yes" or "no" relative to the actual versus requested follow-up interval. It was assessed as "no" in any patient for whom actual follow-up was recorded as a no-show. For those with requested intervals that qualified as urgent as defined above but without a number of days specified, timeliness was assessed as "yes" if the subsequent encounter was within 90 days. For those with a specific time interval requested, follow-up was deemed to be "timely" if it was within 50% of the requested interval, rounding up to the nearest day. For example, if 1 day was requested, follow-up was considered timely if it was within 2 days, rounding up from 1.5. If 7 days were requested, any follow-up within 11 days was counted as timely. Timeliness was not calculated for patients for whom requested follow-up was to an external location, patients with as needed follow-up, or for whom follow-up request was unknown or unspecified.

To identify the subset of factors associated with either outcome, return on time (yes or no) or lost to follow-up (yes or no), a three-step process was used. In the first step, each factor of interest (age, gender, procedure done, urgent procedure, etc.) was associated with the outcome using a chi-square statistic. If that statistic was significant at the 0.05 level, then it was initially included in a multivariate model for the outcome. In step three, a backwards procedure was used to eliminate nonsignificant predictors from the model. For both outcomes the multivariate model was a generalized linear mixed model which accounted for the clustering of responses at the patient level fitted using a logit link function. A factor had to be significant at the 0.05 level to remain in the final multivariate model. All computations were completed using PC-SAS, Version 9.4 (Cary, NC).

Results

A total of 511 patients were identified during the study period, 22 of whom had paper charts that were lost. Using inclusion criteria, a total of 2,104 encounters of these

remaining 489 patients were analyzed, 1,704 from paper charts and 400 from the electronic health record. The mean patient age was 47.2, 93.9% were male, and the average number of encounters per patient was 4.3 (►**Table 1**).

A breakdown of office visits and procedures performed during this period can be seen in ►**Table 2**. A total of 226 surgeries were performed during this time including 121 cataract surgeries, 92 laser procedures, and 58 other in-office procedures.

One hundred and eighty-nine patients had only one encounter. Of those, 114 (60.3 or 23.3% of all patients) had no follow-up requested after the initial visit. These visits were most frequently nonurgent evaluations and/or refraction-only encounters. Seventy-five (15.7%) of the patients were evaluated once, had follow-up requested, and were not seen again. Of the 300 patients with more than one visit, 184 (61.3%) ultimately did not follow-up during the course of their care. Factors significantly associated with improved attendance to next visit were urgency of follow-up ($p < 0.0001$) and having a procedure performed ($p < 0.0001$). The only factor significantly associated with subsequent loss to follow-up was incarcerated status ($p = 0.0408$), No other factors were significant after adjusting for these variables.

Analyzing timeliness, of the 300 patients who had more than one encounter in their chart, only 24 (8%) were on time to every visit, and 56 (18.6%) more were always on time until lost to follow-up. By extension, 220 (73.3%) had a delay in follow-up at least once. In the multivariate model, factors associated with being on-time to the next visit were procedure done (yes = 92.4% vs. no 29.3%, $p < 0.0001$), urgent acuity (47.8% yes vs. 9.6% no, $p < 0.0001$), and fewer than 10 days to next visit (71.4% yes vs. 21.2% no, $p < 0.0001$).

Table 1 Baseline characteristics

Characteristics	Number of encounters
Gender	
Female	30 (6.1%)
Male	459 (93.9%)
Age	Average 47.18 Range (16–84)
# of encounters	Average 4.3 Range (1–55)
Encounters by service	
Cornea	619
Comprehensive	278
Glaucoma	285
Neuro-ophthalmology	33
Oculoplastics	156
Optometry	77
Pediatrics/Strabismus	34
Retina	618
Unknown	4
Encounter source	
EHR	400
Paper	1,704
Total # patients	489
Total # encounters	2,104

Abbreviation: EHR, electronic health record.

Discussion

Over the past 40 years, the prison population in the United States has increased more than sevenfold, with a current prevalence of 743 incarcerated individuals per 100,000; second on the list of developed nations is New Zealand at 173 per 100,000.[8] The reasons for this mass incarceration are complex, as are the public health implications.[9] The literature on correctional health care is limited,[10] with no standards for data reporting or oversight currently required.[11]

The current study provides a small measure of context and found that nearly two-thirds of incarcerated patients evaluated in our outpatient ophthalmology clinic requiring repeat evaluation were ultimately lost to follow-up over 2 years. While the exact percentage of patients lost to follow-up for our entire institution is not tracked, internal data suggests that our institutional rates for individual encounter no-shows for calendar year 2017 was 24.6% for new and 13.5% for all expected patient visits. No comparison data was available for timeliness. This disparity is similar to the few existing reports in the ophthalmology literature. Four studies of private and public clinics in Australia, New Zealand, and the United Kingdom found a nonattendance rate of 9 to 17%,[12–15] with patients scheduled for follow-up less likely to report than new patients.[12,13] Two studies from an urban private retina practice in the U.S. found that 22 and 24% of patients with neovascular age-related macular degeneration and proliferative diabetic retinopathy receiving either an intravitreal injection or panretinal photocoagulation were lost to follow-up over a 4-year period, respectively.[16,17] A similar study in an academic center in Austria, where universal health care coverage is provided, found 19% of patients with diabetic retinopathy were lost to follow-up.[18]

In addition to a paucity of literature, there is no accepted definition of loss to or accuracy of follow-up in clinical medicine. The aforementioned retina clinic reports used an interval of 6 and 12 months without an appointment as a definition.[16–18] A retrospective analysis of 10 retinal clinical trials defined noncompliance as one missed visit or exiting the study early and found an overall noncompliance rate of 45.6%.[19] Another U.S. study of glaucoma patients in an academic resident physician clinic defined compliant as two subsequent follow-up visits, both within 6 ± 2.5 months of the preceding one.[20] In our study, noncompliance was defined as greater than 50% of the requested follow-up interval. We chose this methodology to better assess the timeliness for individual patients, especially in a population with a wide variety of follow-up intervals needed. This should be a potential consideration for subsequent analyses.

One factor significantly associated with loss to follow-up in this study was a transition into or out of the penal system.

Table 2 Office visits, procedures, and procedure type

Type of encounter	# of visits	Average age	# male (%)	# No-show to next visit (%)[a]	# On time to next visit (%)[a]
Regular office visit	1,728	49.2 (10–84)	1,626 (94.1)	240 (16.1)	814 (57.6)
Operating room	226	52.8 (22–84)	216 (95.6)	3 (1.3)	200 (91.7)
Cataract surgery	121	59.9	115 (95.0)	2 (1.7)	113 (94.2)
Combined cataract	6	43.3	6 (100)	0 (0)	5 (83.3)
Corneal surgery	12	44.2	12 (100)	1 (0)	10 (90.9)
Eyelid surgery	12	59.9	11 (91.7)	2 (0)	11 (91.7)
Glaucoma surgery	7	43.9	7 (100)	3 (0)	7 (100)
Globe repair	5	30.8	5 (100)	4 (0)	2 (66.7)
Orbital surgery	19	40.9	19 (100)	5 (0)	12 (75)
Strabismus surgery	4	31.3	4 (100)	6 (0)	4 (100)
Vitrectomy	40	45.5	37 (92.5)	1 (2.5)	36 (92.3)
Laser	92	52.0 (22–80)	88 (95.6)	4 (4.9)	39 (55.7)
Anterior laser	51	53.8	47 (92.2)	2 (4.3)	22 (55)
Retina laser	41	49.8	41 (100)	2 (5.7)	17 (56.7)
Other office procedure	58	46.6 (22–84)	5 (98.2)	5 (10.0)	19 (42.2)
Multiple procedures	1	33.0	1 (100)	0 (0)	0 (0)
Eyelid procedure	18	42.2	18 (100)	3 (21.4)	5 (38.4)
Intravitreal injection	37	49.4	36 (97.3)	2 (6.1)	13 (44.8)
Orbital procedure	1	49.0	1 (100)	0 (0)	1 (100)
Pneumatic retinopexy	1	36.0	1(100)	0 (0)	0 (0)
Grand total	2,104	49.6 (10–84)	1,987 (94.4)	252 (13.6)	1,072 (61.3)

[a]Percent for totals calculated from show/no-show rates, does not include visits where no follow-up was requested.

Several studies have found that incarceration can improve chronic medical conditions in certain patients, while the opposite can occur upon release.[9] Many patients are released without medications or follow-up appointments,[21] or often fail to obtain prescriptions when provided.[22] Correspondingly, these patients have a comparatively higher use of emergency services and inpatient admission rates.[23] This represents a public health opportunity, not only for recently released prisoners, but also the surrounding community. The annual cost of incarceration in the U.S. is roughly one trillion dollars, or 6% of gross domestic product.[24] Over half of these costs are shouldered by the families and community members of the incarcerated individual,[24] suggesting efforts to improve outcomes in these patients can have significant downstream societal impact. To that end, reentry programs have been piloted to provide services to incarcerated patients prior to and immediately after their release. These programs are varied in length and available resources, but typically provide discharge planning, family services, physical and mental health referrals, social service programs, and enrollment in benefits programs.[7]

Several recent studies evaluating follow-up vision care services for patients with diabetic retinopathy have identified socioeconomic disadvantage and social determinants of health as significant risk factors for nonadherence.[25,26] These risks align well with the prison population, particularly patients that are entering and exiting the system. Attempting to identify these factors in clinic patients may aid in decreasing loss to follow-up,[26] although addressing social determinants of health are the far more important and difficult task. It has been suggested the public health concept of "systems thinking" may be necessary to meaningfully affect these barriers. Systems research and integration consider the complex and interactive systems that impact social determinants of health, and identifies opportunities to coordinate interventions across these systems and ultimately change the underlying structures.[7]

There are several important limitations to this study. This was a retrospective study from a single institution with a relatively small sample size and no control group. While patients were referred from three correctional facilities, the regional referral pattern may not be generalizable to a wider incarcerated patient population. In fact, one large facility had resources and equipment that allowed in-house eyecare from a rotating group of comprehensive optometrists and ophthalmologists, so referrals from this institution were procedural or for subspecialty care. We did not have access to prison health records, so it is possible that some patients ultimately received care elsewhere or were released prior to scheduled follow-up. There was no control group to provide

comparative data, although we have internal statistics demonstrating a markedly lower no-show rate for all clinic patients (including incarcerated patients). Lastly, this data represents patients in prison, not any of the estimated 10 million annual short-term admissions to local and county jails for those newly arrested or those awaiting trial[3] or elsewhere in the criminal justice system. For these and many other reasons, further work is required to expand on these results and obtain similar data in the general population.

In conclusion, this single-center study found a concerningly high rate of incarcerated patients that were lost to follow-up in our clinic. Further study is needed to determine the applicability of these findings to a wider population, but clinicians should be cognizant of these potential care issues when managing incarcerated patients.

Conflict of Interest
None declared.

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