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Analysis of eGFR vs CrCl to monitor for renal dose adjustments within Central Refill

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Background

- The electronic medical record (Epic) does not calculate CrCl if serum creatinine is older than 30 days.
- Central Refill uses protocols that utilize eGFR as a surrogate for renal function as CrCl cannot be used. Different medications have different protocols with specific requirements to pass before the prescription can be filled.
- However, a prescription may fail the current protocol despite an appropriate CrCl. This leads to an unnecessary pharmacist review of the prescription.
- Alternatively, the prescription may pass the protocol, but the CrCl may not be acceptable. This leads to prescriptions being approved for refill without review of appropriate dosing based on renal function.
- At times, there is a serum creatinine value available in Care Everywhere within Epic that is a more recent value than those available within the health system. The protocol does not pull this information in, so a manual review is needed. If such a value exists, it is ideally used to determine the appropriateness of the prescription.

- Goals include:
  - Determine the need for adjustments to existing Central Refill protocols
  - Identify reasons behind prescriptions failing the protocols

Purpose

- Evaluate the accuracy of current Central Refill protocols regarding renal function

Outcomes

- Primary outcomes
  - Percentage of prescriptions that inappropriately passed
  - Percentage of prescriptions that inappropriately failed
  - Percentage of prescriptions that appropriately passed or failed

- Secondary outcomes
  - Incidence of failure to use most recent serum creatinine values when available within Care Everywhere

Methods

- Study design
  - Retrospective
  - Quality Improvement

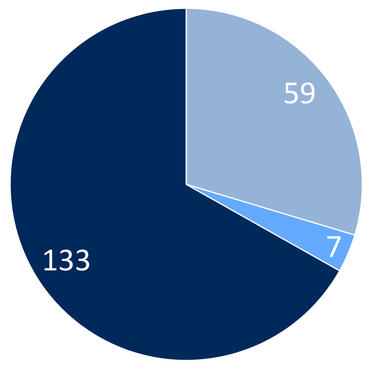
- Inclusion criteria
  - Medications included: gabapentin, duloxetine, pregabalin, topiramate, bisphosphonates, fenofibrate, SGLT2 inhibitors, memantine
  - October 1, 2022-December 31, 2022
  - Clinic A and Clinic B

- Exclusion criteria
  - Repeat patients for same medication in same month
  - Prescriptions that did not have protocol attached
  - Prescriptions lacking any serum creatinine value both within the health system and in Care Everywhere

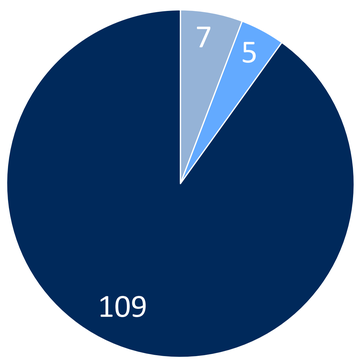
- Subgroup analysis: Exclusion of prescriptions that failed eGFR protocol due to
  - Serum creatinine more than 12 months old
  - Lack recent psychiatric screening
  - Pregnancy status
  - Lack of blood pressure data
  - Lack of HbA1c within 6 months

Primary Outcomes

All Medications



Subgroup Analysis: All Medications



Medication	Failed Inappropriately	Passed Inappropriately	Appropriate Pass or Fail
Gabapentin	27.5% (n=25)	5.5% (n=5)	67% (n=61)
Duloxetine	17.6% (n=6)	0% (n=0)	82.4% (n=28)
Pregabalin	51.6% (n=16)	6.5% (n=2)	41.9% (n=13)
Topiramate	50% (n=6)	0% (n=0)	50% (n=6)
Bisphosphonates	20% (n=2)	0% (n=0)	80% (n=8)
Miscellaneous	23.8% (n=5)	0% (n=0)	76.2% (n=16)

Subgroup Analysis

Medication	Failed Inappropriately	Passed Inappropriately	Appropriate Pass or Fail
Gabapentin	0% (n=0)	8.2% (n=5)	91.8% (n=56)
Duloxetine	0% (n=0)	0% (n=0)	100% (n=24)
Pregabalin	Excluded from subgroup analysis (provider only refill)		
Topiramate	40% (n=4)	0% (n=0)	60% (n=6)
Bisphosphonates	0% (n=0)	0% (n=0)	100% (n=10)
Miscellaneous	18.7% (n=3)	0% (n=0)	81.3% (n=13)

Secondary Outcomes

1 prescription had newer outside serum creatinine values that were not used for the protocol

Results

Primary Outcomes

- Overall, ~67% of prescriptions appropriately passed or appropriately failed. The remainder failed inappropriately (29.6%) or passed inappropriately (3.5%).
- In the subgroup analysis, 90% of prescriptions appropriately passed or appropriately failed. Only 5.9% failed inappropriately and 4.1% passed inappropriately.
- Gabapentin had the highest percentage of prescriptions that failed inappropriately. All these prescriptions failed due to lack of serum creatinine within 12 months of refill.
- Pregabalin was excluded from the subgroup analysis because it a PCP only medication for Central Refill.
- For duloxetine, the subgroup analysis excluded prescriptions that failed due to lack of recent psychiatric screening, pregnancy status, lack of recent blood pressure value and lack of serum creatinine value within the previous 12 months.
- For topiramate and bisphosphonates, the subgroup analysis excluded prescriptions that failed due to lack of serum creatinine value within the previous 12 months.
- Within the miscellaneous group, 3 out of 3 levetiracetam and 1 out of 1 lurasidone prescriptions failed inappropriately.
- For the subgroup analysis for the miscellaneous prescriptions, 4 prescriptions were excluded due to lack of serum creatinine within the previous 12 months and 1 SGLT2 inhibitor prescription was excluded for lack of HbA1c within 6 months.
- N=7 (3.5%) prescriptions overall passed inappropriately. 5 of these prescriptions were gabapentin and 2 were pregabalin.

Secondary Outcomes

- For 1 prescription there was a more recent serum creatinine value available in Care Everywhere which would differentiate between a pass and a fail. This prescription passed and a refill was completed. However, the calculated CrCl from this value was near the cutoff.

Discussion

- Many prescriptions failed inappropriately. These prescriptions failed the protocol that uses eGFR as a surrogate marker, but would pass based on calculated CrCl. The most recent serum creatinine was used to calculate CrCl. However, for 19.6% of prescriptions the serum creatinine value that was used was obtained >12 months before refill/protocol date.
- A higher percentage of prescriptions passed in the subgroup analysis. However, 10% of prescriptions still had a different result when using eGFR vs CrCl.
- Although only a small number of prescriptions passed inappropriately, it is imperative that prescriptions are correctly flagged for review in those with clinically significant renal dysfunction. These particular prescriptions were not flagged for pharmacist review, therefore had the risk of causing toxicity.
- eGFR appears to be a moderately effective surrogate for CrCl, particularly when the most recent serum creatinine value is used regardless of when the lab value was obtained.
- The subgroup analysis, which filters out protocol criteria unrelated to renal function, showed that 10% of prescriptions passed or failed inappropriately. Given this information, it may be beneficial to adjust the protocol to utilize CrCl and to configure a method for Epic to calculate a CrCl from a serum creatinine value that is >30 days old.
- For secondary outcomes, it is reasonable that the prescription with the differing outside lab was sent for refill given the multitude of variations to calculate CrCl and the resulting CrCl value being near the cutoff for dose appropriateness.