



Renal Failure

Hello and welcome to another episode of The GenerEhlist's CFPC 105 topics podcast.

- Today's topic is renal failure
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So our **first objective:**

In patients with chronic renal failure ensure they are aware of their diagnosis and its implications.

To no one's surprise as soon as chronic renal failure is diagnosed, patients should be made aware of their diagnosis. It is helpful to define chronic renal failure in layman terms, for example, presence of kidney damage or decreased kidney function for three or more months.

Furthermore, it is important to inform the patient of the stage of the kidney disease. The patient will likely however, have already been primed as investigations or monitoring to reach this diagnosis will have already taken place.

While we're on this topic, the patient should also be reminded that further testing may be required to better work up their renal failure or monitor kidney function. This would include blood tests and imaging.

They should also be made aware of the variety of symptoms associated with renal failure, these can range from asymptomatic to: changes in appetite and urinary frequency, fatigue, muscle cramps, edema, chest pain, and shortness of breath.

Furthermore, some of these symptoms are associated with progression of disease, so even if they are not experiencing them now, they may come later and can unfortunately be a sign of other comorbidities which are precipitated by renal failure.

Second objective:

In any patient, mitigate the risks of precipitating renal failure when investigation and treatment combinations are likely to be harmful.

This objective kind of speaks for itself. There are several treatments and investigations which need to be watched closely in patients with chronic kidney disease.

While we're not saying all of these should be avoided, care should be taken that we don't overly stress the already compromised kidneys and cause acute kidney injury, accelerated kidney function loss, or other consequences such as electrolyte disturbances and bleeding.



Things which precipitate renal failure include:

- contrast dye,
- bowel preparation, and
- a number of medications.

Contrast dye is nephrotoxic, if it's required make sure the lowest dose possible is used. The general recommendation is to maintain euvoemia before and after receiving contrast. So patients are usually given fluids before and then a few hours after contrast if they're in hospital but I digress. (there is a dearth of good evidence that CIN even exists, however, you will come across this both on examinations and in real life as this information trickles through the medical community)

That's straightforward enough. For bowel preparations anything containing phosphate, which is usually used to draw water into the bowel, will increase the risk of phosphate nephropathy as well as electrolyte disturbances. Shall we move on to medications to be careful with?

Let's do it!

Thiazide and loop diuretics are commonly used to control blood pressure in patients with a reduced GFR. This is critical in advanced chronic kidney disease where blood pressure becomes more sensitive and excess extracellular volume becomes a concern.

Aggressive diuretic use can increase the risk of an acute kidney injury, particularly in patients in an edematous state or who are already volume depleted.

This being said, thiazide and loop diuretics are often used in long-term management of CKD. Thiazides are the recommended add-on therapy for HTN management after ACEi for this population. And most patients need loop diuretics for edema management.

_Just remember that these are "sick day meds" that may need to be held during acute illness, but they shouldn't necessarily always be avoided.

RAAS blockers also deserve some attention, as they are essential to CKD but also have the potential to cause harm. Kidney injury as well as hypotension from RAAS blockers is particularly at risk in patients who also have congestive heart failure, active diuresis, or other illnesses which cause volume depletion.

Furthermore, when more than one RAAS blocker is used or when RAAS blockers are combined with other drugs such as: ACE inhibitors, NSAIDS, or SGLT2 inhibitors, then the risk of kidney injury is amplified.



Keep in mind that when starting SGLT2 inhibitor, the GFR can transiently decrease, but SGLT2i are actually renoprotective and recommended in patients with albuminuria, regardless of whether or not they're diabetic.

So again, ACEi and SGLT2i are used in long-term management but are sick-day meds.

Finally other medications to keep an eye on in chronic kidney disease include: metformin, aminoglycosides, digoxin, lithium, phenytoin, tacrolimus, warfarin, meperidine, morphine.

Basically, anything which is nephrotoxic, or is eliminated by the kidneys or may build-up with kidney injury should be monitored or avoided.

Our third objective:

When prescribing drugs to a patient in renal failure:

- a) Determine drug safety**
- b) Adjust doses when appropriate**
- c) Monitor the impact of the drug on the renal function more frequently.**

A framework to medication assessment was wonderfully described by Whittaker et al., which we've linked in the show notes.

First, check your patient's renal function. We're going to need the most recent GFR to determine drug dosing.

Second, collect a complete medication list. This will include all prescriptions, over the counter medication, as well as any dietary supplements.

Third, perform a medication review. Questions to ask ourselves include: is this medication nephrotoxic, or contraindicated in CKD at a particular GFR? How does this drug or drug metabolites half-life change in CKD? Does CKD increase adverse effects or drug-drug interactions in this medication?

And finally does this drug have a narrow therapeutic index in CKD that requires more intense monitoring?

Fourth, adjust said dose based on GFR. Also here it also makes sense to consider deprescribing medications where the benefit may now be outweighed by potential effects exacerbated by CKD.

And finally, monitor the impact of the drug on your patient's renal function. Focusing on efficacy, toxicity, and kidney function.



Objective 4: Advise patients with existing moderate or severe renal failure to pay close attention to hydration

Hydration is challenging yet very important in patients with renal failure. Normal thirst-guided intake should determine patients' water intake, unless there is a specific reason to increase fluid intake such as salt wasting nephropathy, central and nephrogenic diabetes insipidus or preventing uroli thiasis.

However, patients with chronic renal failure are often told to follow a salt restricted diet to avoid holding on excess fluid. Sounds simple enough.

Sure, but it is very easy for patients to get dehydrated especially when patients are: traveling, ill, exercising, or even just experiencing hot weather. Any of these can result in acute or chronic renal damage.

Therefore, patients should be told to pay close attention to their hydration status by monitoring their fluid intake, as well as urine color and volume.

**Back to the topic of drugs, objective 5:
Advise patients with existing renal failure to avoid certain over-the-counter treatments**

_ This includes NSAIDs which impair renal autoregulation by inhibiting prostaglandin-mediated vasodilatation.

Furthermore, the following natural compounds should be avoided: Noni juice, the always scary St. John's wort, Ginkgo biloba, ephedra alkaloids, and licorice.

And again, circling back to dehydration.

**Objective 6:
In patients with moderate or severe renal failure provide anticipatory guidance that if they become ill and cannot maintain fluid intake they should:**

- Stop certain medications promptly
- Seek prompt reassessment

As we've previously mentioned, staying hydrated is very important... for our listeners and especially for patients with CKD. Patients with moderate or severe renal failure should be provided with anticipatory guidance BEFORE they become ill and struggle to maintain fluid intake.



Generally, when a CKD patient struggles to have enough water, they should know which medications to stop taking and then seek a prompt reassessment so that their physician can review their medications and limit the risk of injury. How would you know which medications to tell your patient to hold?

We can use the classic SADMANS mnemonic so that's:

- sulfonylureas, other secretagogues,
- ACE inhibitors,
 - diuretics and
 - direct renin inhibitors,
 - metformin,
 - angiotensin receptor blockers,
 - NSAIDs, and
 - SGLT2 inhibitor

Great, but let's say that our patient doesn't monitor their hydration status and exacerbates their renal failure. What then?

Then we follow our **seventh objective: In a patient with an exacerbation of their renal failure (acute or chronic renal failure) you should:**

- a) Correct factors (e.g., hydration, pneumonia, congestive heart failure, urinary retention)**
- b) Stop drugs that might be aggravating the situation (e.g., ACE inhibitors, metformin)**
- c) Determine the appropriateness of restarting medications, once renal function has stabilized**

And here the objective itself provides a good framework for how to deal with an acute or chronic renal injury.

Prerenal is due to impaired perfusion resulting from dehydration, blood loss, infection, vascular occlusion, or congestive heart failure. Renal causes are usually acute interstitial nephritis, acute tubular necrosis, and glomerulonephritis.

And finally post renal which is usually due to an obstruction from prostatic hyperplasia, or urinary calculi, strictures, or tumors.

And then if the clinical picture and cause isn't clear based on history and presentation, further investigations would be required but, in the meantime, we stop our SADMANS drugs that could aggravate the situation, especially if dehydration is a concern. But what would we do after that?

After holding these drugs, and hopefully identifying the cause of this exacerbation we begin to treat the cause.



So you're saying if they're dehydrated we hydrate? If there's an infection, we give antibiotics?

You've got it! What about if it's post renal?

Then we again treat the cause? Presumably this looks like the removal of a kidney stone, dilation of a stricture, or removal of a tumor?

Objective 8:

Monitor patients with renal failure periodically, as some patients will worsen over time.

This is unfortunate but is the harsh truth. General management consists of treating reversible causes of renal failure, slowing progression, treating complications, identifying and preventing comorbidities as well as adjusting drug doses.

Because there are many moving parts that need to be monitored, good follow up with a primary care physician is key in management of patients with chronic renal failure.

Objective 9:

For patients with renal failure determine, based on patient factors and local resources, if and when consultation is required.

The guidelines are quite clear here: patients with chronic renal failure should be referred to a nephrologist for the following reasons:

- eGFR is less than 30 or
- if an unexplained, progressive decline in eGFR ≥ 5 mL/min/1.73m² that occurs over 6 months

Other reasons for referral include

- persistent albuminuria, and
- sustained hematuria not explained by urinary tract source,
- acute nephrotic syndrome,
- suspected vasculitis, or
- glomerulonephritis.
- resistant/suspected secondary HTN in the context of CKD,
- persistent electrolyte abnormalities,
- hereditary kidney disease or
- recurrent or extensive nephrolithiasis.

Reasons for an emergent referral would include:



- a new diagnosis of eGFR < 10. Life threatening uremic symptoms such as hyperkalemia > 6.5 mmol/L; pulmonary edema and kidney failure; pericarditis and kidney failure, or evere rapidly progressive kidney failure with a significant decline in kidney function over days to weeks.

However this could vary from province to province, so we've attached a quick provincial referral guide in the show notes.

KDIGO international guidelines are also generally followed for management so those can be an additional resource.

Once again you can find these in the show notes.

Final objective:

Ensure those involved in consultant care of patients with renal failure are aware of other important health considerations that may affect decision making around treatment.

Studies have shown associations between early involvement of nephrology and both improved morbidity and mortality as well as an overall decrease in healthcare costs. Therefore, it is crucial to get nephrology involved in a timely manner.

That makes sense, kidney people are good with kidneys. Where does primary care come into play here?

Well, in order for nephrology to make the best treatment decisions they need to be aware of all possible health considerations which would be known by their primary care provider who has been following the patient long term. This would include other medical conditions, risk factors, patient preference and other patient factors such as cognitive status, socioeconomic background, location, history of substance use, family dynamics and so on.

Considerations of these factors would also help determine if other consultants or health care professionals need to be involved in said patient's care.



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