MEDICATION ANALYSIS FOR HOSPITAL PATIENTS WITH RENAL INSUFFICIENCY: FROM DEVELOPMENT PHASE TO STANDARD PRACTICE

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PURPOSE:

Our hospital ward phamacists´ routine procedure and trainees´ projects have confirmed the utility of ongoing consultation with doctors concerning medicine optimization. We thus analyzed the extent to which ongoing supervision of patients with renal insufficiency could be integrated into daily pharmacy-department procedures despite limited human resources.

METHOD:

Our clinic´s central laboratory compiled a list of the daily GFRs of all in-patients, those with GFR < 40 ml/min then selected for evaluation. The current medication situation was accessed via our electronic patient record. To sensibly limit the number of cases to control, three GFR categories were chosen & compared:

≤10 ml/min	10-30 ml/min	30-40 ml/min

Prognosis of CKD by GFR and albuminuria category

(GFR = glomerular filtration rate)

(CKD = chronic kidney disease)

Prognosis of CKD by GFR and Albuminuria Categories: KDIGO 2012

GFR categories (ml/min/ 1.73 m²) Description and range				Persistent albuminuria categories Description and range		
				A1	A2	A3
				Normal to mildly increased	Moderately increased	Severely increased
				<30 mg/g <3 mg/mmol	30-300 mg/g 3-30 mg/mmol	>300 mg/g >30 mg/mmol
	G1	Normal or high	≥90			
	G2	Mildly decreased	60-89			
	G3a	Mildly to moderately decreased	45-59			
	G3b	Moderately to severely decreased	30-44			
	G4	Severely decreased	15-29			
	G5	Kidney failure	<15			

Green: low risk (if no other markers of kidney disease, no CKD); Yellow: moderately increased risk; Orange: high risk; Red, very high risk.

Chart 1: Stages of renal insufficiency (based on KDIGO, [1]) & risk assessment

In total, the medication of 425 patients was monitored from March to June, 2017; with intervention proving necessary in 154 (ca. 36 %) cases, & related to two main areas of focus:

- **kidney-related adjustment** (via *www.dosing.de* & SmPC; compilation of a database and of an overview dosage sheet designed to facilitate entry & documentation)
- **general drug interaction** (via ABDAMED database; entries limited to those cases which required corrective change)

Cases where clinically relevant abnormalities requiring alternative or adjusted medication were observed were discussed with the respective doctors in the wards. The extent to which the suggested steps had been taken were checked the following day.

RESULTS:

Application of changes regarding medication or at least discussion of suggested adjustments was possible in ca. 73 % of the cases. If the patients already classified as ´discharged´ or ´transferred´ (unknown) the following day are included in this figure, then it rises to as much as 84 %.

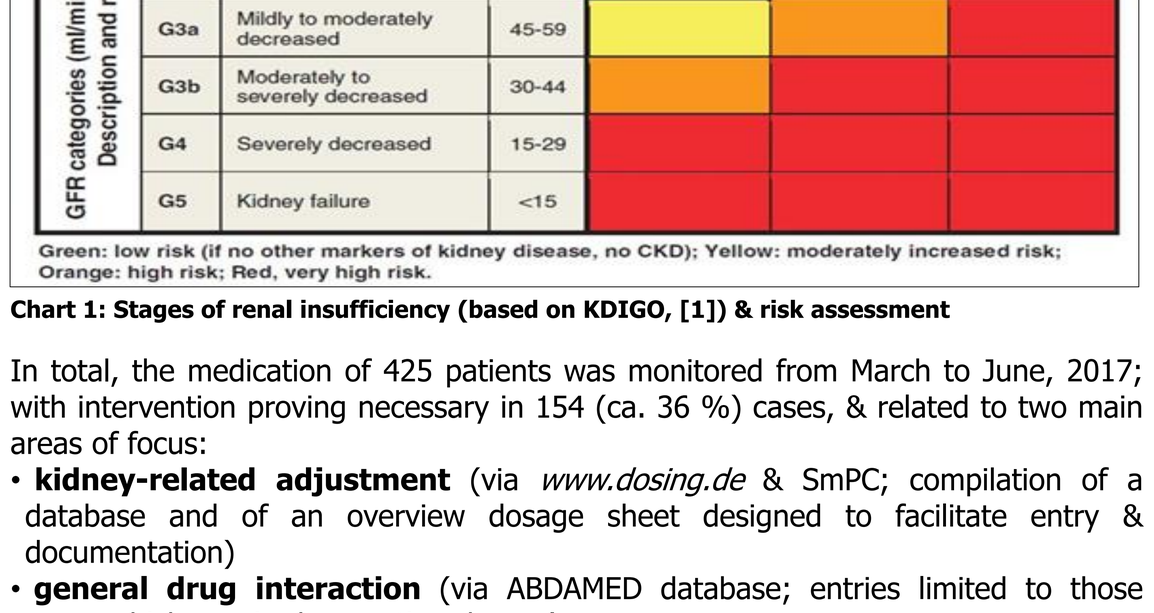

Chart 2: Application of recommendations

Intervention due to renal impairment varies greatly between the three groups, with drug interaction, in contrast, being largely constant. Overall, GFR 10-30 ml/min cases had the highest intervention rate (50.9 %) among cases in which intervention was carried out (cf. GFR < 10 ml/min: 28,5 %; GFR 30-40 ml/min: 17.1 %). In situations in which adjustment was necessary, on average 1,47 medication errors were ascertained (GFR < 10: 1.33; GFR 10-30: 1.57; GFR 30-40: 1.16).

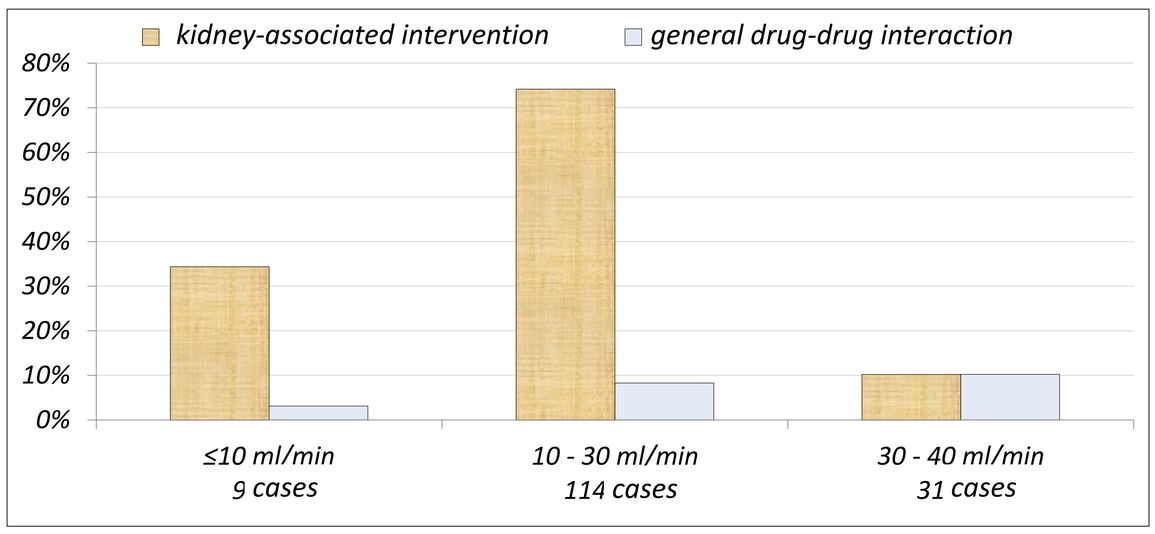

Chart 3: Interventions, grouped according to category

The most frequent abnormalities were entered onto a fact sheet for doctors. Interactions were particularly evident when levothyroxine or quinolones had been administered with polyvalent cations & amlodipine had been combined with simvastatin. Problems related to renal insufficiency are largely an issue connected with simvastatin, ramipril, diuretics & oral anti-diabetics.

Kontraindikationen (KI) & wichtige Hinweise zur Arzneimittelgabe

cave: lediglich eine Auswahl ohne Gewähr! *Kliniken Nordoberpfalz AG , 2018*

GFR < 60 ml/min
Ramipril 5mg/d
Methotrexat KI
Olmesartan 20mg/d
Moxonidin 0,4mg/d
(Einzeldosis max. 0,2mg)

GFR < 50 ml/min
Leflunomid KI
Sitagliptin 50mg/d

GFR < 45 ml/min
Metformin 1000mg/d

GFR < 35 ml/min
Alendronat
(Anwendung nicht empfohlen)

GFR < 30 ml/min
Simvastatin > 10 mg/d nur mit Risikoabwägung
Lercanidipin KI
Dihydralazin KI
Ranolazin KI
orale Coxibe KI
Duloxetin KI
(ausschleichen!)

Orale Antidiabetika:
Metformin KI
Sitagliptin 25mg/d
Glimepirid KI
Glibenclamid KI

Diuretika:
Eplerenon KI
Spironolacton KI
Hydrochlorothiazid KI*
Chlortalidon KI*
(*: Außer bei sequentieller Nephronblockade)

Simvastatin:
! Gabe bevorzugt **abends**
! Vorsicht bei Niereninsuffizienz
! Maximal 20 mg/d in Kombination mit Amlodipin, Amiodaron, Verapamil, Diltiazem, Ranolazin
! Kontraindiziert in Kombination mit Makrolid-Antibiotika, Azol-Antimykotika, HIV-Protease-Inhibitoren

QT-Zeit-Verlängerung (cave insb. bei Kombinatione!):
! Antibiotika (Chinolone, Makrolide), Psychopharmaka, Antiemetika, Muskelrelaxantia wie: Domperidon, Haloperidol, Doxepin, (Es-)Citalopram, Melperon, Mirtazapin, Quetiapin, Risperidon, Sulpirid, Venlafaxin, Setrone, Tizanidin, Tiaprid

Resorptionsminderung (> 2h Abstand zu Antazida, Mg, Ca, Fe u.a.)
! Chinolone
! Levothyroxin (Magnesium ist erlaubt)
! Doxycyclin
! Bisphosphonate
! Eisen

Clopidogrel:
! Verminderte Wirkung mit CYP2C19-Inhibitoren, wie z.B. Carbamazepin, sowie Omeprazol (Pantoprazol empfohlen)

Kombinationspräparate:
Vorsicht aufgrund maximaler Tagesdosis!
- Amlodipin: max 10 mg/d: enthalten in Exforge® und Vocado®
- Simvastatin: enthalten in Inegy®

Bei **Antibiosen** jeweiliges Dosierungsschema beachten!
Niedermolekulare **Heparine** gemäß Zulassung einsetzen!

Chart 4: White-coat pocket memory card for doctors

DISCUSSION / SUMMARY:

The decision to focus only on the 10-30 ml/min GFR group proved itself to be conducive to making structuring medication analysis procedures as efficient as possible. Comparison with controls encompassing all groups shows that by opting for limitation to one GFR group the number of patients each day was reduced (16.4 → 8.4), but most of the medication errors were nevertheless identified (8.7 → 6.4). In this form, the service can be permanent. In the case of patients with GFR 30-40 ml/min, renal insufficiency probems associated with medication occur less frequently because the SmPC mostly only provide data for dosage adjustment & contra-indications for patients from GFR < 30 ml/min. Special medical care of dialysis patients (in most cases GFR < 10 ml/min) leads to fewer necessary interventions.

Literatur:

[1] DIGO (Hrsg.), KDIGO 2012 Clinical Practice Guideline for the Evaluation and Management of Chronic Kidney Disease. Official Journal of the International Society of Nephrology: Kidney International Supplements, Volume 3 (Issue 1), 2013, 1–150

24th Congress of the EAHP (European Association of Hospital Pharmacists), Barcelona, 27 – 29 March 2019

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