Validation and Utility of a Medication Regimen Complexity Scoring Tool (MRC-ICU) Applied to Surgical Intensive Care Unit Patients

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Background

- Few objective tools are available to assess the workload of clinical pharmacists in the intensive care unit (ICU) setting
- The Medication Regimen Complexity Scoring Tool for the ICU (MRC-ICU) was developed in the medical ICU of a large academic medical center in 2017 to measure medication regimen complexity in critically ill medical patients

Purpose

- To validate the MRC-ICU score in a surgical ICU (SICU) population at a community teaching hospital
- To determine whether the MRC-ICU score correlates with pharmacist workload and patient outcomes

Methods

- Design: IRB Approved, retrospective, cohort study
- Setting: ICU at a 250-bed community teaching hospital
- Inclusion Criteria: Admitted to surgical ICU service
- Exclusion Criteria: ICU length of stay <24 hours
- Time Frame: March 2018 - May 2018

Results

Table 1. Patient Characteristics

Characteristic	SICU (n=50)
Gender, male	25 (50%)
Age, years	61 (40 – 74)
Weight, kg	79 (63 – 106)
APACHE II	15 (8 – 24)
Mortality	5 (8%)
ICU length of stay, days	2 (2 – 5)
Total Home Meds	7 (3 – 13)
0 – 4	17 (28%)
5 – 10	16 (26%)
11+	17 (28%)

All data presented as median (interquartile range) or number (percent)

Results

Table 2. MRC-ICU score at 24 hours

	SICU (n=50)
Total Orders at 24 hrs	88 (59 – 106)
Total medication orders at 24 hrs	30 (23 – 41)
MRC-ICU score at 24 hrs	11 (8 – 13)
Pharmacist interventions at ICU discharge	2 (1 – 6)
Drug-Drug Interactions	28 (18 – 55)

Table 3. Validation of MRC-ICU in SICU patients

	Rho	p-value
Total orders at 24 hours	0.423	0.002
Medication orders at 24 hours	0.446	0.001
Age	0.008	0.654
Weight	0.076	0.600

Table 4. Correlation of MRC-ICU with pharmacist workload and patient outcomes

MRC-ICU @ 24 hours	Rho	p-value
Pharmacist Interventions	0.502	0.001
Drug-Drug interactions	0.452	0.001
ICU length of stay	0.180	0.210
Inpatient mortality	N/A	0.508

Conclusion

- The MRC-ICU score was found to be a valid tool for assessing medication complexity in a surgical population at a community teaching hospital
- MRC-ICU score positively correlated with pharmacist workload, as indicated by number of DDIs screened and number of pharmacist interventions
- No significant correlation was found between MRC-ICU score and ICU length of stay or inpatient mortality
- Future research will further examine the utility of MRC-ICU score for predicting pharmacist workload, which may lead to use of the MRC-ICU to determine an ideal pharmacist–to-patient ratio

MRC-ICU

Parameter	Point Value
High Priority Medications	
Aminoglycosides (amikacin, gentamicin, tobramycin)	3x
Amphotericin B and Liposomal Amphotericin B	1
Antiarrhythmics (amiodarone, dofetilide, sotalol)	1x
Anticoagulants (NOAC's/DOAC's, fondaparinux)	1x
Anticonvulsants (carbamazepine, phenobarbital, phenytoin, valproic acid)	3x
Argatroban	2
Azole antifungals (posaconazole voriconazole)	2x
Blood products (factor products, antithrombin III)	2x
Chemotherapy (active inpatient)	3x
Clozapine	3
Digoxin	3
Ganciclovir/valganciclovir	1x
Hyperosmolar fluids (hypetonic saline (1.5%, 3%, 23,4%), mannitol)	1x
Immunosuppressants (cyclosporine, sirolimus, tacrolimus)	3x
Lidocaine (continuous infusion)	2
Lithium	3
Prostacyclins (epoprostenol, iloprost, treprostinil)	2x
Theophylline	3
Therapeutic heparins (enoxaparin, heparin infusion)	2x
Vancomycin (IV)	3
Warfarin	3
ICU medications	
Neuromuscular blockade	2
Continuous infusions (exclude those listed elsewhere)	1x
Total parental Nutrition	
Managed by non-pharmacist service	1
Managed by clinical specialist pharmacist	3
ICU prophylaxis and FAST HUGS BID	
Thromboembolic prophylaxis (exclude heparin infusion, therapeutic enoxaparin)	1
Stress ulcer prophylaxis (exclude pantoprazole infusion)	1
Glycemic control (subcutaneous insulin; exclude IV insulin)	1
Bowel regimen	1
Chlorhexidine	1
Analgesia and sedation	
Opioids and sedatives (scheduled and PRN)	1x
Continuous infusion opioids and sedatives (Propofol, fentanyl, dexamadetomidine, ketamine, benzodiazepines)	2x
Antimicrobial agents	
Antimicrobials (include HIV medicactions, exclude those listed elsewhere)	1x
Restricted antimicrobials	2x
Devices	
Dialysis	2
Extracorporeal membrane oxygenations (ECMO	2
Intra-aortic balloon pump (IABP)	1
Left ventricular assist device (LVAD)	1
Mechanical ventilation	2

References

Newsome, A. et al. Development of a Medication Regimen Complexity Scoring Tool (MRC-ICU) for Critically Ill Patents. Critical Care Medicine. 46(1):439. DOI:10.1097/01.ccm.0000528919.21233.e5.