





# Optimizing pharmacotherapy by assessing drug therapy problems in an advanced heart failure care center

 **Emilija Katarina Lozo<sup>1\*</sup>**,  
 **Mirna Alebić<sup>1</sup>**,  
 **Jasmina Matijašević Škerlj<sup>1</sup>**,  
 **Nives Kerner<sup>2</sup>**

<sup>1</sup>University Hospital Centre Zagreb, Zagreb, Croatia

<sup>2</sup>Zadar General Hospital, Zadar, Croatia

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**\*ADDRESS FOR CORRESPONDENCE:** Emilija Katarina Lozo, Klinički bolnički centar Zagreb, Kišpatičeva 12, HR-10000 Zagreb, Croatia. / Phone: +385-92-2619-566 / E-mail: [lozo.ek@gmail.com](mailto:lozo.ek@gmail.com)

**ORCID:** Emilija Katarina Lozo, <https://orcid.org/0009-0001-2537-9948> • Mirna Alebić, <https://orcid.org/0009-0002-9585-1563> • Jasmina Matijašević Škerlj, <https://orcid.org/0009-0007-0403-5066> • Nives Kerner, <https://orcid.org/0009-0006-7303-5644>

**Introduction:** Drug therapy problem (DTP) is an undesirable event experienced by a patient that involves drug therapy, interferes with achieving goals of therapy and requires professional judgement to resolve. Providing a medication management service, a pharmacist can ensure that all medications are the most appropriate and effective, the safest possible and taken as intended<sup>1</sup>. The aim of this research was to determine the prevalence of DTPs, interventions of clinical pharmacist and follow-up which includes clinical outcomes.

**Patients and Methods:** We included 150 patients in the research, of which 57 patients were in HTx (heart transplant) group, 19 in LVAD (left ventricular assist device) group, 64 in CMP (cardiomyopathy) group and 10 were classified as Others. At the initial assessment patients, DTPs were grouped into 4 categories: indication, effectiveness, safety and adherence. Follow-up was conducted on next following visit. Clinical parameters and number of hospital admission were assessed at the baseline and following visits for all patients, while parameters such as international normalized ratio or tacrolimus concentration were appointed to specific group of patients.

**Results:** On average, patients were 57 years old, majority were men (80.00%). The number of prescribed medications was 1734 with an average of 11.5 per patient. Analysis revealed 484 DTP and their distribution overall and among 4 patient groups is shown in **Table 1**. In HTx group most frequent intervention included immunosuppressants; 85.96% had immunosuppressant values within the therapeutic levels range, compared to 61.40% prior intervention. In the CMP group 82.70% patients had 4 pillars of heart failure therapy at baseline, compared to 89.13% after follow-up. Details about target doses are shown

**TABLE 1. Distribution and percentage of drug therapy problem between the groups.**

The most common DTP overall	The most common DTP in HTx	The most common DTP in CMP	The most common DTP in LVAD	The most common DTP in Others
<b>Effectiveness:</b> ineffective dose (15.70 %)	<b>Effectiveness:</b> ineffective dose (15.27 %)	<b>Indication:</b> untreated condition (17.46 %)	<b>Indication:</b> untreated condition (19.67 %)	<b>Indication:</b> untreated condition (19.35 %)
<b>Effectiveness:</b> needs additional monitoring (14.88 %)	<b>Effectiveness:</b> needs additional monitoring (14.29 %)	<b>Effectiveness:</b> ineffective dose (15.34 %); needs additional monitoring (15.34 %)	<b>Effectiveness:</b> ineffective dose (18.03 %); needs additional monitoring (16.39 %)	<b>Effectiveness:</b> ineffective dose (16.13 %)
<b>Indication:</b> untreated condition (13.84 %)	<b>Safety:</b> dose too high (12.32 %)	<b>Effectiveness:</b> more effective drug available (12.70 %)	<b>Safety:</b> drug interaction (16.39 %)	<b>Effectiveness:</b> needs additional monitoring (12.90 %)
<b>Percentage of DTP in categories:</b>	41.94 %	39.04 %	12.61 %	6.41 %

DTP = drug therapy problem; HTx = heart transplant group; CMP = cardiomyopathy group; LVAD = left ventricular assist device group;

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in **Table 2.** High percentage of four pillars is not surprising considering that prescribers are adopting a guideline-directed medical therapy for heart failure with reduced ejection fraction. Achieving target doses of medications was limited by symptomatic hypotension and bradycardia, renal impairment and hyperkalemia. Long-term anticoagulation with warfarin is required after LVAD implantation; 68.42% patients in LVAD group were in the INR range comparable to 89.00% after follow-up. According to the percentage of drug interactions, the narrow therapeutic width of warfarin is predisposing factor for clinically significant interactions.

**TABLE 2. Percentage of patients with target doses of guideline-directed medical therapy for heart failure with reduced ejection fraction.**

	ARNI	BB	MRA	SGLT2i	4 PILLARS
After intervention	26.92 %	11.53 %	80.77 %	90.38 %	82.70 %
After follow-up	47.83%	15.22 %	82.61 %	95.65 %	89.13 %

ARNI: angiotensin receptor/neprilysin inhibitor; BB: beta blocker, MRA: mineralocorticoid receptor antagonists; SGLT2i: sodium-glucose cotransporter-2 inhibitors

**Conclusion:** As a part of multidisciplinary team, clinical pharmacists have essential role in identifying and resolving DTPs, simplifying complex regimens and providing individualized education thus ensuring patient safety and having positive impact on clinical outcomes.

#### LITERATURE

1. Cipolle RJ, Strand L, Morley P. *Pharmaceutical Care Practice: The Patient-Centered Approach to Medication Management*. 3rd ed. McGraw-Hill; 2012.