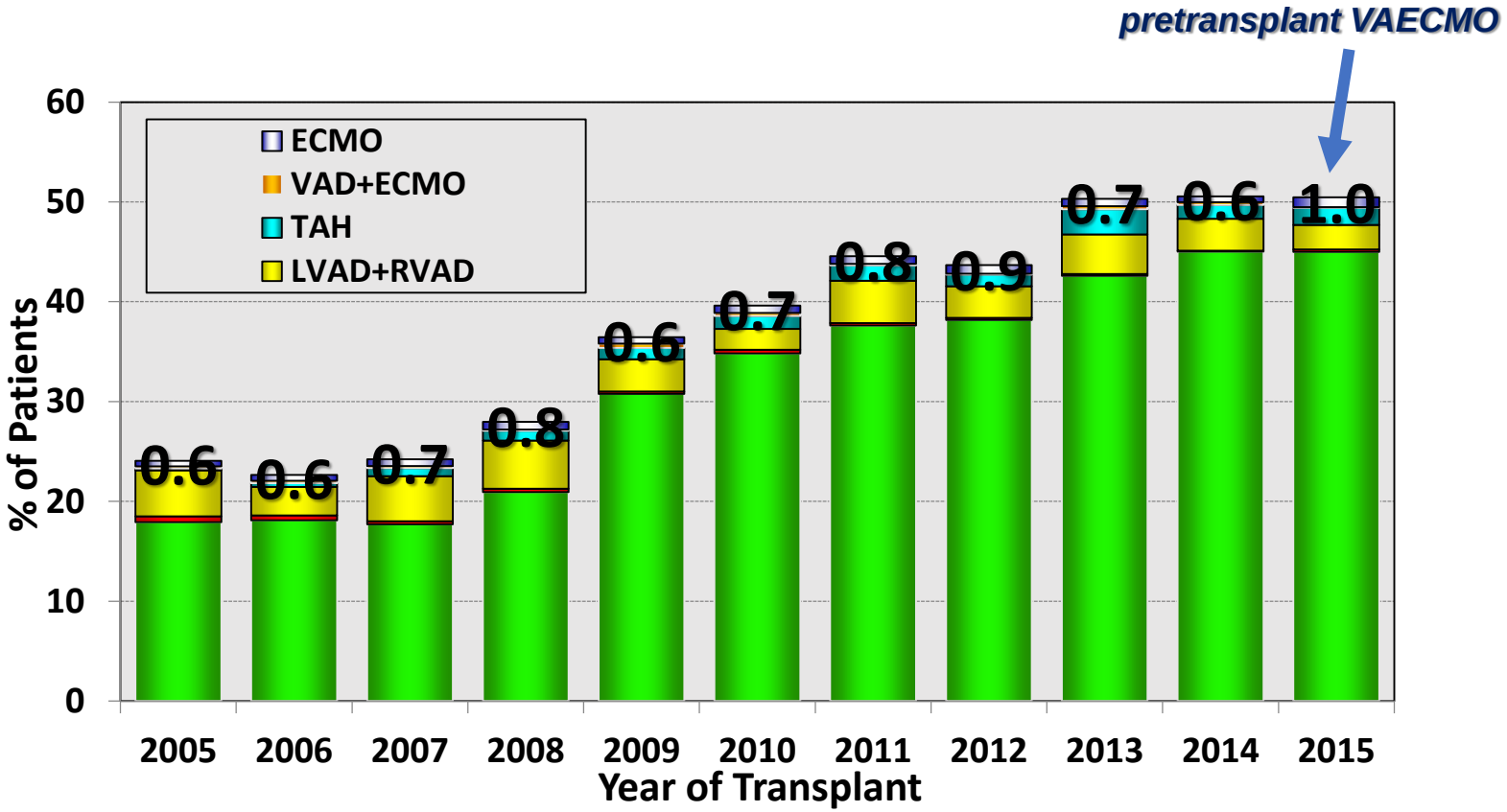
Five Years Experience of Peripheral Veno-Arterial ECMO as Method of Mechanical Circulatory Support in Heart Transplant Candidates

V. N. Poptsov, E. A. Spirina, A. A. Dogonascheva.

Heart/Lung Transplant Team,
Shumakov National Medical Research Centre of Transplantology and Artificial Organs,
Moscow, Russian Federation

Adult Heart Transplants
% of Patients Bridged with Mechanical Circulatory Support* by Year and Device Type



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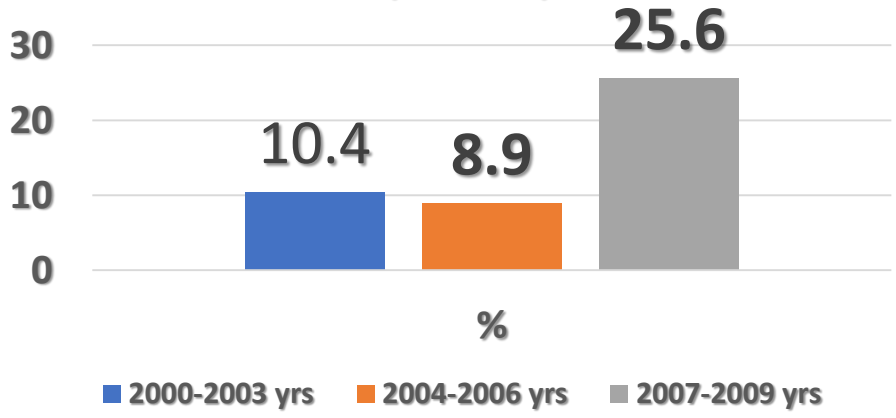
Short-term mechanical circulatory support as a bridge to urgency heart transplantation

Spanish National Heart Transplant Registry

(Spanish, 2000-2009 yrs.)

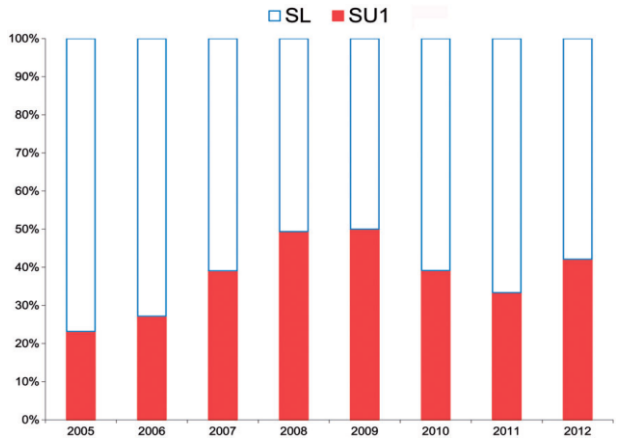
Short-term pretransplant MCS



*Barge-Caballero E. et al. Impact of short-term mechanical circulatory support with extracorporeal devices on postoperative outcomes after emergency heart transplantation: **data from a multi-institutional Spanish cohor**t. // Int J Cardiol 2014; 173: 86-93.*

High-Urgency Waiting List Super Urgence (SU) (France, since 2004 yr.)

38% (n=87) SU1 with pretransplant VAECMO



*D'Alessandro C. et al. High-urgency waiting list for cardiac recipients in France: **single-centre 8-year experience.** //Eur J Cardiothorac Surg 2017; 51: 271-278.*

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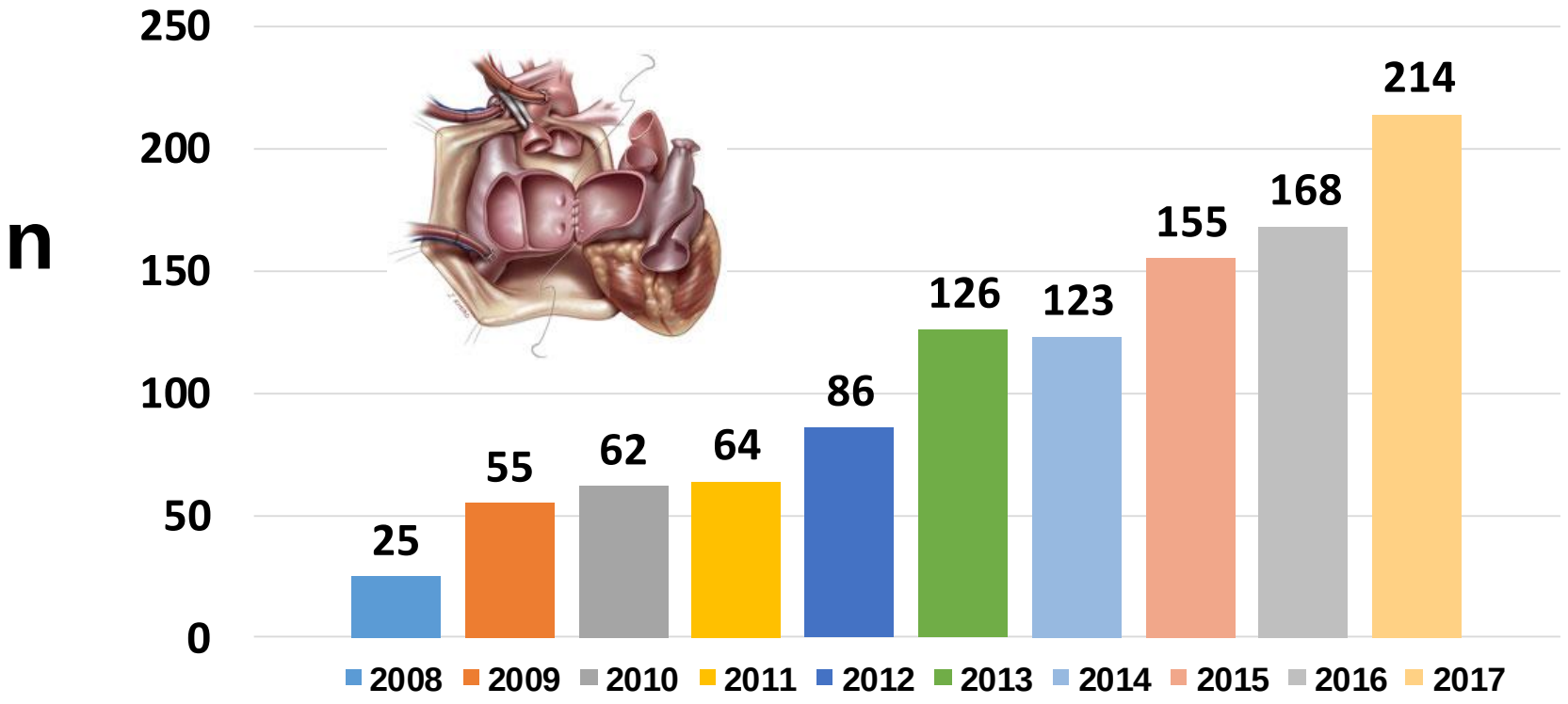
heart transplant wait list (2008-2017 yrs.)



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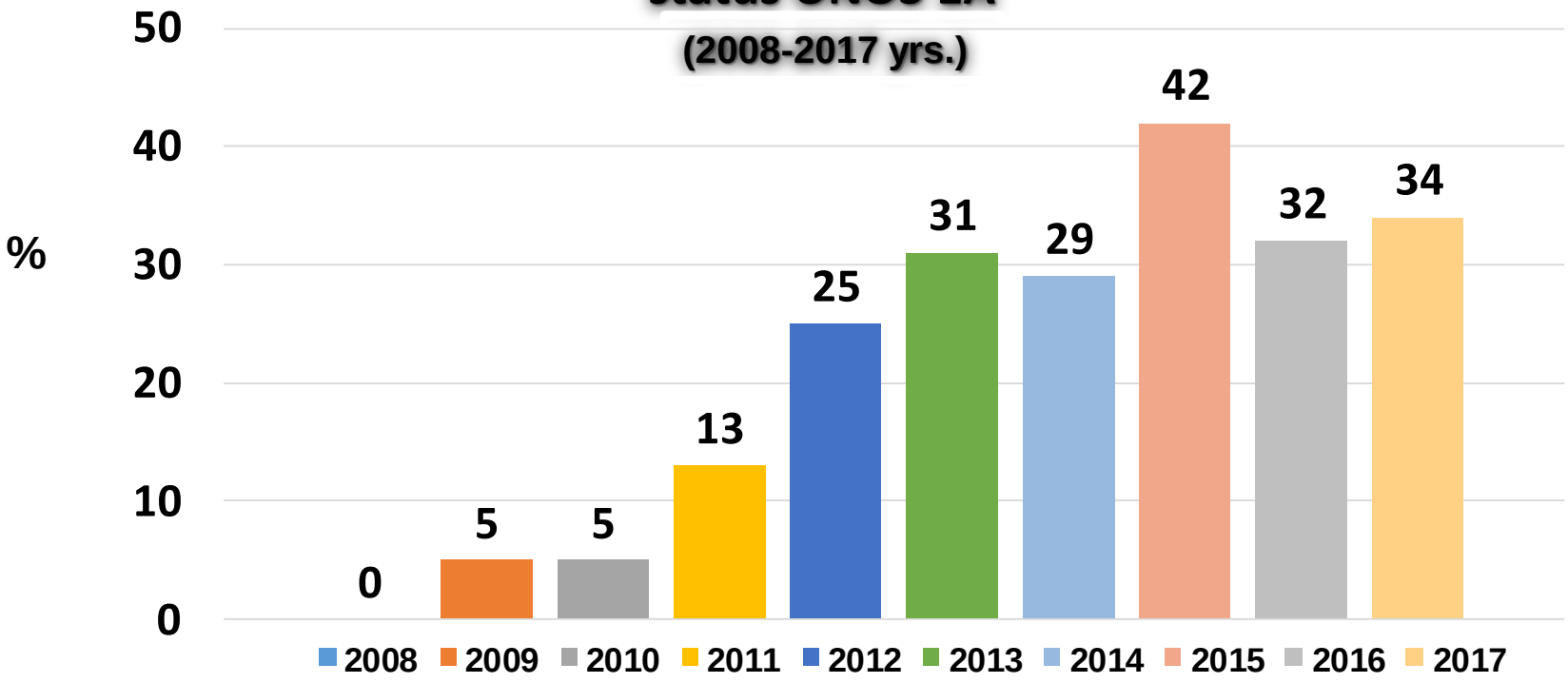
heart transplant wait list

status UNOS 1A

(2008-2017 yrs.)



The goal of study was estimate results of using pVAECMO as a method of short-term mecahanical circulatory support (MCS) in heart transplant candidates requiring urgent heart transplantation (HT).

Patients (n=149)

or 21.1% (n=149) from heart transplant waiting list (n=706) (2011–2017 yrs.)

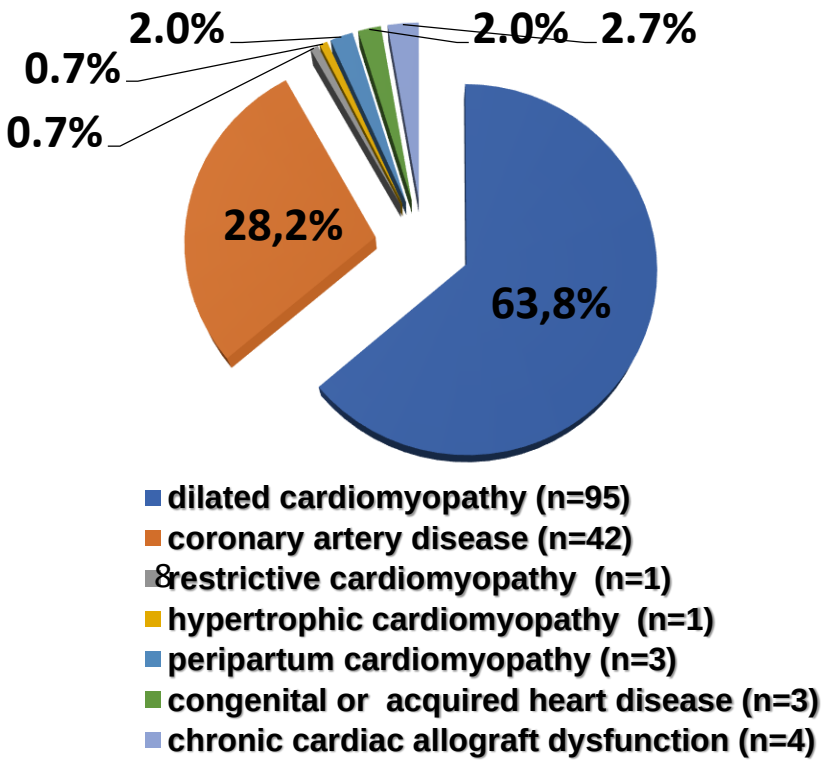
age 12-72 (43.0±1.2) yrs

men 87% (n=129)/ female 13% (n=20)

TPG 4-20 (11.2±2.0) mmHg

PVR 1.9-5.6 (3.8±0.6) Wood's Unit

Etiology of advanced CHF



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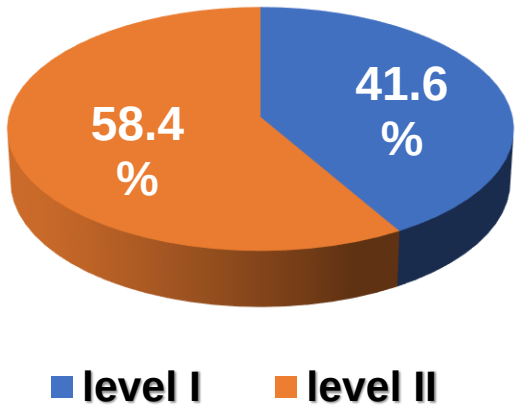


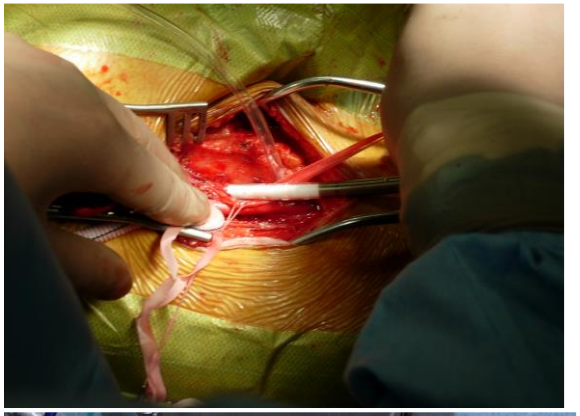
Patients (n=149)

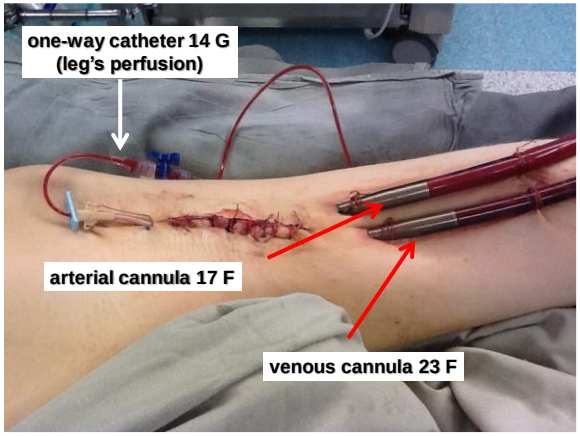
“conventional” VAECMO installation (n=144 (96.6%))

extracorporeal cardiopulmonary resuscitation (ECPR) at heart transplant candidates with in-hospital cardiac arrest (n=5 (3.4%))

peripheral VAECMO n=149 (100%)

open (surgical) technique n=29 (19.5%)



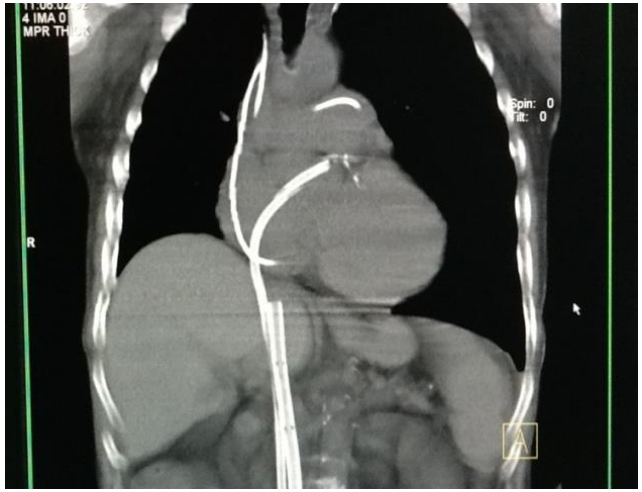


percutaneous technique n=120 (80.5%)

Leg's perfusion 100% (n=149) - required condition !!!

pVAECMO and left heart decompression (n=31 (20.8%))

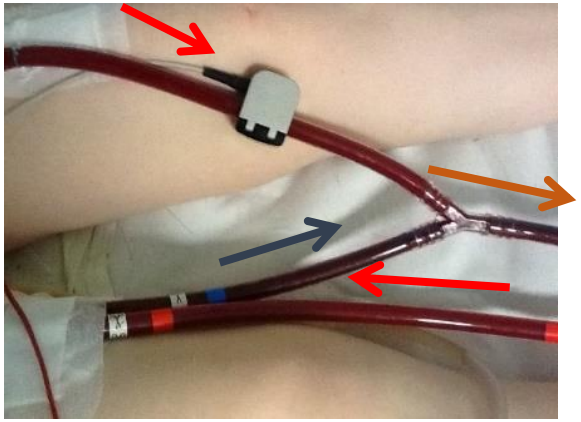
percutaneous LA drainage (n=24 (72,7%))



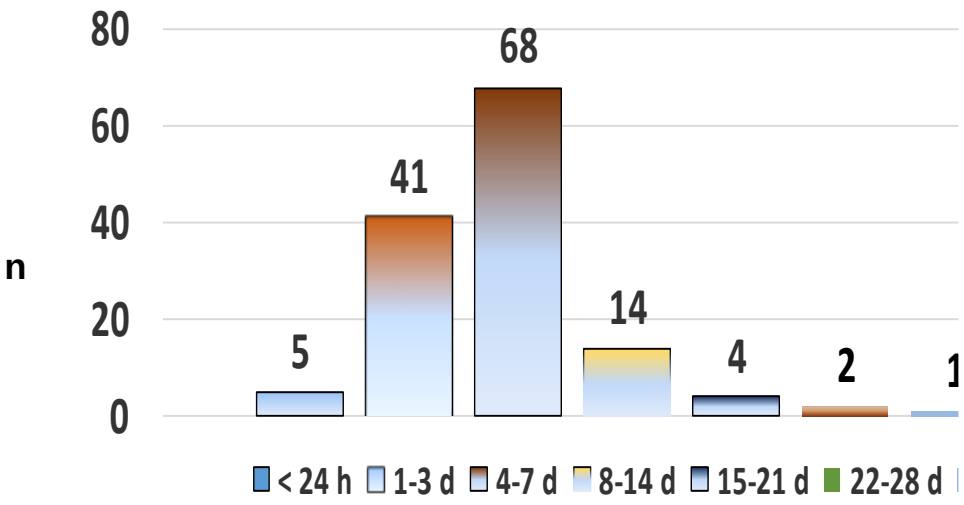
1.72±0.12 л/мин

open LV drainage (n=7 (21,2%))

3.83±0.35 л/мин (p<0,05)

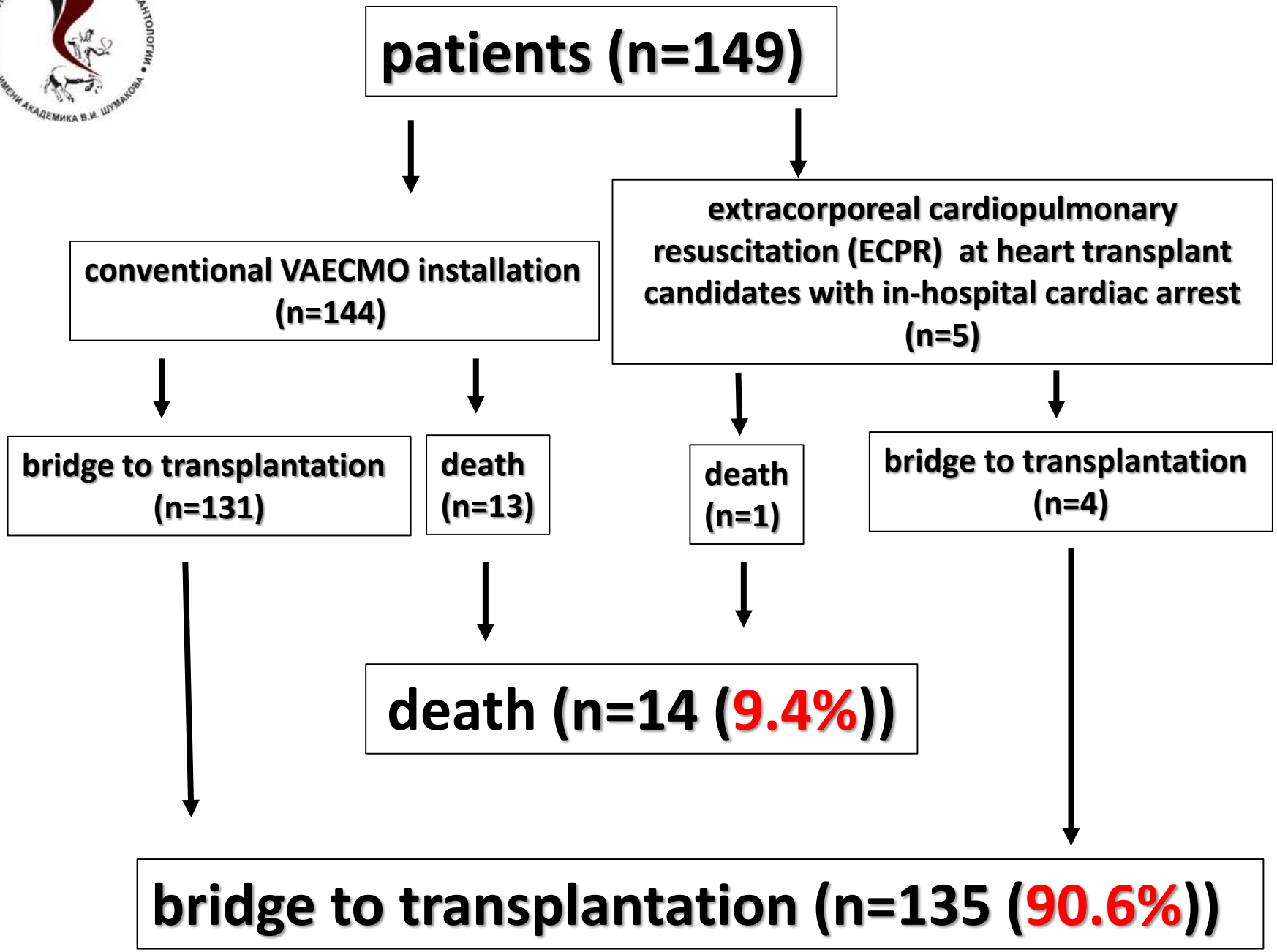


bridge to transplantation (n=135 (90.6%))



VAECMO duration - from 12 h to 34 (5.8±3.2) days

parameter	M±σ
revolution per minute (rpm)	3719±102
Q, L/m	3.59±0.12
Q, L/min/m^2	1.84±0.10
sweep gas, L/min	3.2±0.4
sweep gas, FiO_2	0.67±0.03


patients (n=149)
conventional VAECMO installation (n=144)
extracorporeal cardiopulmonary resuscitation (ECPR) at heart transplant candidates with in-hospital cardiac arrest (n=5)
bridge to transplantation (n=131)
death (n=13)
death (n=1)
bridge to transplantation (n=4)
death (n=14 (9.4%))
bridge to transplantation (n=135 (90.6%))

causes of death (n=14 (9.4%))

- multiorgan failure/sepsis (n=11 (78.6%))
- anoxic encephalopathy (n=1 (7.1%)) due to cardiopulmonary resuscitation
- stroke (n=2 (14.2%)) (preexisting LV thrombosis)

mortality risk factor analysis

variable	Odds Ratio (OR)	Confidence Interval	p Value
hemolysis ≥ 300 mg%	88.667	15.368-511.56	0.0040
pneumonia	33.156	6,94-156,92	0.0001
ALT ≥ 300 U/L	22.541	6.324-80.053	0.0001
AST ≥ 300 U/L	18.45	5.318-64.004	0.0001
total bilirubine ≥ 80 µmol/l	21.607	5.977-78.110	0.0013
LV thrombosis	18.136	2.734-120.34	0.0060
transthoracic LV drainage	17.600	3.45-32.28	0.0015
BMI < 20 kg/m^2	13.1	2.842-60.389	0.0028
Creatinine ≥ 140 mmol/l	6.875	2.028-23.309	0.0013
urea ≥ 15 mmol/l	10.476	2.76-39.758	0.0002
cardiopulmonary resuscitation	2.519	0.2616-24.25	0.3938
percutaneous LV drainage	3.385	0.3276-34.939	0.3290
open (surgical) technique of cannulation	0.666	0.1407-3.159	1.0000

Heart transplantation at recipients with pretransplant pVAECMO (n=135)

hospital mortality 14,0% (n=25)

donor risk factor

variable	Odds Ratio (OR)	Confidence Interval	*p* Value
donor age > 55 year	6,875	2,028-23,309	0,0013
noradrenalin > 600 ng/kg	10,476	2,76-39,758	0,0002
total bilirubine ≥ 80 µmol/l	21,607	5,977-78,11	0,0010

Posttransplant Survival rate

Discharge to home	86.0%
1-year	84.5%
2-year	81.3%
3-year	78.1%

peritransplant risk factor

variable	Odds Ratio (OR)	Confidence Interval	p Value
VAECMO after HT > 4 day	21,4	2,392-191,46	0,0019
Inotropic index > 20	4,922	1,317-18,393	0,0234
bloodloss > 2.5 L	8,556	2,391-30,619	0,0234
packed red blood cell > 6	2,833	1,119-7,173	0,0378
fresh frozen plasma > 10	2,964	1,16-7,573	0,0244

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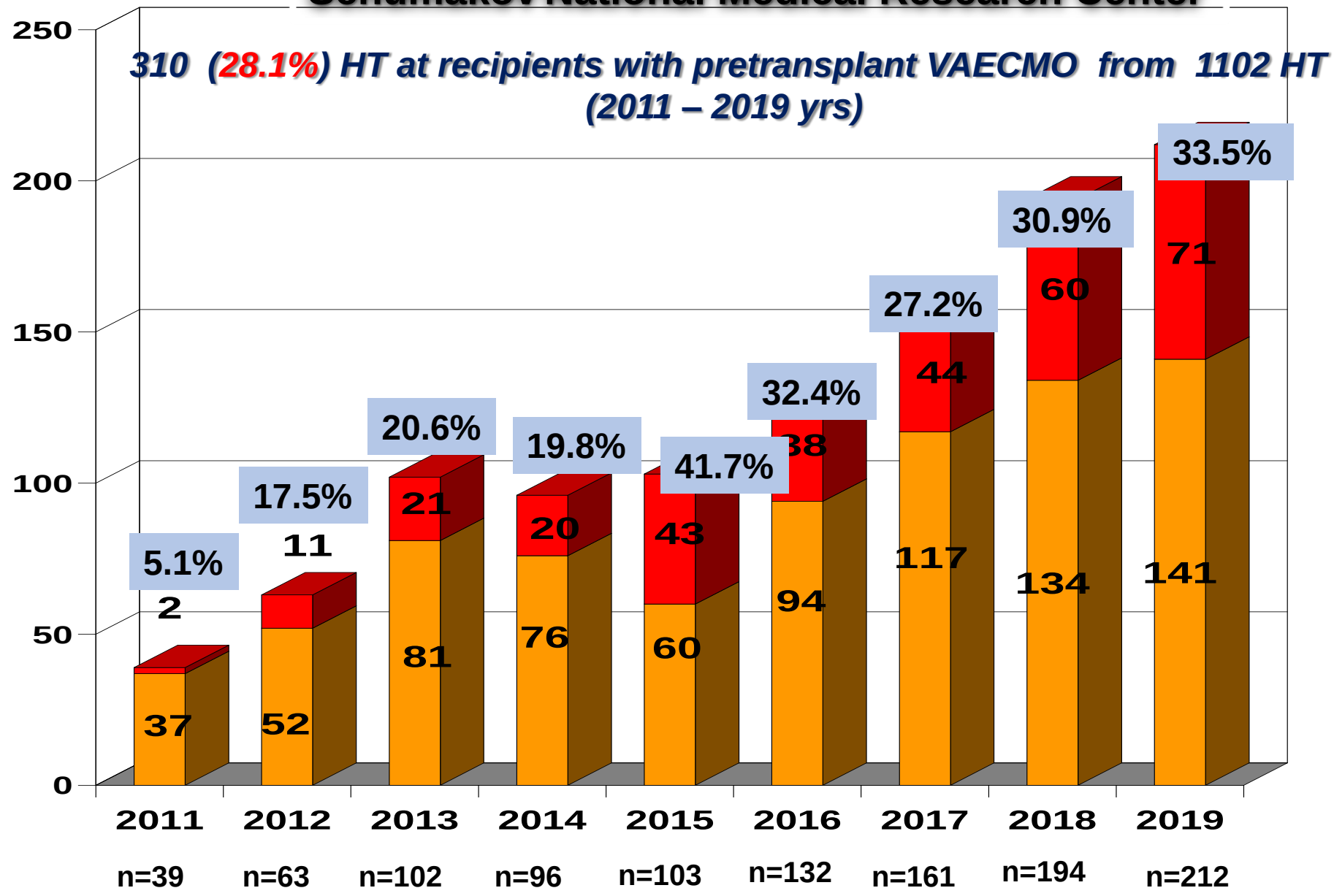

Heart transplantation

Conclusion

Peripheral VA ECMO provides a successful bridge to urgent HT in 90% of heart transplant candidates with satisfactory survival after HT