Response to the letter to the editor regarding the results of the retrospective study "Predictors of intra-aortic balloon pump hemodynamic failure in non-acute myocardial infarction cardiogenic shock" published in the *American Heart Journal*

Dear Dr. Sacco and colleagues,

We greatly appreciate your interest in our work and your insightful comments and questions. I will reply on behalf of our author group.

1. You are correct, there were a few patients who were not on inotropic support at time of IABP placement. In total 9/74 patients were not on inotropes at time of IABP insertion. In all these cases, there was a strong history of VT, or ongoing VT/NSVT that precluded inotrope use, or high SVR that called for preferential sodium nitroprusside use. These patients met inclusion criteria for cardiogenic shock by BP and end-organ malperfusion criteria.
2. We did acquire data on inotrope use and dosages at time of IABP implantation and afterwards. Because of the wide range of attending preferences and clinical circumstances, we could not adjust for all the different inotropes and dosages used. That said, we did query our data to look at number of inotropes used as well as dosages:

	Favorable outcome	Poor outcome
Number of inotropes		
1	48/53 (90%)	17/21 (81%)
2	23/53 (43%)	8/21 (38%)
3	3/53 (6%)	1/21 (5%)
Doses of inotropes		
Dobutamine	5.3 μg kg^{-1} min^{-1}	6.2 μg kg^{-1} min^{-1}
Milrinone	0.398 μg kg^{-1} min^{-1}	0.333 μg kg^{-1} min^{-1}
Dopamine	6.6 μg kg^{-1} min^{-1}	5 μg kg^{-1} min^{-1}

There were similar proportions of patients on zero, one, two, or three inotropes. The most used inotropes are also listed in order of prevalent use. There were no statistical differences between dobutamine, milrinone, or dopamine doses.

Based on these data, it would be hard to conclude that an excess number or dosing of inotropes had a detrimental effect on the latter group. IABP insertion was of course at the discretion of the providers in this retrospective study, so it is hard to delineate why these providers decided to add IABP support as opposed to increasing vasodilator use. In the poor outcome group, MAP was slightly lower though, which may have precluded additional vasodilator use.

3. We agree that improving filling pressures are paramount to the treatment of cardiogenic shock. All patients were actively diuresed in addition to inotropic/IABP support. We did look at RAP, mPAP, and PCWP at all time points. As illustrated in Table 2, there were no significant differences in baseline RAP, PCWP, or mean PAP between the favorable and poor outcome groups. We summarize below these baseline values, as well as these values after 48 hours of balloon pump, stratified by outcome group:

	Favorable outcome		Poor outcome	
	Mean	SD	Mean	SD
Baseline				
RAP	18.5	6.6	18.3	6.9
mPAP	38.2	8.4	37.7	12.5
PCWP	28.8	7.4	26.9	8.6
@ 48 Hours				
RAP	15.2	6.8	15.7	7.2
mPAP	30.4	6.8	28.7	6.7
PCWP	21.0	6.7	18.4	4.7

*All measured by PA catheterization, in mm Hg.

At baseline, there was no significant difference between the favorable and poor outcome groups in terms of RAP, mPAP, or PCWP. At 48 hours, all pressures improved in both cohorts. There again was no significant difference between groups. Thus, in this cohort, neither baseline filling pressures nor filling pressure trends seemed to drive the poor outcomes observed. Instead, inadequate cardiac flow and cardiac

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power really drove poor outcomes and failure of IABP support.

We thank you again for your interest and the opportunity to share these additional insights. We hope these results can help shed more light on the care of this very sick patient population.

Sincerely,

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