

# THE BURDEN OF STERNAL WOUND INFECTIONS (SWI) FOLLOWING CORONARY ARTERY BYPASS GRAFT (CABG) SURGERY WITHIN THE MEDICARE PATIENT POPULATION

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## BACKGROUND

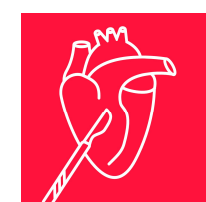
- Although antibiotic prophylaxis is used almost ubiquitously after CABG, the incidence of SWI in the USA is reported to be between 1 and 4%<sup>1</sup>
- The majority of CABG patients are Medicare beneficiaries<sup>2</sup>
- The Centers for Medicare and Medicaid Services (CMS) stopped reimbursing costs for SWI following CABG procedures in 2008
- In financial year 2015 the Hospital-Acquired Condition (HAC) Reduction Program was introduced
  - Mandated by the Affordable Care Act, this program requires that CMS reduce hospital payments by 1% for hospitals that ranked in the lowest quartile for HACs
  - SWIs following CABG were added to this program in FY 2016
- Medicare bundle payments for CABG through 90-days post-discharge are anticipated to negatively impact 72% of hospitals due to care costs for complications<sup>3</sup>
- Today hospitals have to absorb costs incurred in the treatment of SWIs, making optimized CABG SWI prophylaxis a high priority for hospital care

## OBJECTIVE

- To quantify the burden of SWIs following CABG in the Medicare population
- To understand the potential impact of improved SWI prophylaxis regimens

## METHODS

- A literature review identified publications presenting the incidence of SWIs (superficial and deep), the time required to treat SWIs, and the costs of providing post CABG care
- Extracted key parameters to estimate the burden of SWIs were:



- CABG procedures/year



- SWI rate
- Ratio of superficial to deep SWIs



- Length of hospital stay for CABG without complications
- Additional length of stay due to SWIs



- Cost per day of intensive care unit (ICU) and general ward (GW)

- A previously presented Markov model<sup>4</sup> was adapted to estimate the yearly burden of SWIs after CABG procedures, with costs in 2016 USD
- As antibiotic prophylaxis is essentially ubiquitous for patients undergoing CABG other potential methods to reduce SWI associated with cross-contamination were considered
- Single-patient-use electrocardiogram cable and lead (ECG) systems have recently been shown to significantly reduce the incidence of surgical site infection after CABG (18.8% reduction at 30 days post surgery)<sup>5</sup>

## RESULTS

### Literature review findings

- Approximately 55.3 million Medicare beneficiaries<sup>6</sup>
- ~ 178 procedures per 100,000 beneficiaries<sup>7</sup>
  - Medicare: 98,434 Isolated CABG procedures per year
- The SWI rate was reported to be between 1 and 4%<sup>1</sup>
- Deep SWI representing up to 40.75% of SWI cases<sup>8</sup>
- To be conservative, an SWI rate of 2.5% at 30 days is taken, 20% of which are DSWI (Fig.1)

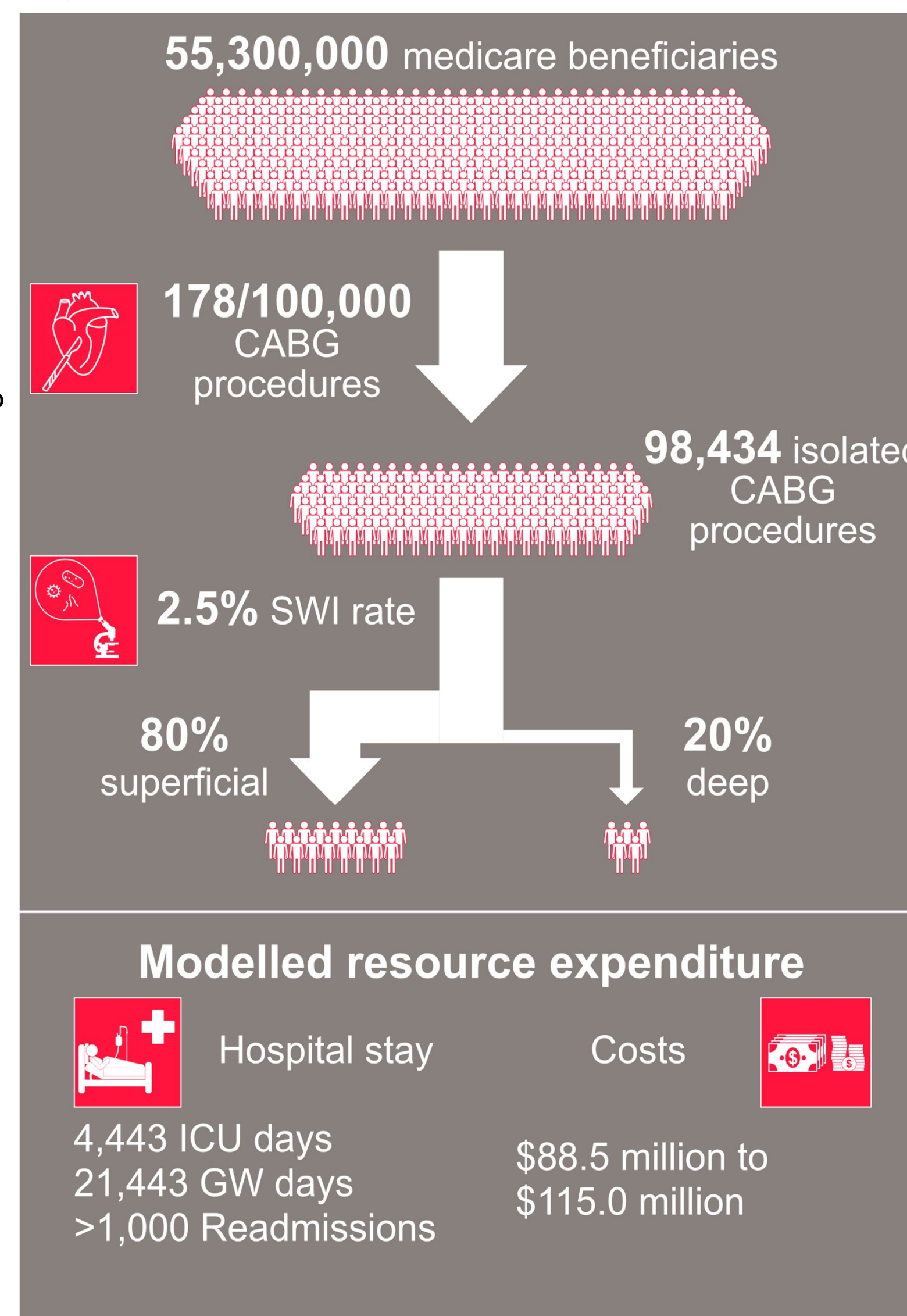
### Resource expenditure

- ICU cost per day: \$2,536<sup>9</sup>
- GW cost per day: \$2,357<sup>10</sup>
- Days to treat superficial SSI: 13.3<sup>11</sup>
- Days to treat deep SSI: 24<sup>12</sup>

### Annual burden of SWI to Medicare

- Burden of SWIs was **\$88.5 million**
- An additional **4,443 ICU** and **21,443 GW** days
- Over 1,000 readmissions
- At higher end estimates, SWI could be costing providers **\$115.0 million** per year.

Fig. 1 Model parameters and results



Tab. 1 Model parameters

Population in 1,000,000	CABG rate per 100,000	LoS Days	ICU \$ per day	GW \$ per day	SWI % procedures	DSWI % of SSI	SWI Days to treat	DSWI Days to treat
55.3	178	8 <sup>13,14</sup>	2,536 <sup>9</sup>	2,357 <sup>10</sup>	2.5	20	13.3 <sup>11</sup>	24 <sup>12</sup>

CABG: Coronary artery bypass graft, LoS: Length of stay, ICU: Intensive care unit, GW: General ward, SWI: Sternal wound infection, DSWI: deep sternal wound infection

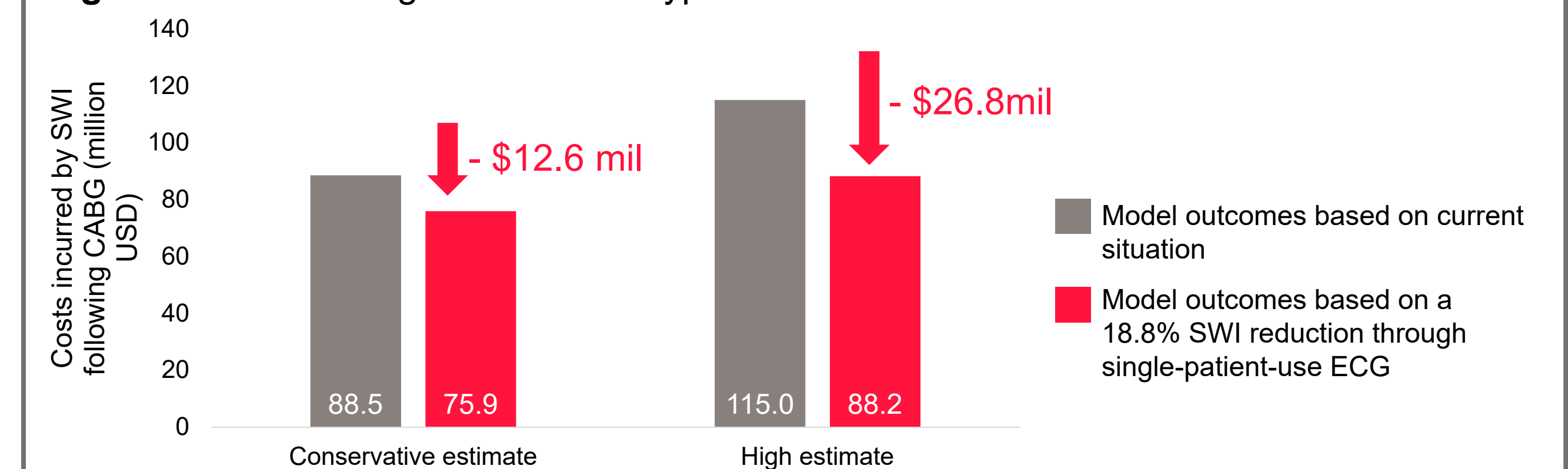
## Implications of a SWI rate reduction

- Assuming an 18.8%<sup>5</sup> reduction of SWI rates at 30 days, providers could save between \$12.6 million and \$26.8 million (\$271 per procedure) at the higher end of estimates.
- At a \$6 incremental cost, single-patient-use ECG could represent a 45-fold return on investment.

## CONCLUSIONS

- SWIs after CABG in the Medicare population come at considerable cost to providers
- Preventing SWI has advantages for both patients and providers
- Investment in items designed to reduce cross-contamination could be cost-effective

Fig. 2 Potential savings based on a hypothetical reduction of the SWI rate



SWI: Sternal wound infection, CABG: Coronary artery bypass graft, ECG: Electrocardiogram cable and lead

## REFERENCES

- Lazar et al. J Thoracic and Cardiovascular Surgery 2016
- LaPar et al. Circulation 2012
- Hawkins et al. J Thoracic and Cardiovascular Surgery 2018
- Saunders R & Lankiewicz JD, ISPOR 2018
- Lankiewicz JD, et al. Am J Infect Control. 2018
- <https://www.statista.com/statistics/200962/percentage-of-americans-covered-by-medicare/> (accessed Jan 2019) combined with US population in 2017
- Culler et al. Circulation. 2015;131:362-370
- Selby, L. V et al. J. Surg. Res. 2015
- Gershengorn HB et al. Ann Am Thorac Soc 2015
- The Kaiser Family Foundation State Health Facts. Data Source: Hospital Adjusted Expenses per Inpatient Day.
- Alasmari, FA et al. Mayo Clin. Proc. 2012
- Sears ED et al. World J Surg. 2016
- McNeely C et al. Ann Thorac Surg 2016;
- Raza S et al. J Thorac Cardiovasc Surg. 2015

## DISCLOSURE

RS is the owner and MB is an employee of Coreva Scientific, which received consultancy fees for this work, JL is an employee of Cardinal Health.