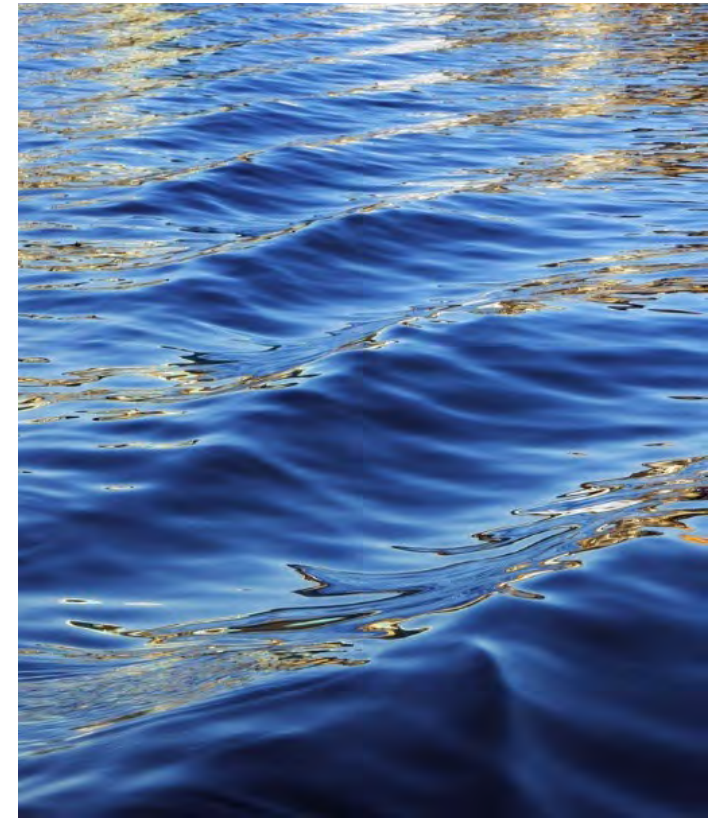


# MISSION GREEN

Becoming Sustainability Agents  
in the OR

VANA Winter Workshop 2024  
Presenter: Deadra Maxwell MSN CRNA





## Sustainability

To maintain or preserve

# What's the problem?

- Hospitals produce approx. 5 million tons of waste annually.
- On average that's 29-33 Lbs per hospital bed per day. 20-25% of this waste is plastic.
- This includes regulated (RMW) and Pharmaceutical waste.
- Approx. 85% of waste disposed in RMW containers is not RMW. Cost exceed 100k annually.
- Improper waste disposal contributes to already overwhelmed landfills.
- Improper pharmaceutical disposal results in contamination of waterways, leaching into soil and disturbing ecosystems.



# Can we make a difference?

Anesthesia pharmaceutical waste comes in two major forms:

- IV meds- charcoal based waste systems are becoming common in all areas.

Charcoal is recommended to prevent leaching into the soil.

- Gas: Carbon Emissions are created from anesthesia gas waste.

Nitrous and Desflurane have the most negative impact on the environment.



# Nitrous Oxide

## 1904

- Last for about 120 years in the atmosphere.
- Theodore Roosevelt was president
- Life expectancy in US was 47 years
- American occupation of Cuba ends

# Desflurane

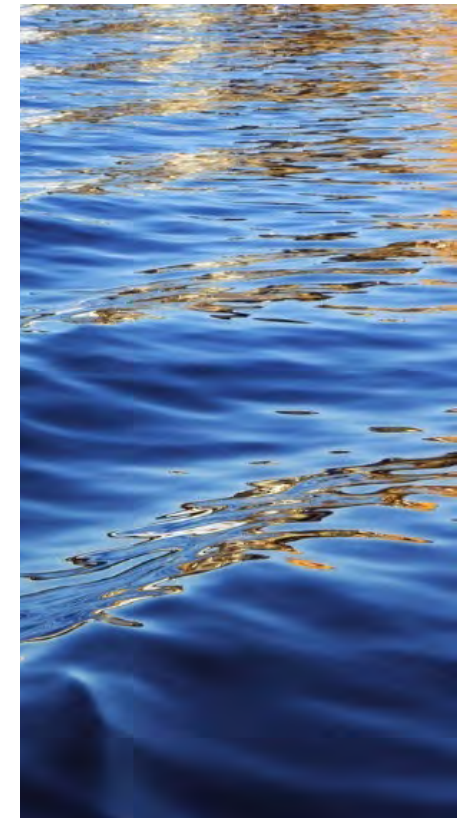
- Has a global warming potential 2,500 times greater than carbon dioxide.
- Equivalent of driving 12 diesel powered Humvees during procedure.
- Contributes 26 times more to global warming than an anesthetic with sevoflurane.
- Multiple European countries are proposing a ban on Desflurane including Scotland and England by 2024.

Global warming  
potential  
 $3714 \times > \text{CO}_2$



**Table I. Greenhouse Gas Emissions of Common Inhaled Anesthetic Agents**

1 MAC inhaled agent at various Fresh Gas Flows (FGF)	Atmospheric lifetime (years)	Equivalent auto miles driven per hour use of anesthetic
Sevoflurane 2% 2L FGF	1.1	8
Isoflurane 1.2% 2L FGF	3.2	18
Desflurane 6% 2L FGF	14	400
60 % nitrous oxide alone at 1L fresh gas flow	114	61





# Gas choice and flow rate has exponential results

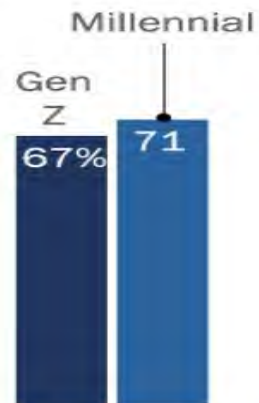
## Low Flow has several important benefits, including

- Cost-effectiveness
- Environmental impact
- Patient safety

Table 1

*% of U.S. adults who say ...*

**Climate should be top priority to ensure sustainable planet for future generations**



desflurane, sevoflurane, and isoflurane at different fresh um alveolar concentration hour

	Desflurane	Sevoflurane	Isoflurane
ent cost	5.16	1.07	0.16
cost	1.62	1.62	1.62
	6.78	2.69	1.78
ent cost	20.64	4.28	0.64
cost	0.41	0.41	0.41
	21.05	4.69	1.05

From informal convo, most people were *not* aware of how their anesthetic practices affect the environment

Goal of survey

Assess current anesthetic practices of NAPA providers

Determine reasons why providers may not be meeting measures

Assess knowledge on how our anesthetic practices affect the environment

Assess provider attitude towards environmental awareness

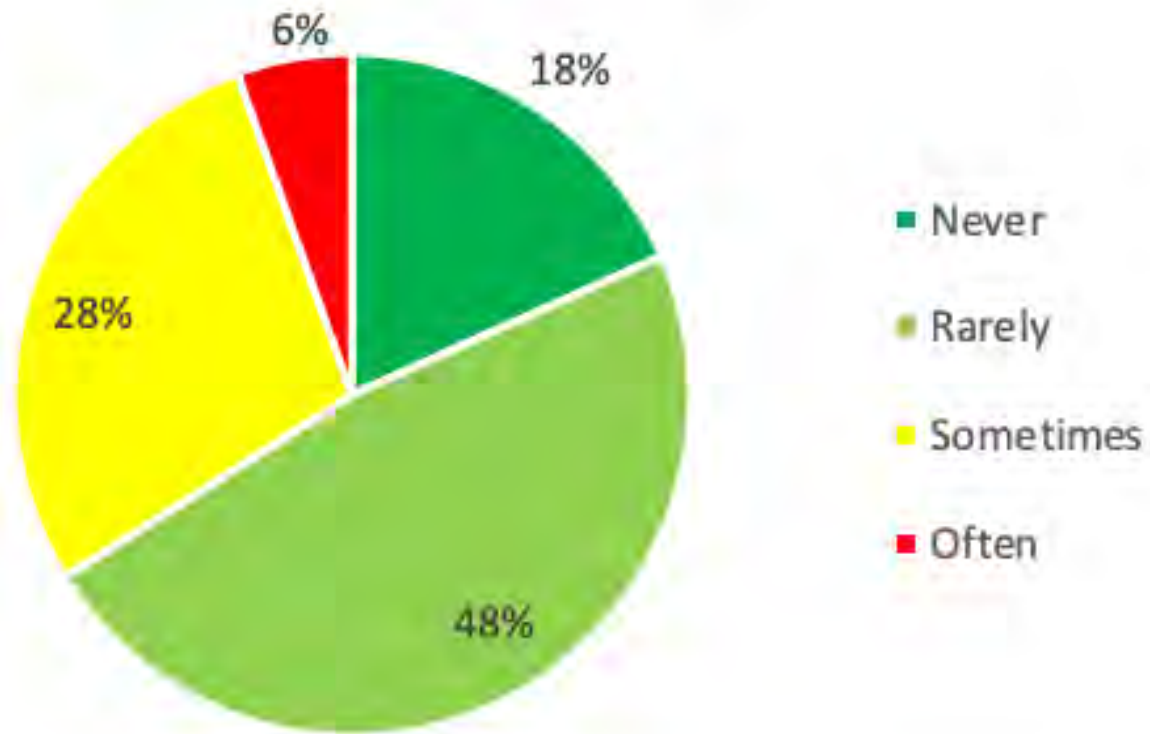
Created a **7-9 question** survey distributed to various NAPA sites

Distributed early March *prior* to quality measures being added to iPro

**109 responses** received

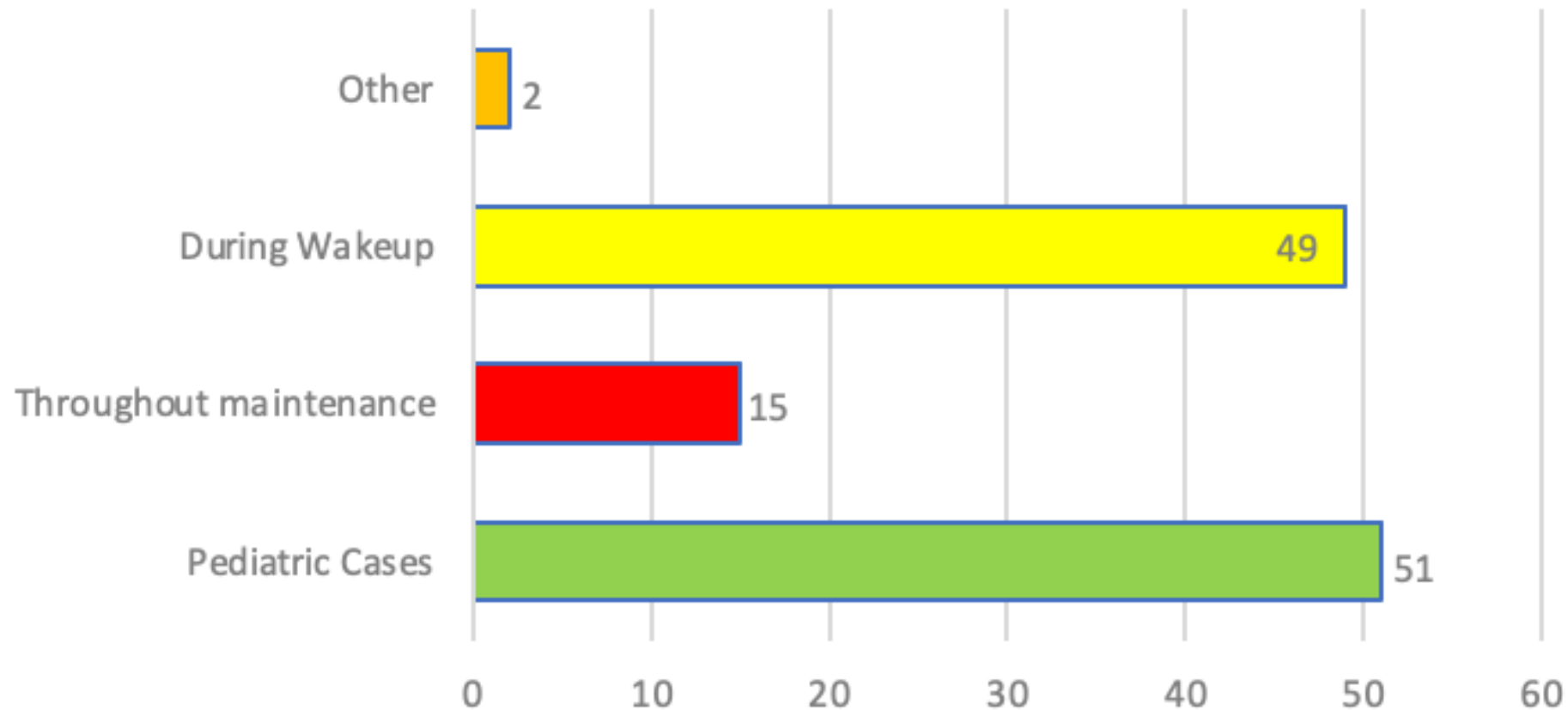
# Results – Provider Anesthetic Practice

Q1: When administering anesthesia, do you use nitrous oxide?



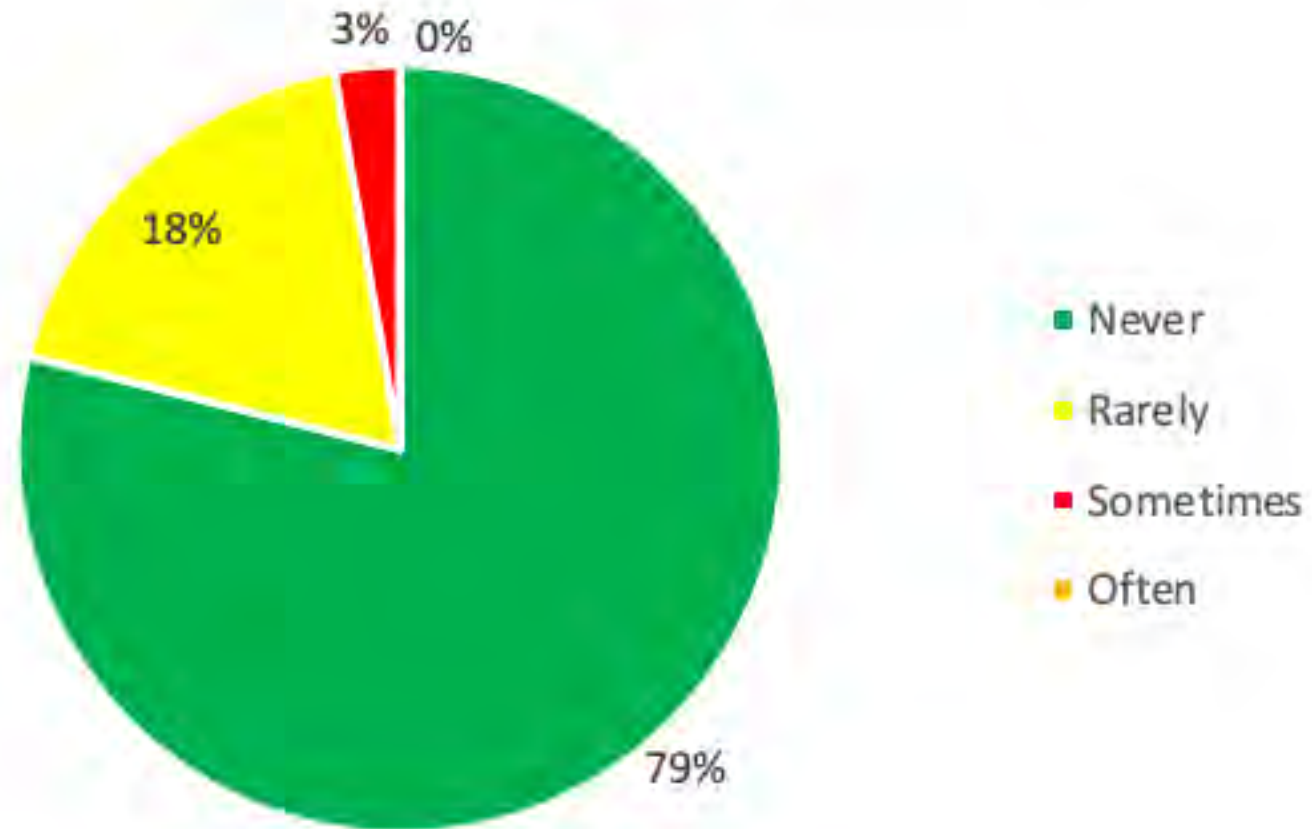
# Results – Provider Anesthetic Practice

Q2: If you use nitrous oxide, in which situations do you use it? (select all that apply)



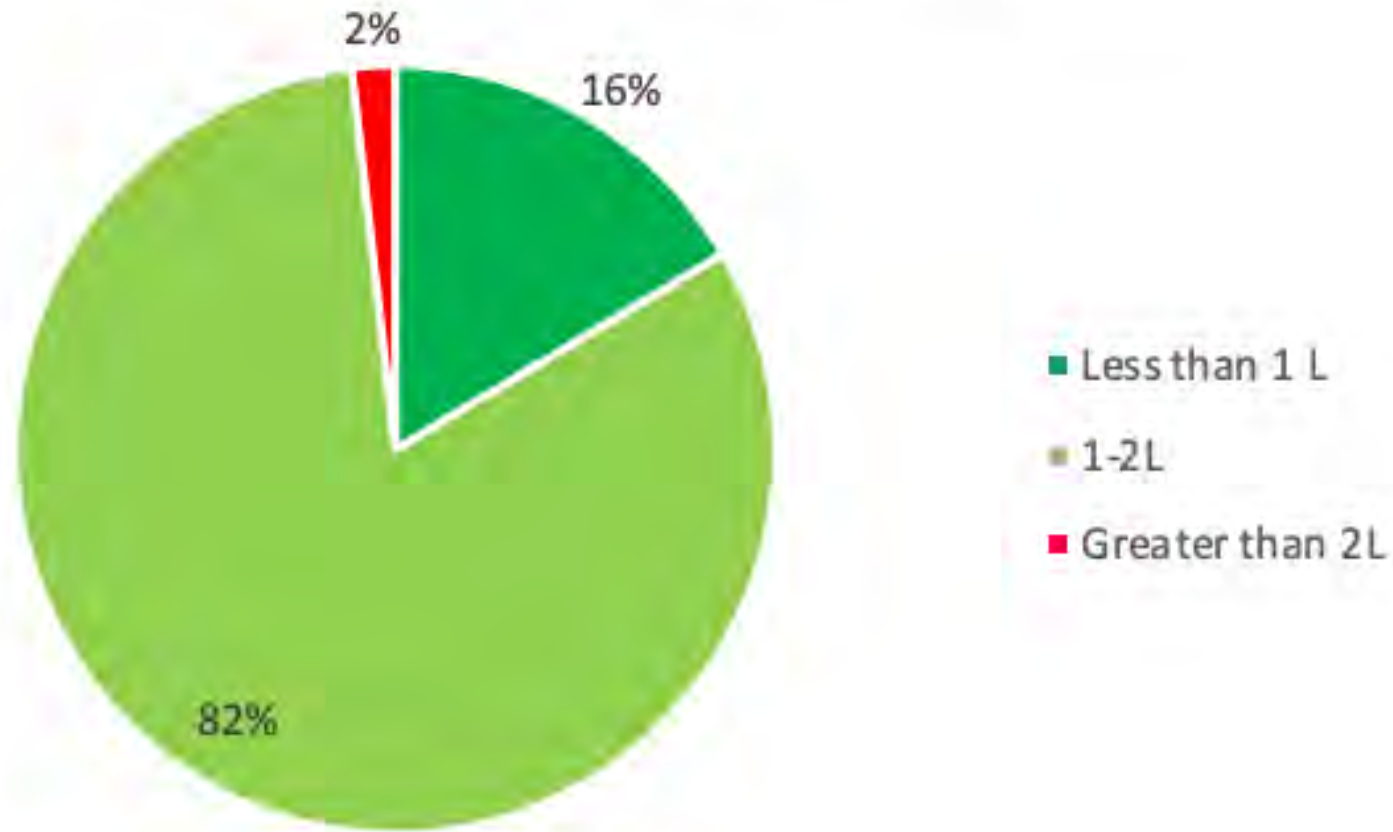
# Results – Provider Anesthetic Practice

Q3: Do you use desflurane?



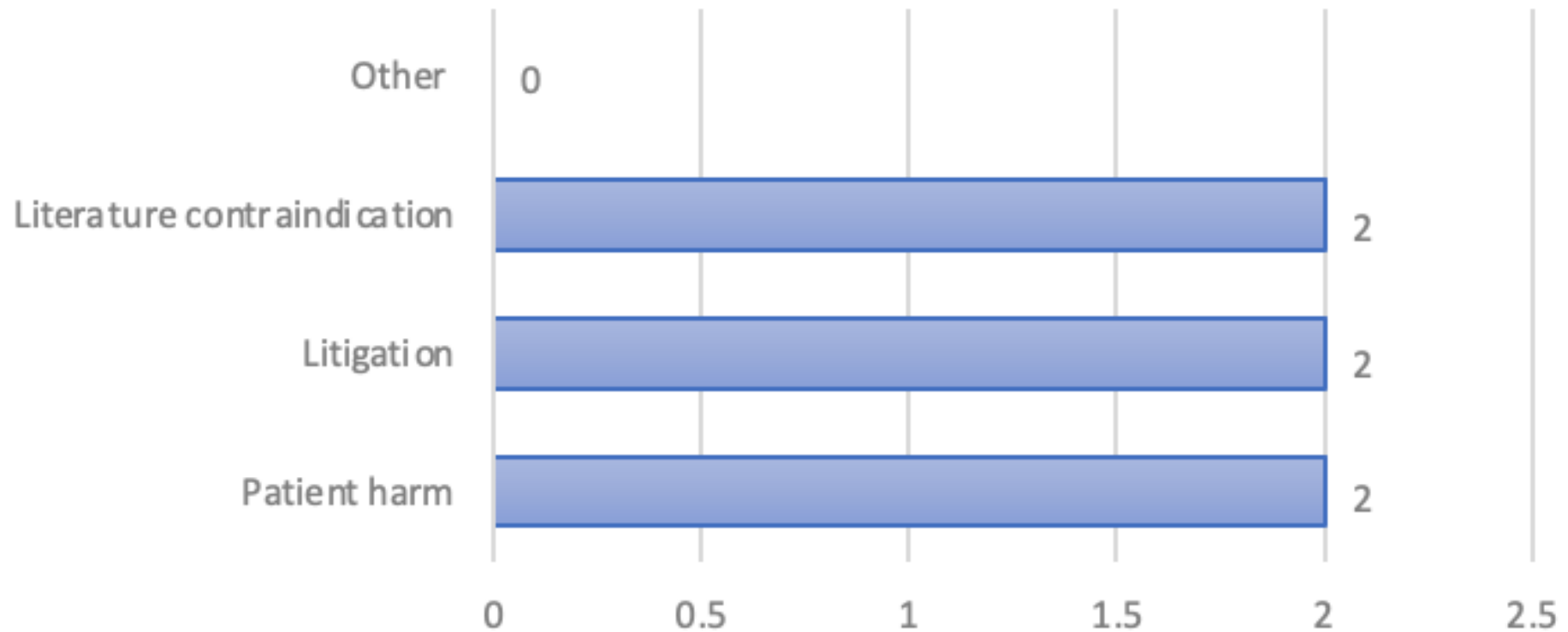
# Results – Provider Anesthetic Practice

Q4: What total flows do you typically run?



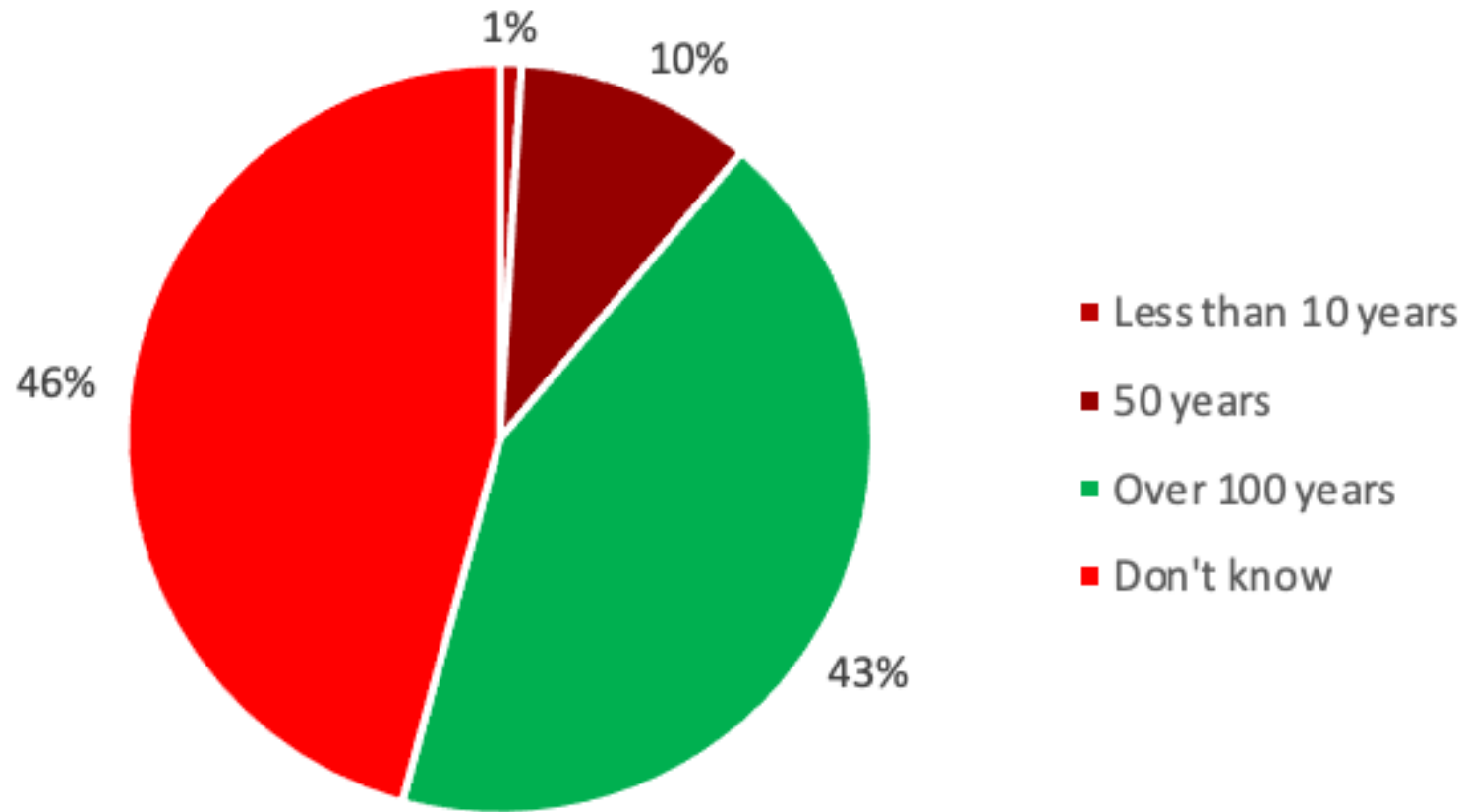
# Results – Provider Anesthetic Practice

Q5: If you typically run greater than 2L total flows, what limits you from decreasing total flows (select all that apply)



# Results – Knowledge

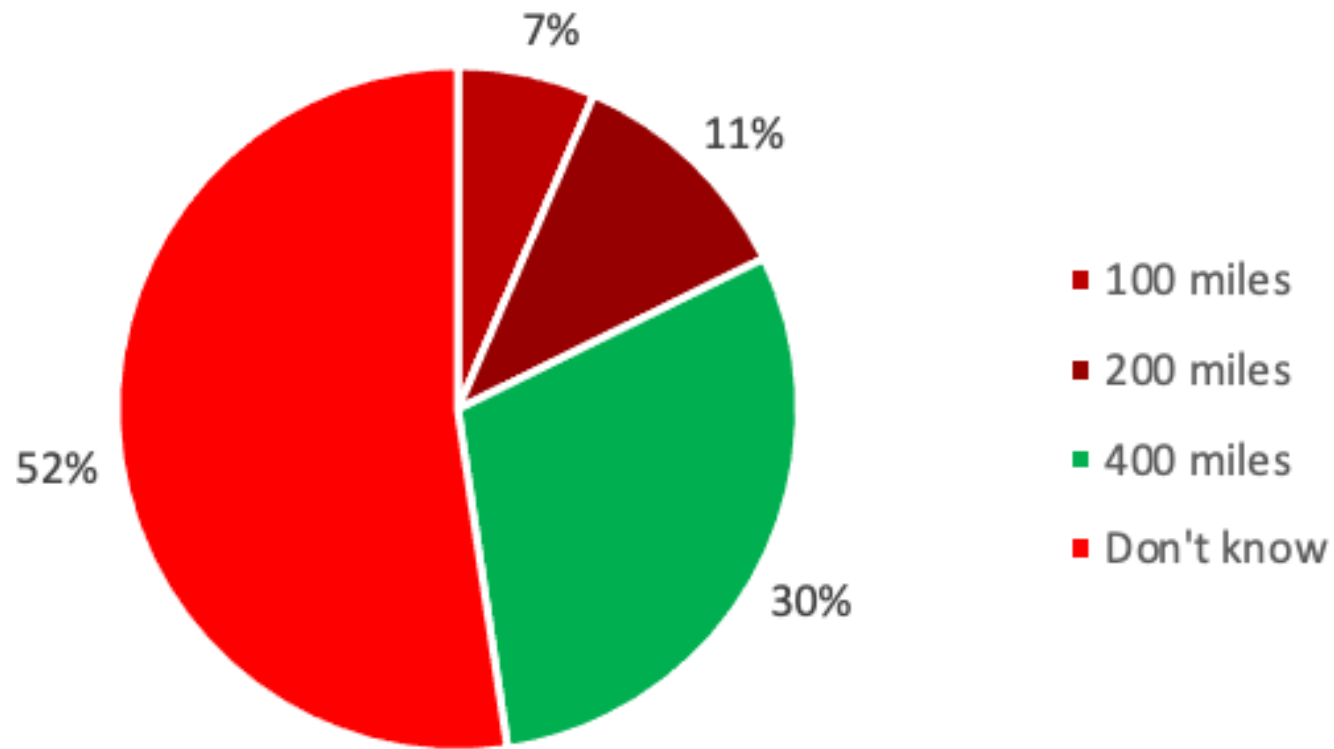
Q6: Nitrous oxide has an atmospheric lifetime of:





# Results – Knowledge

Q7: Using desflurane 6% at 2L FGF for an hour emits as much greenhouse gas as driving:



# Survey Conclusions

- Knowledge deficit identified
- Avoiding nitrous oxide, especially during maintenance
- Avoiding desflurane completely
- Reducing flows *further* to <2L
- Significant percentage of providers are concerned

# Stakeholders

- Hospitals
  - Payors
  - Anesthesia groups
  - Providers
  - Public
  - Regulatory bodies (JC)
- 
- MAC hour at 2L  
Desflurane- \$21.05  
Sevoflurane- \$4.69





DO

NO

HARM