

A photograph of two men in a hospital setting. The man on the left is wearing a blue and white checkered button-down shirt and a lanyard with an ID badge. The man on the right is wearing blue scrubs, glasses, and a stethoscope, and is gesturing with his hands while speaking. The background is a blurred hospital room with medical equipment.

CONNECTING WITH CARE

INVESTOR EVENT 2023 | TIJUANA + IRVINE

Important notice

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Mexico: Culture of continuous improvement

Malena Ortiz
General Director Mexico Operations

Fisher & Paykel
HEALTHCARE

Investor Day agenda

9:30 am Welcome

Overview of F&P Mexico operations

10:00 am Break

10:30 am Business Excellence Model

Purpose, People, Process, Performance

11:00 am Tour of manufacturing areas

12:00 pm Q&A

12:30 pm Lunch

2:00 pm Depart for Irvine, California

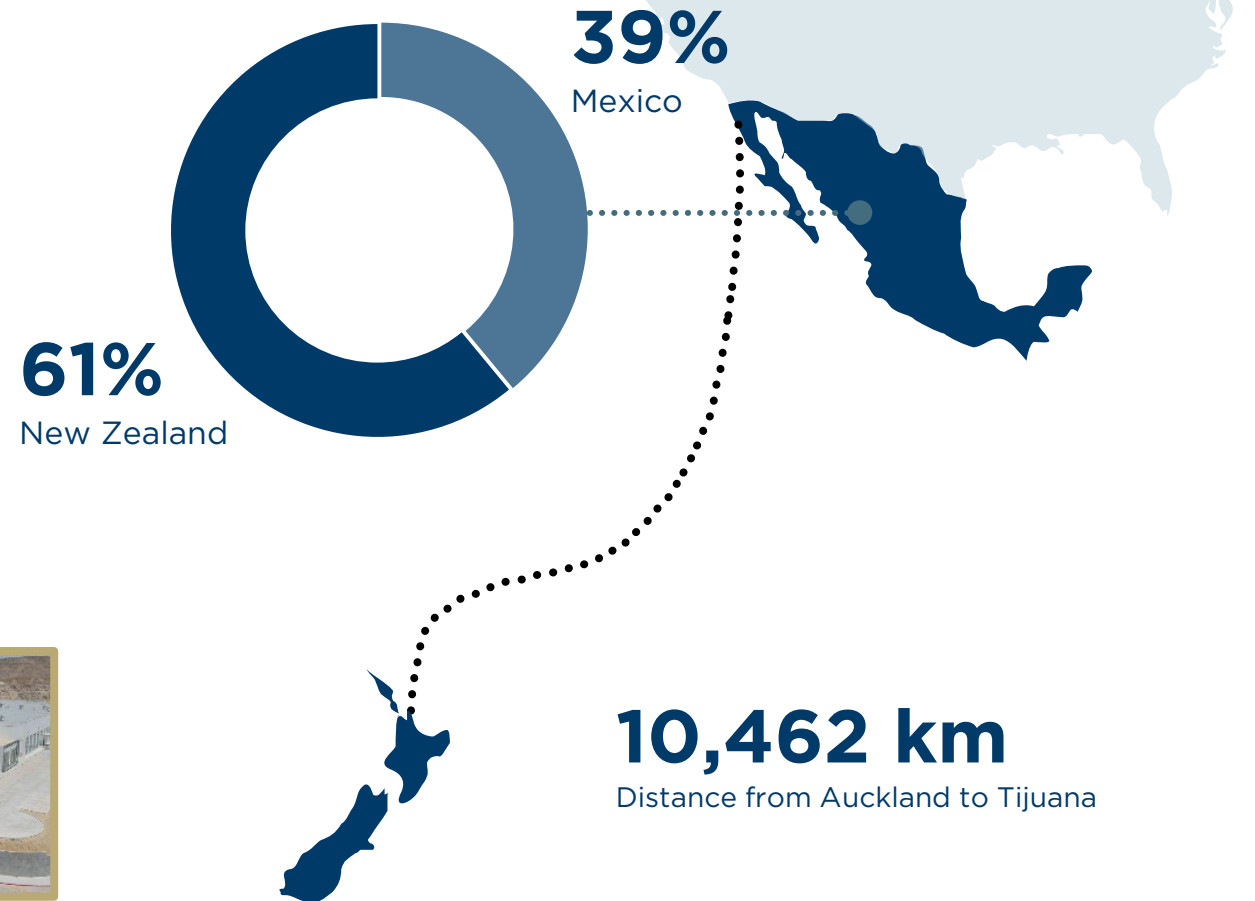
F&P Mexico manufacturing

F&P Mexico overview:

- First breathing circuit shipped in 2010.
- Diversified manufacturing.
- 1,900+ collaborators.
- Hospital and Homecare consumables.
- Mexico contributes 39% of manufacturing.

Mexico facilities:

- Three buildings: 63,000 m² / 690,000 ft².



Medical device industry in Tijuana

Tijuana is a world leader in the manufacturing of medical devices.

- 90% of medical device companies are certified under ISO13485, FDA or CE mark.
- +80 medical device manufacturing plants in Tijuana.
- >74,000 people employed in Tijuana medical device manufacturing.

F&P benefits of manufacturing in Tijuana:

- Time zones overlap.
- Medical device manufacturing skills.
- Diversified product supply.
- Proximity to major markets.
- Relatively stable manufacturing labor costs.

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SCIENTIFIC

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flex

icumedical

Integer®

Nordson
MEDICAL

MASIMO

Fisher & Paykel
HEALTHCARE

Scantibodies
Imaging & Therapy

BD

ÖSSUR®
LIFE WITHOUT LIMITATIONS

BREG

Medtronic

vyaire
MEDICAL

Teleflex®

WelchAllyn®

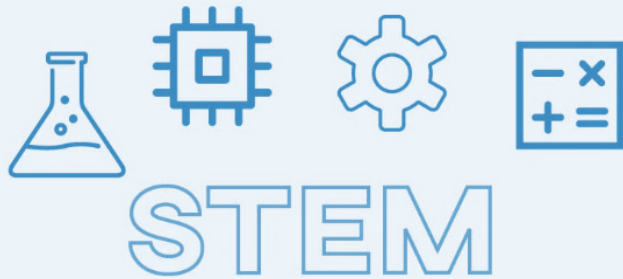
Fisher & Paykel
HEALTHCARE

Medical device industry driving education

Supporting high-end manufacturing industries, such as medical devices, requires an innovative workforce and investment in education and research on both sides of the border.

Baja California offers 89 public & private universities

9 Universities with Cross-Border Partnerships



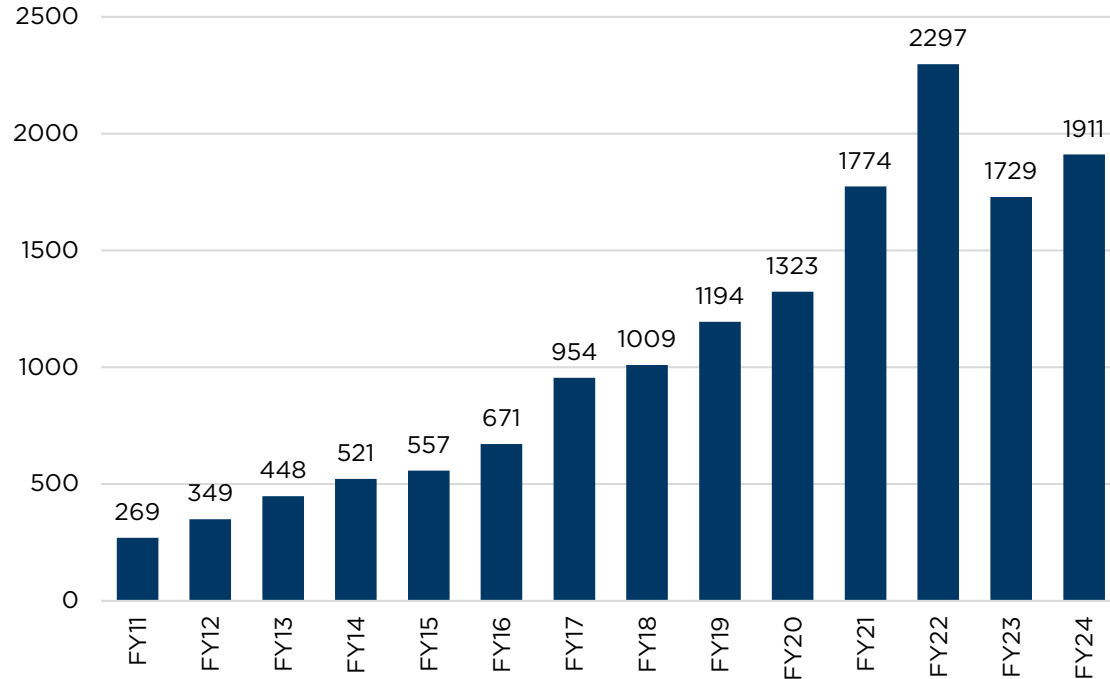
In 2021, engineering was the STEM field with the highest number of degrees conferred at **3,700**, followed by health sciences at **2,500** degrees in Baja California.



San Diego had nearly **34,000** workers dedicated to scientific research and development services, over **23,000** people in computer systems design and related services, and nearly **12,000** people at colleges and universities.

Our people

NUMBER OF COLLABORATORS IN MEXICO



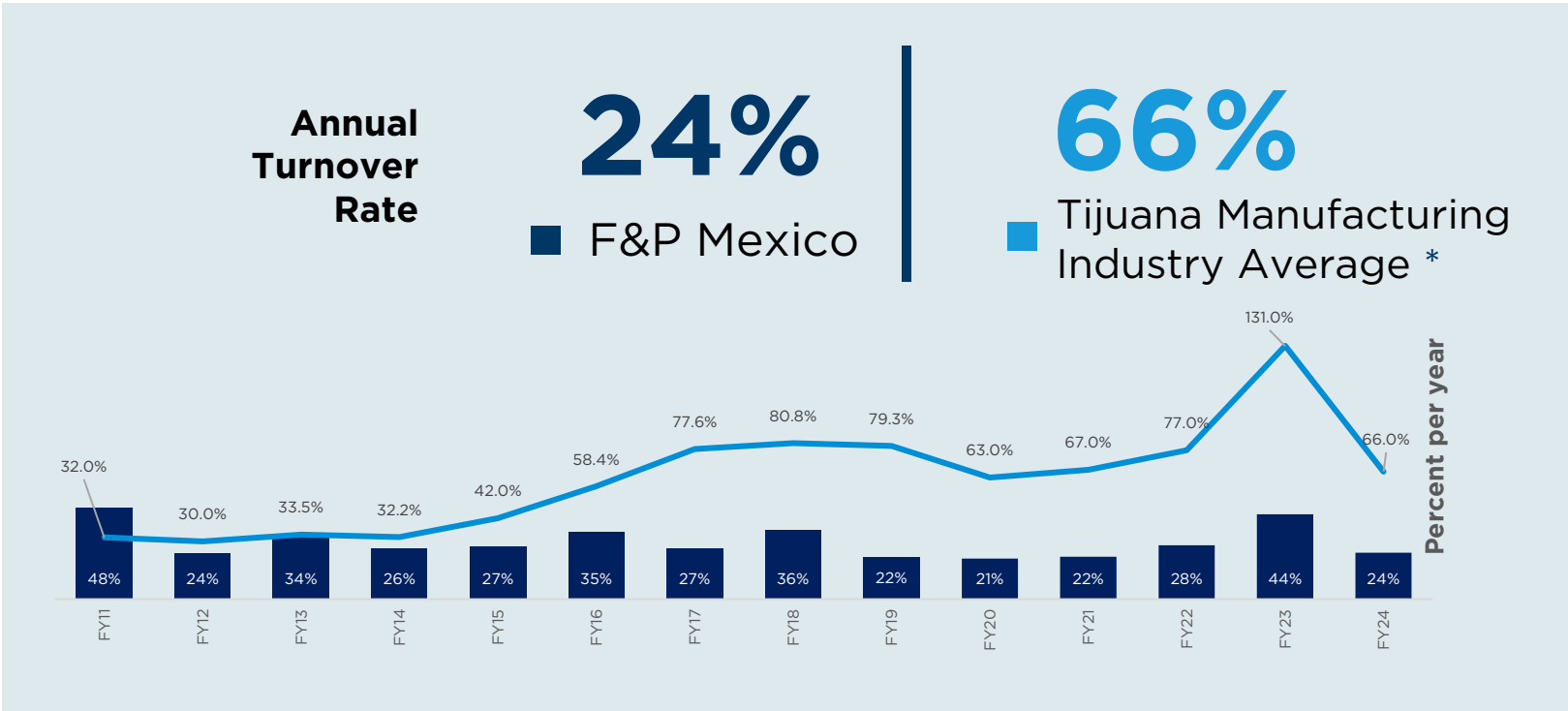
1900+ collaborators



41% Male **59%** Female
64% Direct **36%** Indirect

Why our people stay

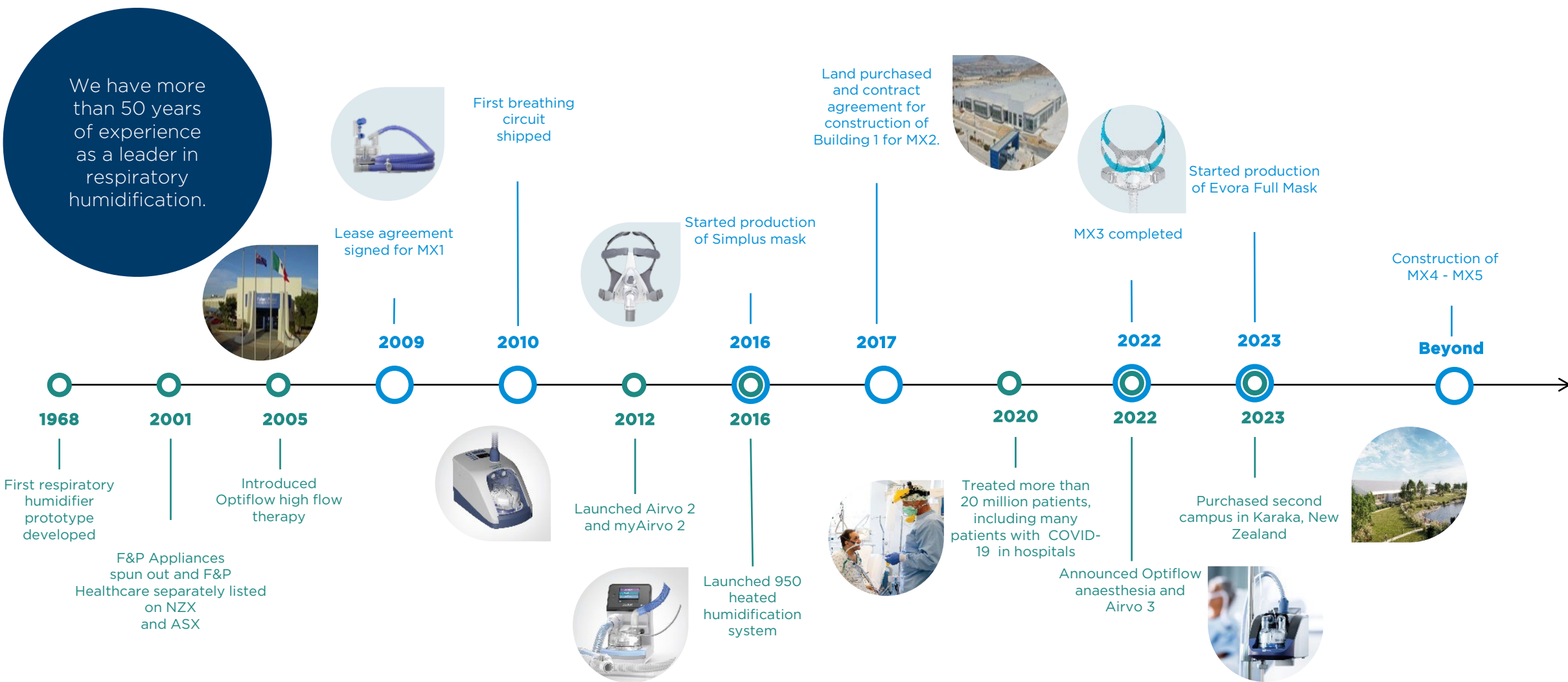
We recognize that having **engaged collaborators** has tangible **business benefits** for our **collaborators** and our **patients**.



FY24 is 12 month rolling average to Aug 2023

*Source: Ruiz-Morales y Asociados Firm - Tijuana Maquiladora Industry

Our journey



Continuous improvement journey



Integrating our values and our people



We are committed to **leading transformation initiatives and driving change**. Develop and overseeing plans and programs to **improve the efficiency, with a key focus on using continuous improvement culture** to analyze, understand and improve our operating processes through **principles, systems and tools**, in order to create a **culture of ideal behaviors** that generate **sustainable ideal results**.

Our Purpose

Business excellence model

People

Personas

Making it possible for people within the organization to **engage** in the **transformation** journey, identifying ideal behaviors and **understanding and building** a culture of business excellence.

Performance

Desempeño

Great results are the **outcome** of **connection to purpose** and a culture of **continuous improvement**.

Process

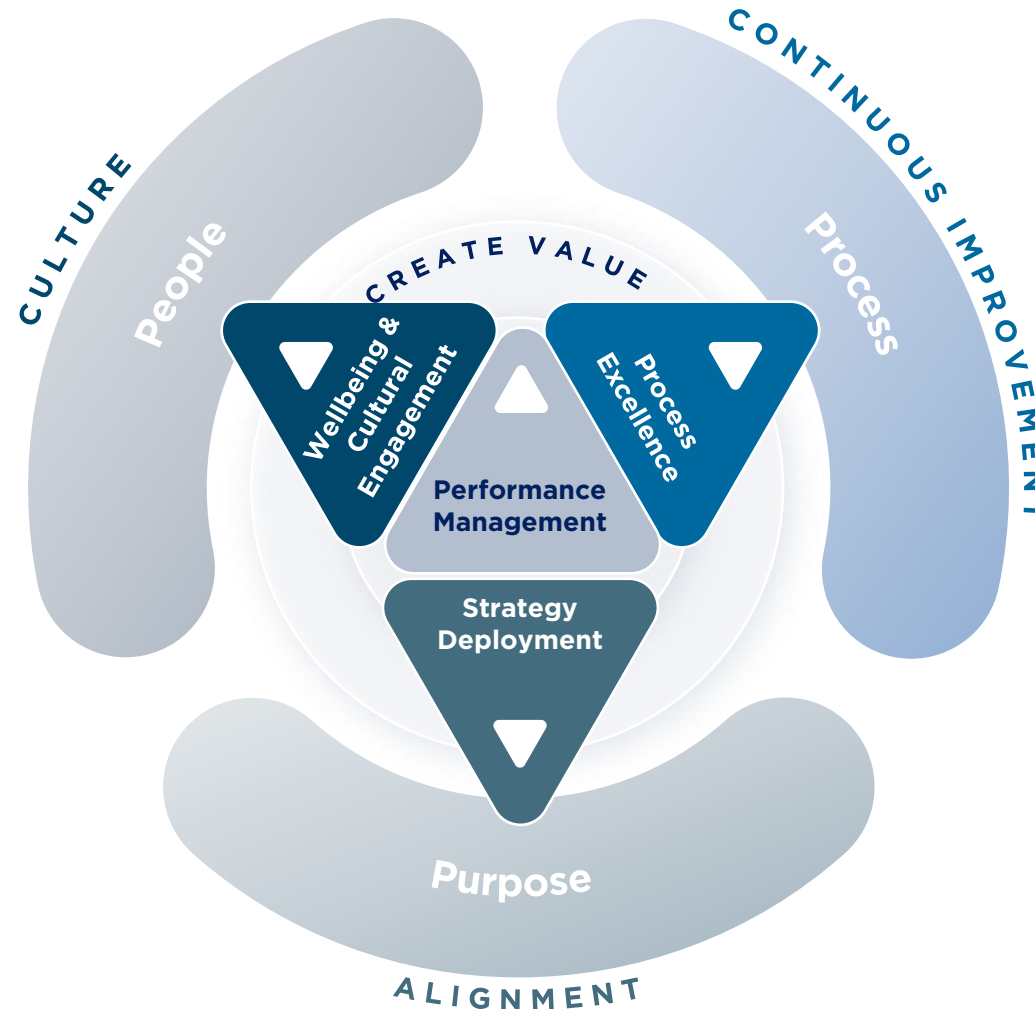
Procesos

Creating **long-term solutions** not temporary fixes, **simplifying work processes**, ensuring resources that are needed are available when required and organizing places of work so **potential problems become immediately visible**.

Purpose

Propósito

Develop **management systems** that effectively align every value stream with principles and directions in ways that are **simple, comprehensive, actionable and standardized**.



Summary of model in Mexico



Purpose:

Leading our response through daily workstreams focusing on People Safety, Manufacturing and Distribution

People:

Values Cards
1,836

Raised Ideas
1,817

Projects
1,656

Process:



Summary of model in Mexico



Great results are the **outcome** of **connection to purpose** and a culture of **continuous improvement**.



Questions

「 Thank you



Business Excellence model stations



Develop **management systems** that effectively align every value stream with principles and directions in ways that are **simple, comprehensive, actionable and standardized.**



Principles



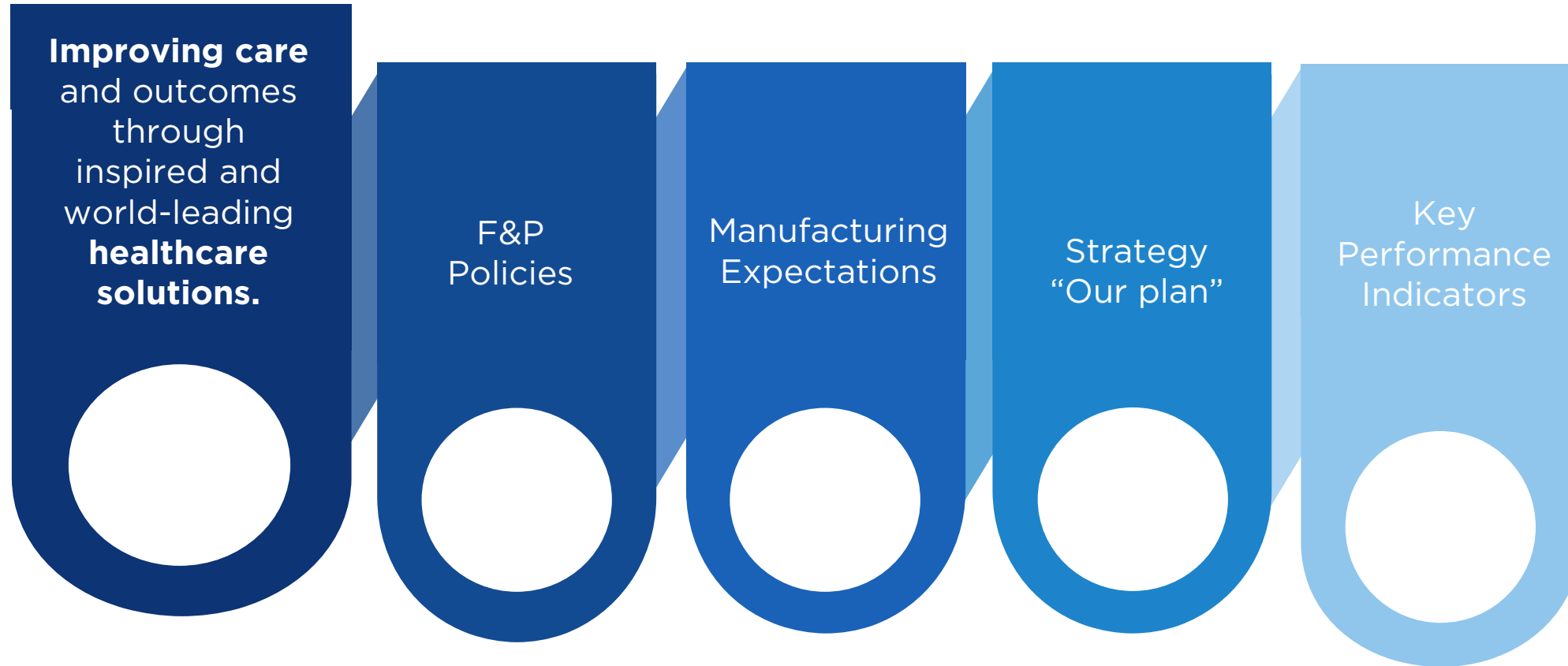
Create Constancy of Purpose



Think Systemically

How our strategy works

PURPOSE OF F&P



Making it possible for people within the organization to **engage** in the **transformation** journey, identifying ideal behaviors and **understanding and building** a culture of business excellence.



Principles

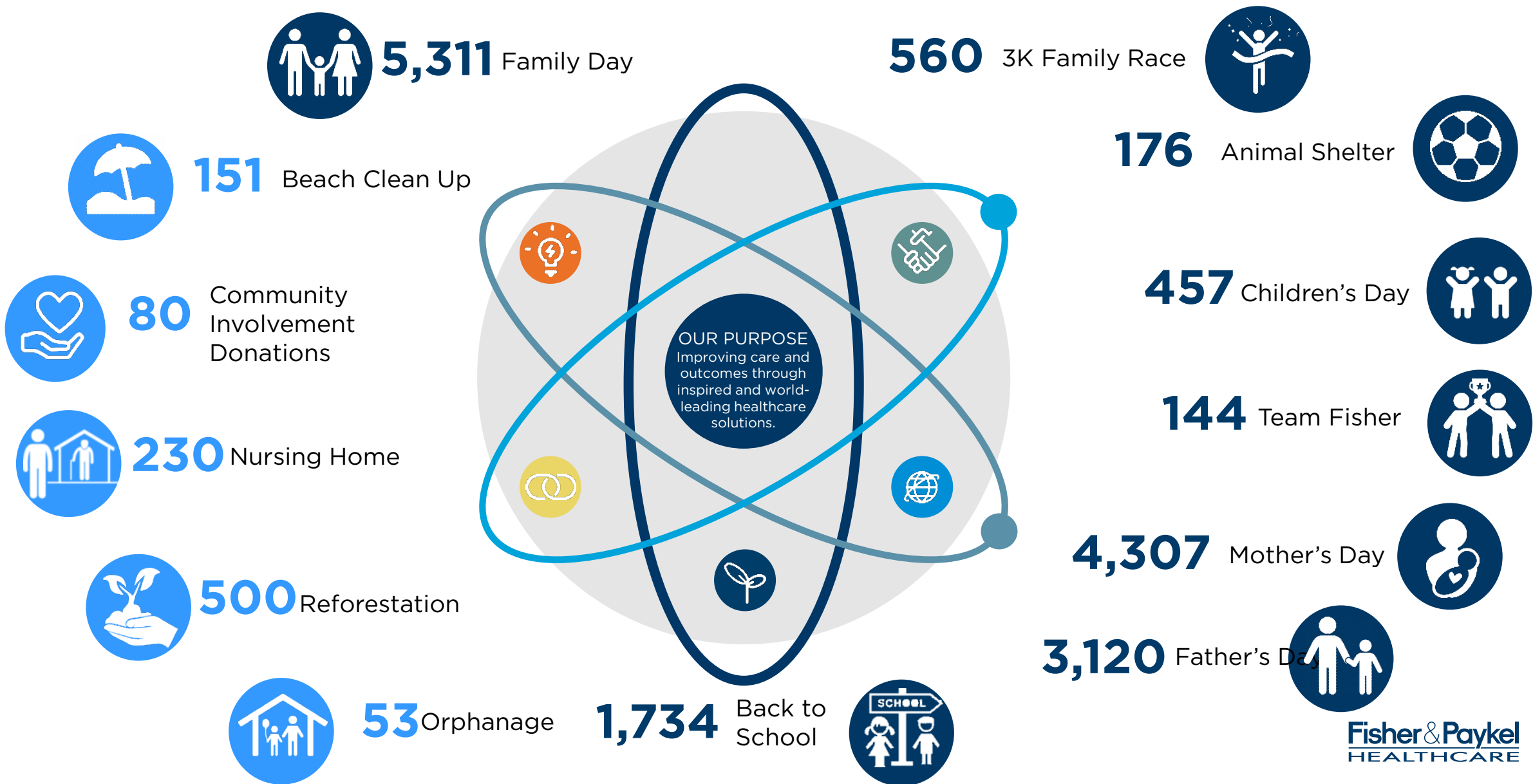


Lead with Humility



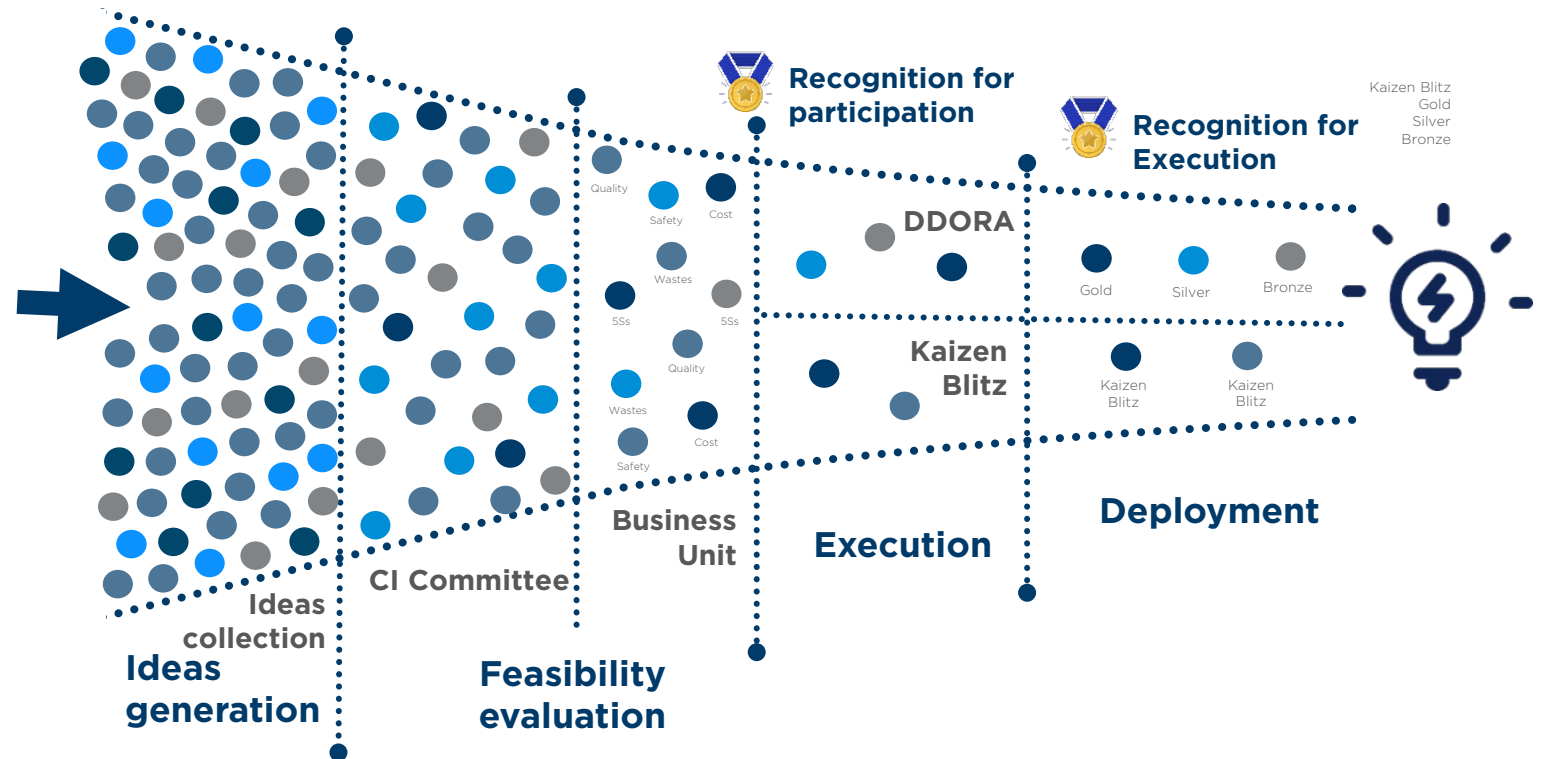
Respect Every
Individual

Our programs



A culture of continuous improvement

Building a culture of **continuous improvement** requires an understanding that **every idea is important** and contributes to **business excellence**.



Creating **long-term solutions** not temporary fixes, **simplifying work processes**, ensuring resources that are needed are available when required and organizing places of work so **potential problems become immediately visible**.

Principles



Seek Perfection



Flow & Pull Value



Focus on Process



Embrace Scientific
Thinking



Assure Quality at the
Source



Training and certifications

Deploy a culture of continuous improvement that drives the transformation of the organization through behaviors that are observable, development of lean manufacturing and six sigma skills, and specialized training of our people through all levels within F&P.

Achievements

8,000+ Improvements | **100+** Lean | Six Sigma Certifications



Continuous Improvement Learning & Development Path



- 1 Project Development
- Test Approval



- 2 Lean Projects Development



- 1 Six Sigma Project Development
- Test Approval



- 1 Six Sigma Project Development
- Test Approval



Problem solving

Create a systematic method which allows all team members to use structured problem-solving tools.

Achievements

Culture of problem solving
(DDORA methodology)



Problem solving area
inside production floor

+30

Continuous training in
problem solving
methodology



+400

People trained



+300

Projects
completed by
DDORA
Methodology



Fisher & Paykel
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Great results are the **outcome** of **connection to purpose** and a culture of **continuous improvement**.

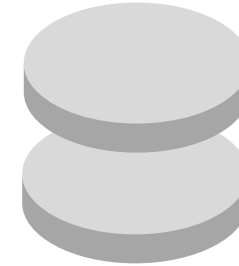
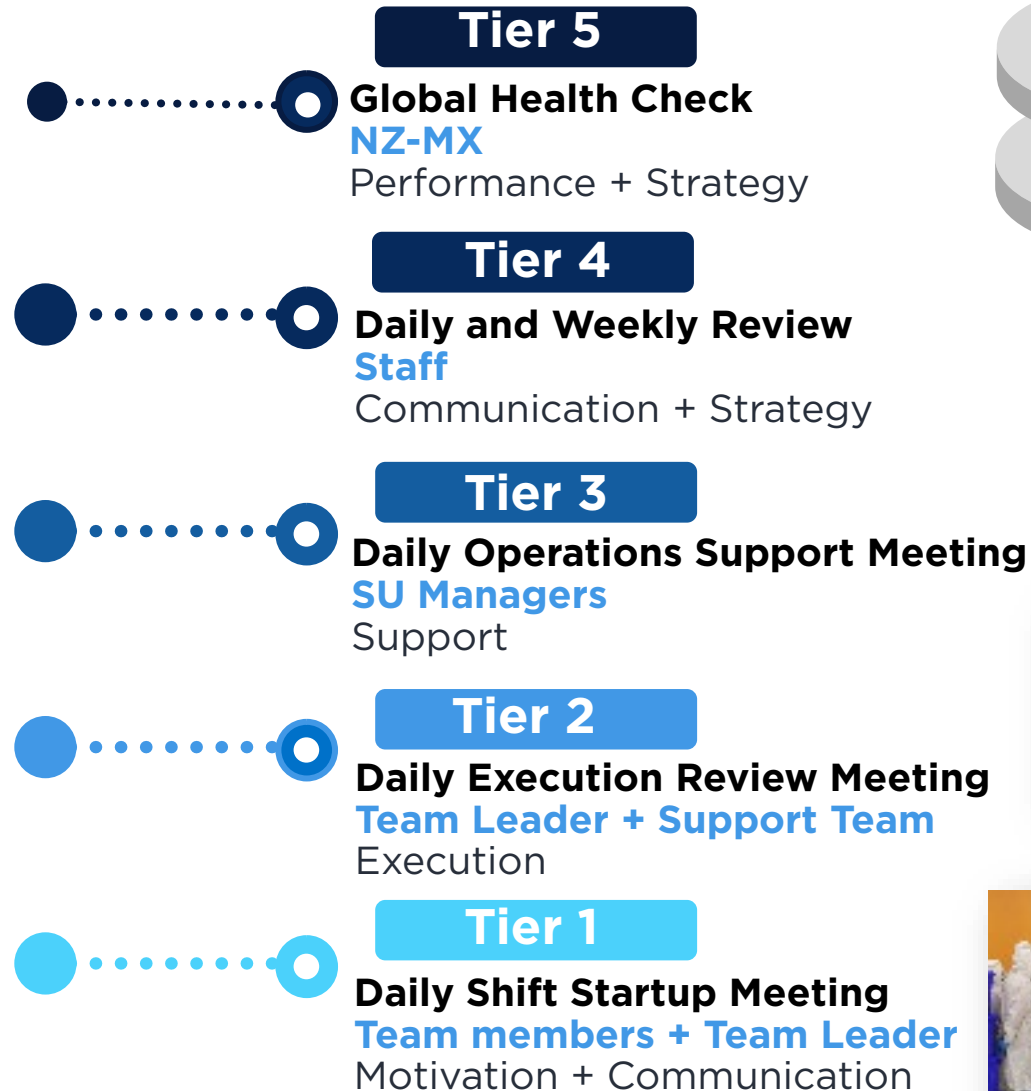
Principles



Create Value for the
Customer



Daily management system



MX Town Hall Meeting - All Performance + Strategy

Weekly Operations Review Meeting - BAU
Ops Team + Support Team Communication



Manufacturing tour



How we connect our people to our purpose

FPH College – developing the technical, operational, and managerial abilities of our collaborators.

Community – social programs to connect our people with the local community.

Living our values – values card program recognizing and rewarding our people for living the Fisher & Paykel Healthcare values of Life, Relationships, Internationalism, Commitment and Originality.



Idea generation

Continuous improvement comes from our collaborators sharing ideas.

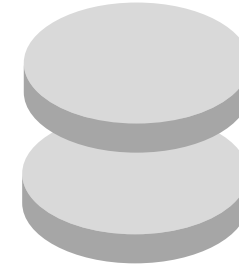
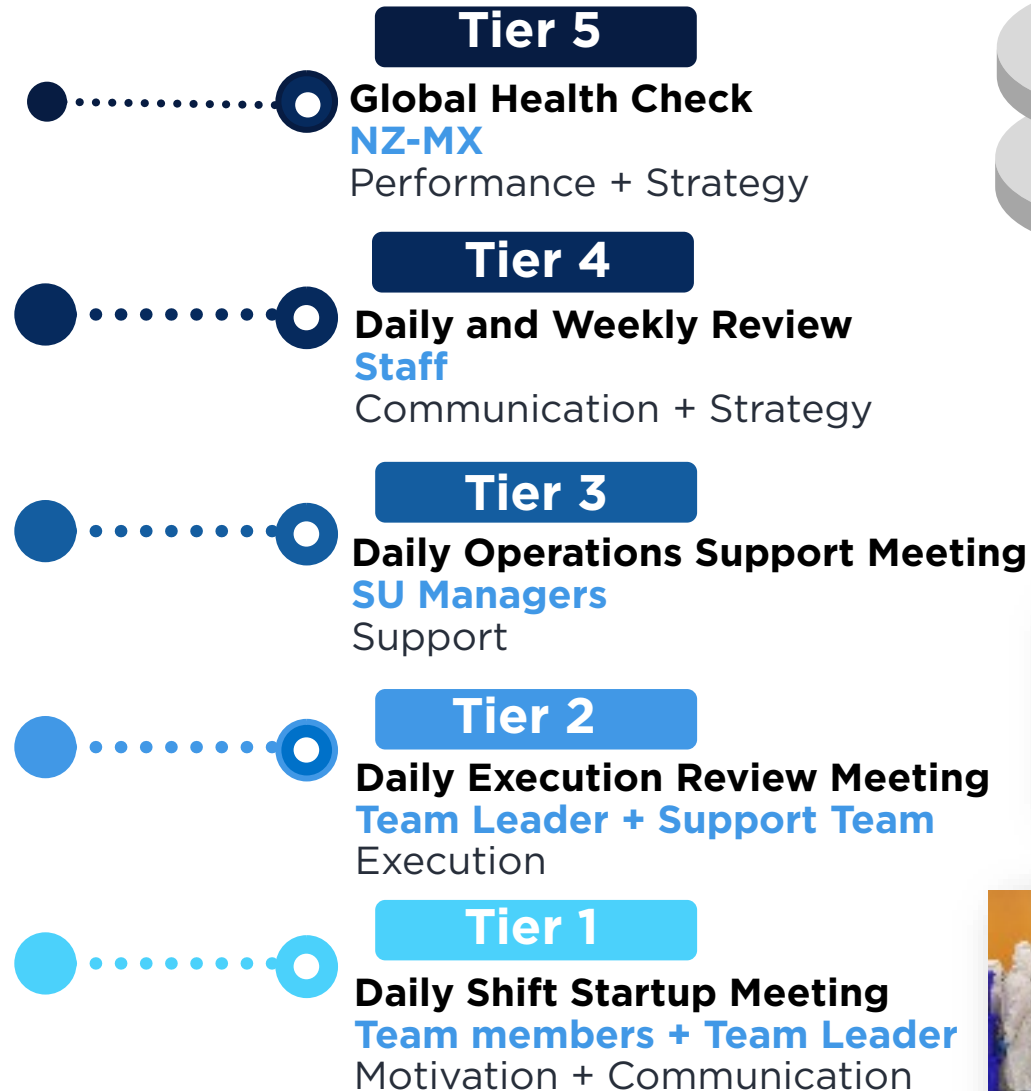
Kaizen Blitz
+800

Kaizen
+50

Six Sigma
Projects
+20



Daily management system



MX Town Hall Meeting - All Performance + Strategy

Weekly Operations Review Meeting - BAU
Ops Team + Support Team Communication



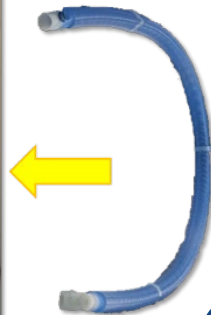
Global CI Award - Inspiratory Limb Assembly Cycle Time Reduction

Benefits

People

- Growing the Internal Talent in production.
- Integration of multidisciplinary team to deliver results.

VISION CIRCUITS

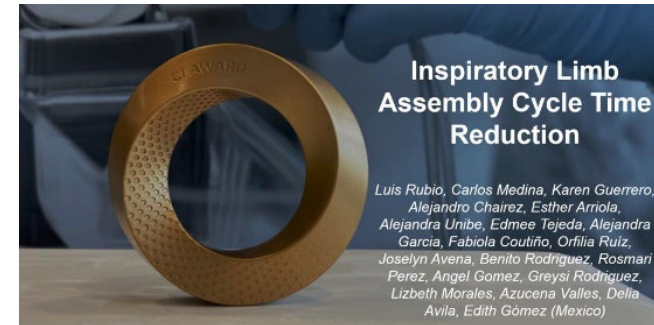


Integrate Supply Chain

- Competitive advantage to meet customer needs in the delivery of Vision Circuit kits.
- Increase adaptability, resilience and quick response to any global demand change.
- Creating value by developing personnel who are capable of working as a team in urgent situations.

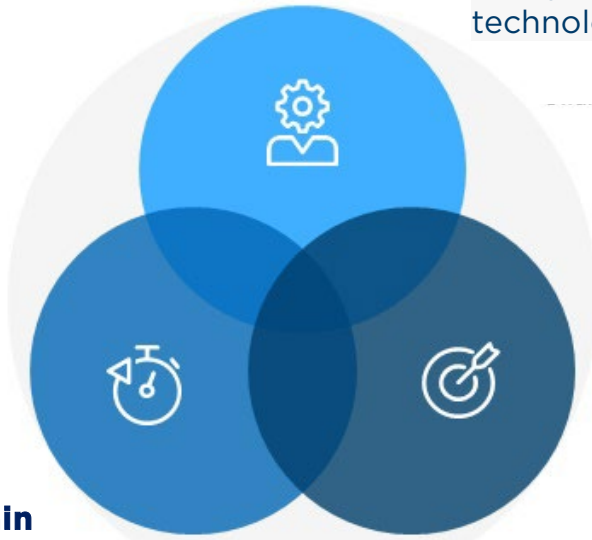
Process

- Better operational safety by providing more space and a more controlled work pace for our production people.
- Use of Lean tools to analyze and identify better options to reach goals.



In-house manufacturing heater wire project

Benefits



Integrate Supply Chain

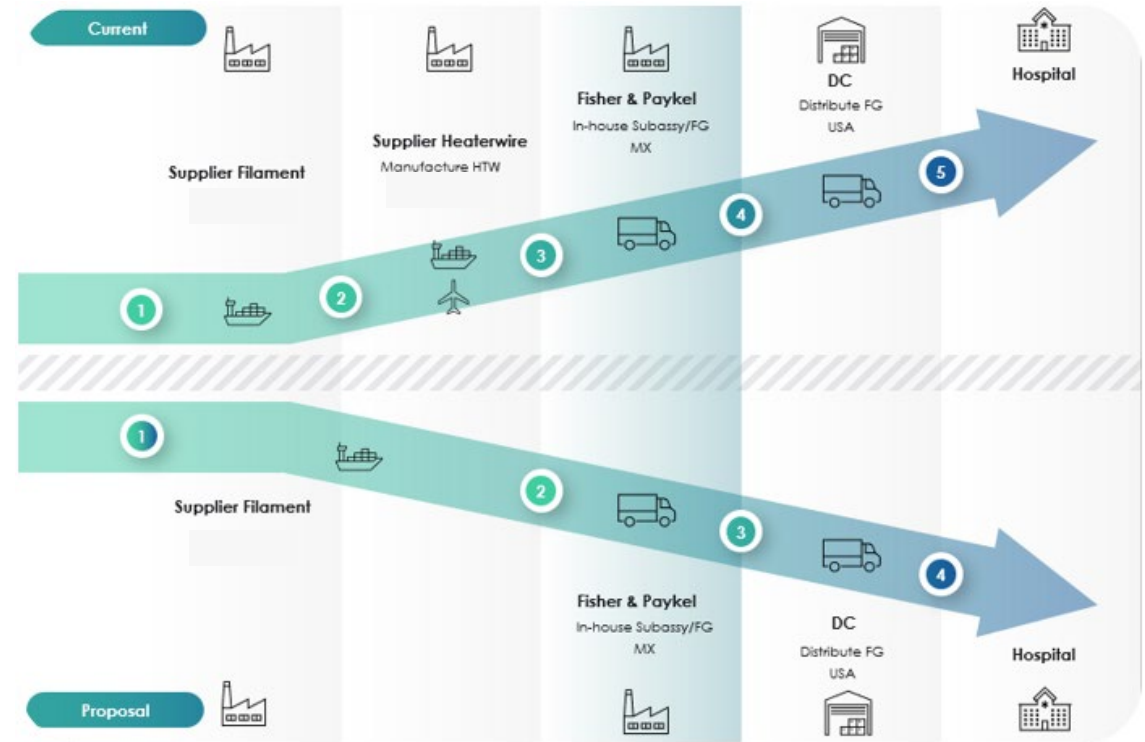
- Competitive advantage in product supply chain, reducing shipping cost/time.
- Increase adaptability, resilience and quick response to any global demand change.

People

- Internal Talent developing new processes and technology.

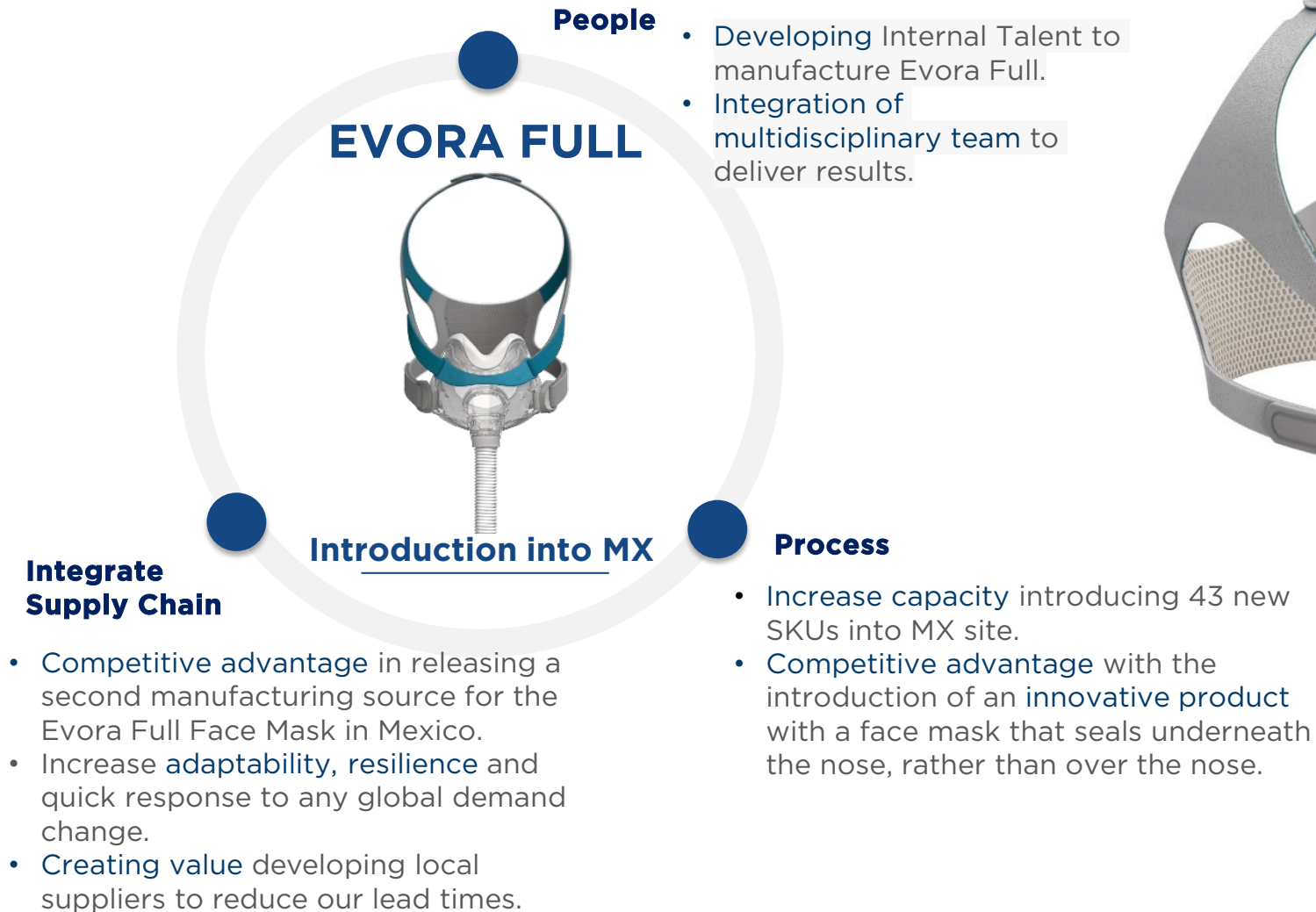
Process

- Increase Autonomy & Self-sufficiency in critical manufacturing process.
- Eliminate/reduce any risk associated with manufacturing process.



F&P Evora Full Compact Full Face Mask

Benefits



Human rights



HUMAN RESOURCES CULTURE

- Respect Policies



HARMONIOUS LABOR PRACTICES

- Internal Preventative Committee to deploy Harassment and Bullying Policy.



EMBEDDING F&P CULTURE

- Constant communication of organizational culture (Values, Purpose).
- Communication channel with all tiers (Suggestion box)



INCLUSION

- Diverse and inclusive workforce



NONDISCRIMINATION

- Psychosocial risk prevention policy
- Diversity and inclusion



SOCIAL ENVIRONMENT

- Educational support for collaborators and family
- Recognition programs



ENVIRONMENTAL PROTECTION

- Wastewater treatment plant
- Solar panels
- LEED Certification (Leadership in Energy and Environmental Design)
 - All buildings constructed in a sustainable way





Educational Symposium

Nasal High Flow Evidence & Application

Friday, September 15, 2023
9:30am – 11:30am

Mission Conference Center
Conference Rooms A/B

26726 Crown Valley Parkway, Mission Viejo, CA 92691

Educational Symposium Agenda

9:30am Welcome & Presenter Introduction

9:40am Nasal High Flow: What's Next?
Matthew W. Trump, DO – UnityPoint Health

10:10am Interviews
Robert Y. Goldberg, MD – Providence Mission Hospital
James B. Price, MD – Providence Mission Hospital

10:40am Nasal High Flow Across the Hospital
Daniel B. Graviloni, RCP – Providence St Jude Medical Center

11:00am Panel Q&A
Hosted by Julie Jackson, RRT - Clinical Affairs Specialist, F&P

11:30am Thank you – Depart for Irvine Office

Welcome to Providence Mission Hospital



- Established in 1971
- State-of-the-art 523-bed acute care hospital
- Level II adult & pediatric trauma center
- Part of Providence, a not-for-profit provider of integrated health care
- Approx 2800+ caregivers
- Approx 800+ physicians
- Approx 78,000+ Emergency Department visits
- Approx 145,00 Outpatient visits



Presenters



THE IOWA
CLINIC®



UnityPoint Health

Matthew W. Trump, DO

- Pulmonology & Critical Care Specialist
- The Iowa Clinic and UnityPoint Health, Des Moines, IA Adjunct Clinical Associate Professor
- University of Iowa, Carver College of Medicine, Iowa City, IA



Providence

Mission Hospital

James B. Price, MD

- Emergency Medicine Specialist
- Providence Mission Hospital, Mission Viejo, CA



Providence

Mission Hospital

Robert Y. Goldberg, MD

- Pulmonology & Critical Care Specialist
- Providence Mission Hospital, Mission Viejo, CA



Providence

St. Jude

Medical Center

Daniel B. Graviloni, RCP

- Respiratory Director
- Providence St Jude Medical Center, Fullerton, CA

Disclosure: Fisher & Paykel Healthcare will make a donation to the Providence Mission Hospital Foundation and will reimburse the above clinicians for any expenses incurred in connection with participation in today's event.

Matthew W. Trump, DO



THE IOWA
CLINIC®



UnityPoint Health

Matthew W. Trump, DO

- Pulmonology & Critical Care Specialist
- The Iowa Clinic and UnityPoint Health,
Des Moines, IA Adjunct Clinical Associate Professor
- University of Iowa, Carver College of Medicine, Iowa City, IA

Nasal High Flow ... Now What?



Nasal High Flow... Now What?

Dr. Matthew Trump DO FACP FCCP

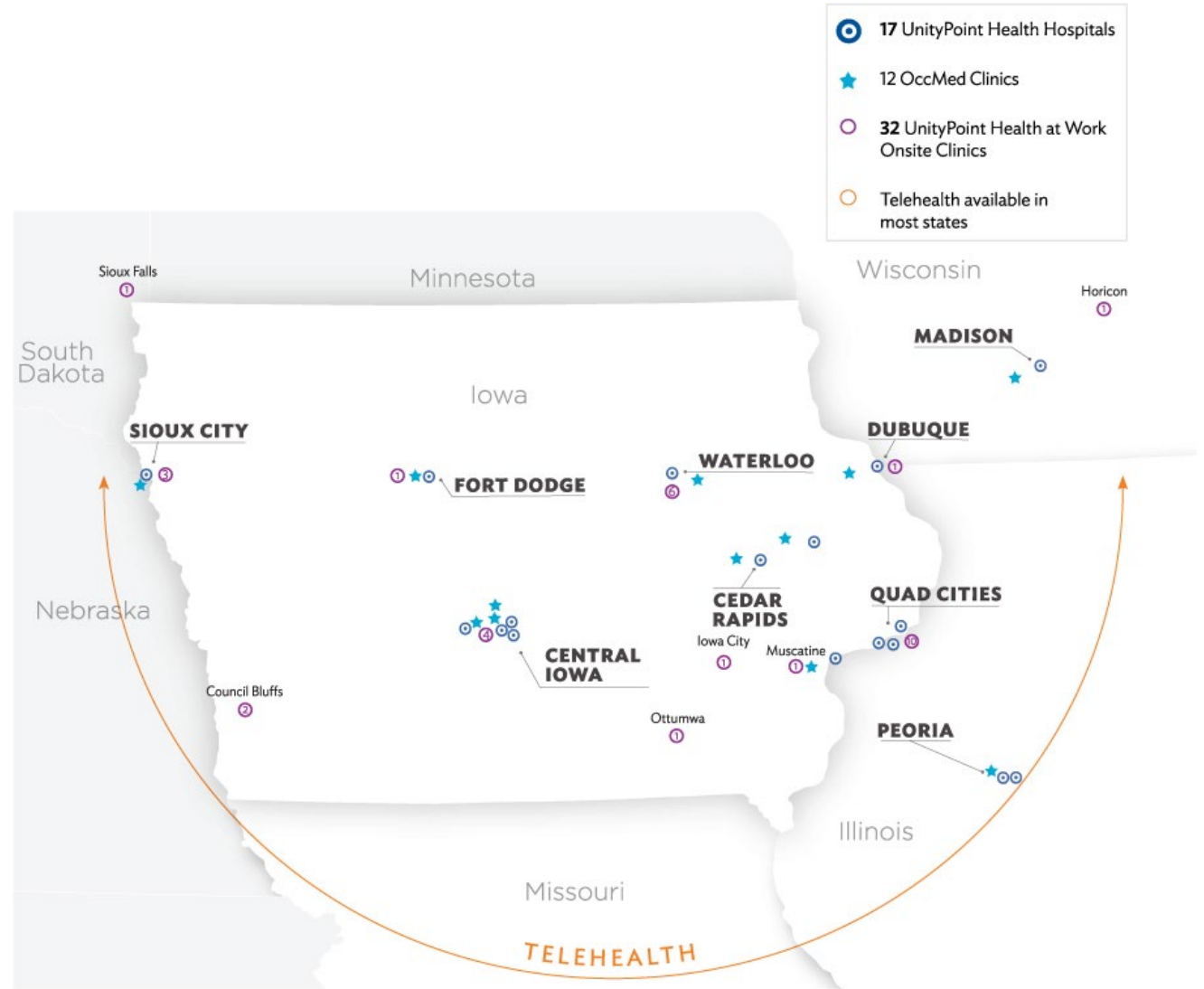


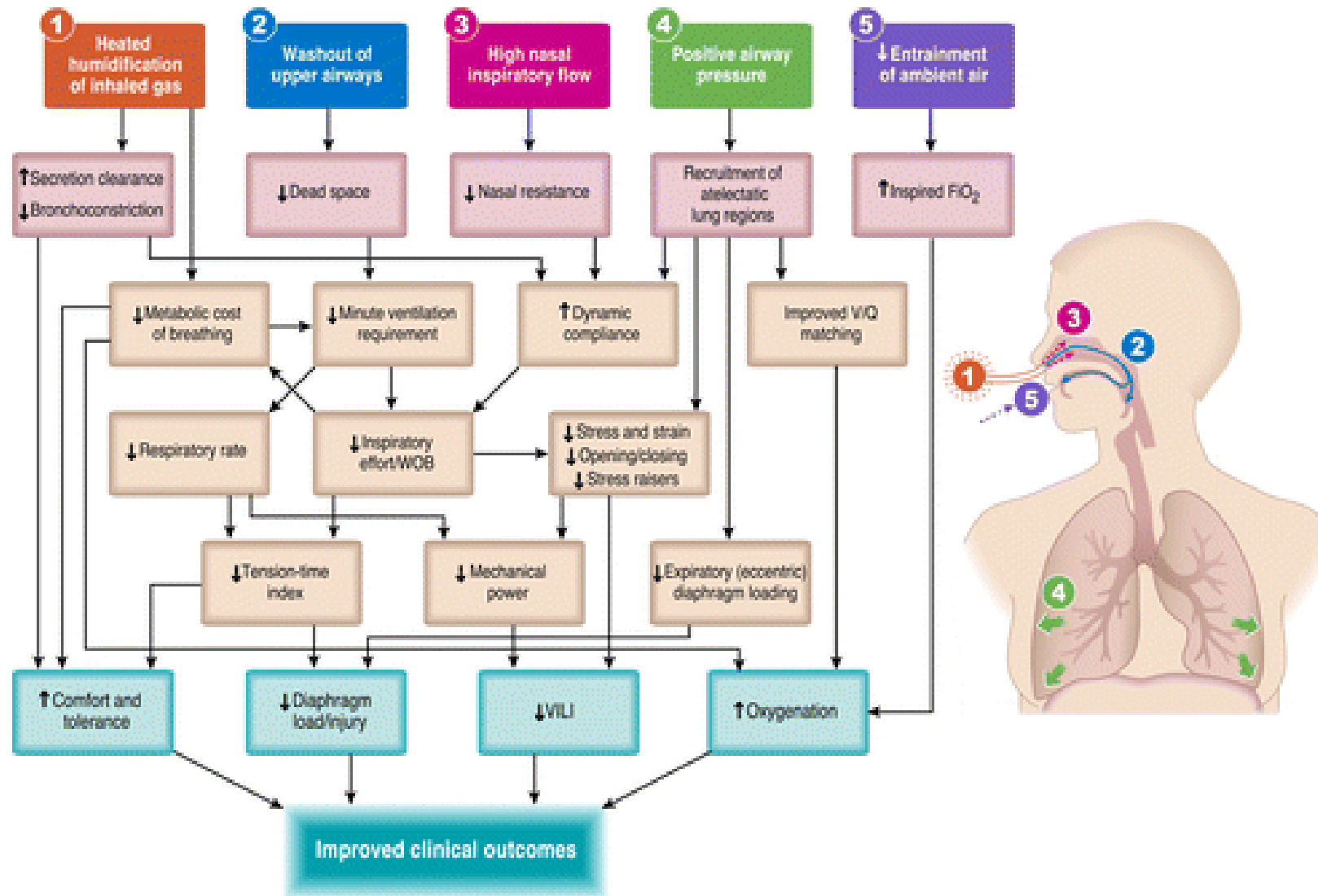
Iowa Methodist Medical Center

- Level I Trauma Center
- 370 staffed beds
- Mixed medical/surgical ICU



- UnityPoint Health

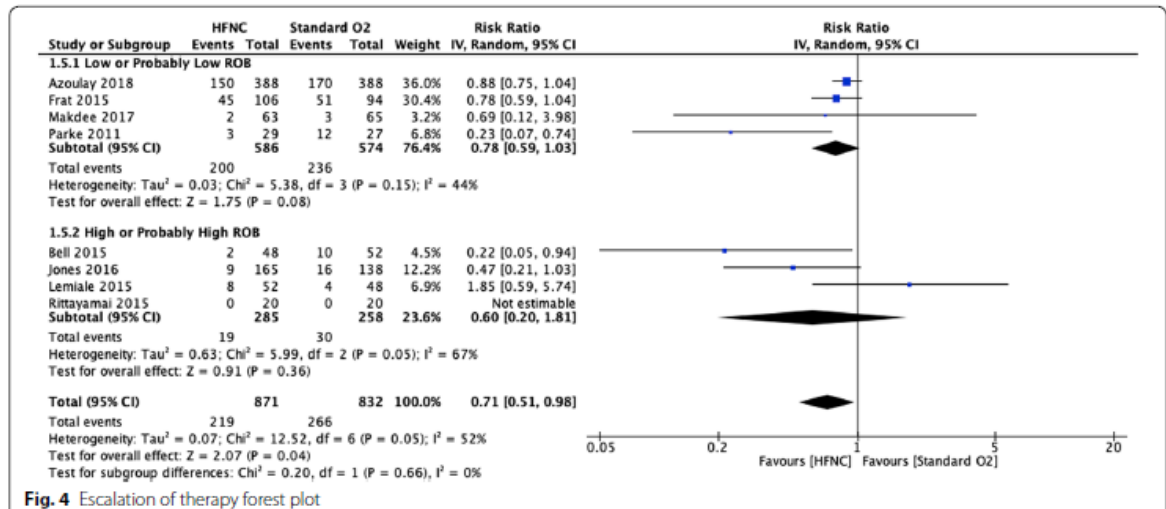
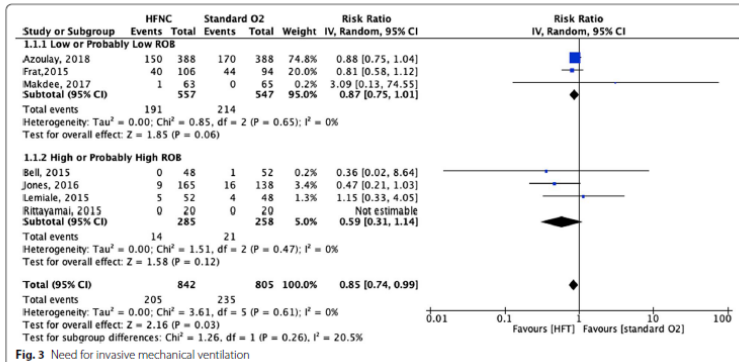




SYSTEMATIC REVIEW

High flow nasal cannula compared with conventional oxygen therapy for acute hypoxemic respiratory failure: a systematic review and meta-analysis

B. Rochwerg^{1,2,22*}, D. Granton¹, D. X. Wang³, Y. Helviz⁴, S. Einav^{4,5}, J. P. Frat^{6,7,8}, A. Mekontso-Dessap^{9,10}, A. Schreiber¹¹, E. Azoulay^{12,13}, A. Mercat¹⁴, A. Demoule^{15,16}, V. Lemiale^{12,13}, A. Pesenti^{17,18}, E. D. Riviello¹⁹, T. Mauri^{17,18}, J. Mancebo²⁰, L. Brochard²¹ and K. Burns²¹



Meta Analysis Findings

4% absolute reduction
in need for intubation

NNT = 23

CONFERENCE REPORTS AND EXPERT PANEL

ESICM guidelines on acute respiratory distress syndrome: definition, phenotyping and respiratory support strategies



Recommendation 3.1

We **recommend** that non-mechanically ventilated patients with AHRF not due to cardiogenic pulmonary edema or acute exacerbation of COPD receive HFNO as compared to conventional oxygen therapy to reduce the risk of intubation

Strong recommendation; moderate level of evidence in favor

We are **unable to make a recommendation** for or against the use of HFNO over conventional oxygen therapy to reduce mortality

No recommendation; high level of evidence of no effect

This recommendation applies also to AHRF from COVID-19

Strong recommendation; low level of evidence in favor for intubation and no recommendation; moderate level of evidence of no effect for mortality, for indirectness.

Updated systematic review

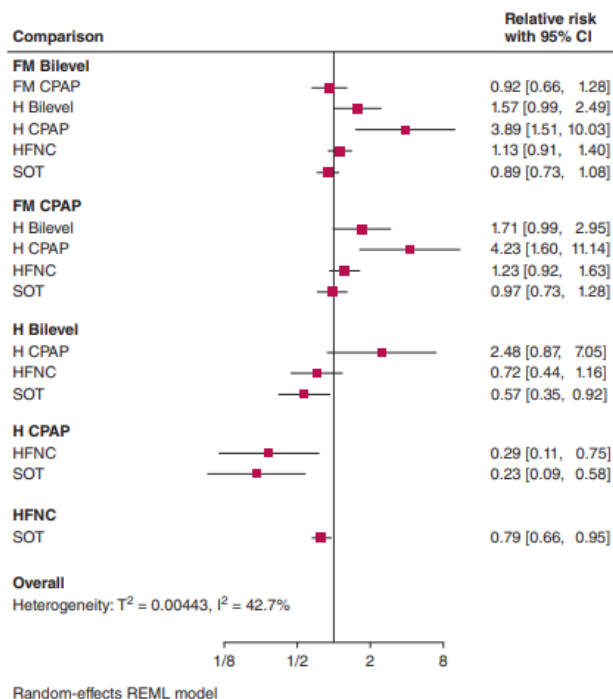


Figure 5 – Network forest plot for mortality. The comparisons are boldfaced, and the interventions are listed below each comparison. This forest plot includes the network estimates for all comparisons for mortality. FM = face mask; H = helmet; HFNC = high-flow nasal cannula; REML = restricted maximum likelihood; SOT = standard oxygen therapy.

[Critical Care Original Research]

CHEST

Noninvasive Oxygenation Strategies in Adult Patients With Acute Hypoxemic Respiratory Failure A Systematic Review and Network Meta-Analysis

Tyler Pitre, MD; Dena Zeraatkar, PhD; George V. Kachkovski, BSN; Gareth Leung, MPhil; Erica Shligold, BSc; Sebastian Dowhanik, MD; Federico Angriman, MD, MPH; Bruno L. Ferreyro, MD, PhD; Damon C. Scales, MD, PhD; and Bram Rochwerg, MD

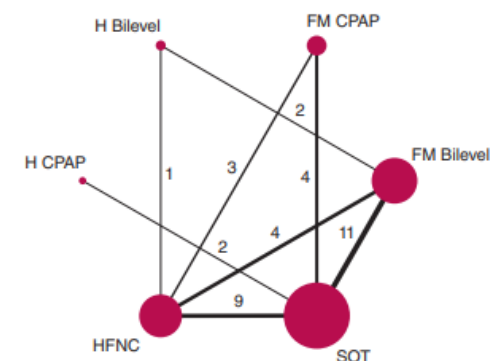


Figure 3 – Network diagram for mortality. The size of the circles represents the number of patients for each intervention, and the thickness of the lines indicates the number of trials for each comparison, which is indicated by the number next to the line. FM = face mask; H = helmet; HFNC = high-flow nasal cannula; SOT = standard oxygen therapy.

- Less heterogeneity by excluding: ED, post op, AECOPD, pulmonary edema

Improved outcomes and tolerance

- Reduced mortality
- Reduction in intubation
- Increased ventilator free days
- Better tolerated than NIV

Oxygen Strategy	Benefit Outcomes [Risk difference per 1,000 (95% CI)]		Efficacy Outcomes [Mean Difference (95% CI)]		
	Death	IMV	Duration of Hospitalization	Duration of ICU	Ventilator-Free Days
Standard oxygen therapy	300 per 1,000	450 per 1,000	...	...	...
HFNC	-63 (-102 to -15) ^{a,b}	-103.5 (-157.5 to -40.5) ^a	-1.35 (-2.42 to -0.28) ^{a,c}	-0.88 (-1.92 to 0.16) ^{a,b}	2.53 (-0.08 to 5.15) ^{a,c}
H CPAP	-231 (-273 to -126) ^a	-306 (-373.5 to -189) ^{a,d}	-1.42 (-3.77 to 0.93) ^{a,c}	-1.74 (-4.49 to 1.01) ^{a,c}	
H bilevel	-129 (-195 to -24) ^{a,d}	-351 (-400.5 to -256.5) ^{a,d}	-6.17 (-10.72 to -1.63) ^{a,b}	-4.84 (-7.36 to -2.33) ^{a,d}	8.51 (2.96 to 14.07) ^{a,c}
FM bilevel	-36 (-84 to 24) ^{a,b}	-99 (-157.5 to -27) ^a	-1.07 (-2.60 to 0.66) ^{a,c}	-0.42 (-1.56 to 0.73) ^{a,c}	-0.82 (-4.53 to 2.9) ^{a,c}
FM CPAP	-9 (-81 to 84) ^{a,c}	-76.5 (-166.5 to 36) ^{a,e}	-1.00 (-2.62 to 0.66) ^{a,c}	-0.68 (-2.3 to 0.94) ^{a,c}	1.33 (-3.55 to 6.21) ^{a,c}

<i>High certainty</i>	Definitely more beneficial than standard oxygen	Definitely more harmful than standard oxygen	Definitely no different from standard oxygen
<i>Moderate certainty</i>	Probably more beneficial than standard oxygen	Probably more harmful than standard oxygen	Probably no different from standard oxygen
<i>Low certainty</i>	May be more beneficial than standard oxygen	May be more harmful than standard oxygen	May be no different from standard oxygen
<i>Very low certainty</i>	We are very uncertain	We are very uncertain	We are very uncertain



What we do

Began
with a
protocol

Proactive Use of High-Flow Nasal Cannula With Critically Ill Subjects

Keith D Lamb RRT RRT-ACCS, Sarah K Spilman MA, Trevor W Oetting RRT, Julie A Jackson RRT RRT-ACCS, Matthew W Trump DO, and Sheryl M Sahr MD MSc

INTRODUCTION: It has been suggested that use of a high-flow nasal cannula (HFNC) could be a first-line therapy for patients with acute hypoxic respiratory failure. The purpose of this study was to determine if protocolized use of HFNC decreases unplanned intubation and adverse outcomes in an ICU population. **METHODS:** The study was a prospective evaluation of 2 cohorts who received HFNC per protocol. Control groups were retrospective selections of subjects who received HFNC in the pre-protocol period. Cohort 1 ($n = 88$) received mechanical ventilation for ≥ 24 h and was extubated directly to HFNC following strict protocol criteria. Cohort 2 ($n = 83$) were placed on HFNC when oxygen requirements escalated (>4 L/min). **RESULTS:** Cohort 1 did not differ from its control group in mortality, hospital stay, or ICU days, but there were significant decreases in incidence of Gram-negative pulmonary infection (30% vs 9%, $P = .001$) and use of bronchodilator therapy (81% vs 61%, $P = .008$). Failed extubation rates were nearly identical across groups, but time to re-intubation was shorter in the protocol group (24 vs 13 h, $P = .19$). Cohort 2 did not differ significantly from its control group in intubation rates or mortality, but subjects managed by protocol experienced significant decreases in ICU days (4 vs 3 d, $P = .03$) and hospital days (12 vs 8 d, $P = .007$). There was a trend toward fewer hours on HFNC (33 vs 24 h, $P = .10$) and faster time to intubation when HFNC failed (19 vs 9 h, $P = .08$). **CONCLUSIONS:** Extubation to HFNC led to a significant decrease in pulmonary infections and bronchodilator therapy in Cohort 1 but did not reduce length of stay or rates of failed extubation. When HFNC was used early and per protocol (Cohort 2), ICU and hospital lengths of stay were reduced and HFNC was initiated more quickly when the need for respiratory support escalated. *Key words:* high-flow nasal cannula; respiratory failure; mechanical ventilation; postextubation management; re-intubation; pulmonary infection. [Respir Care 2018;63(3):259–266. © 2018 Daedalus Enterprises]



Fig. 1. Study protocol for cohort 1.

Variable	Pre-Protocol (n=88)	Protocol (n=88)	P-value
Age, median (IQR)	68 (56, 76)	62 (51, 73)	.06
Male, n (%)	48 (54%)	51 (58%)	.38
Do-not-resuscitate (DNR) at any time, n (%)	28 (32%)	23 (26%)	.25
Comorbidities, n (%)			
Current or former smoker	19 (22%)	20 (23%)	.50
Cardiac disease	46 (52%)	46 (52%)	.56
Respiratory disease	36 (41%)	31 (35%)	.27
Mortality, n (%)	11 (13%)	8 (9%)	.31
Gram-negative pulmonary infection, n (%)	26 (30%)	8 (9%)	<.001
Bronchodilator therapy, n (%)	71 (81%)	54 (61%)	.004
Hospital days, median (IQR)	13 (8, 22)	14 (9, 23)	.27
Total ICU days, median (IQR)	7 (4, 11)	7 (4, 11)	.79



Fig. 2. Study protocol for cohort 2.

Variable	Pre-Protocol (n=83)	Protocol (n=83)	P-value
Age, median (IQR)	65 (56, 77)	69 (54, 77)	.36
Male, n (%)	45 (54%)	45 (54%)	.56
Do-not-resuscitate (DNR) at any time, n (%)	38 (46%)	32 (39%)	.22
Comorbidities, n (%)			
Current or former smoker	56 (68%)	53 (68%)	.41
Cardiac disease	47 (57%)	52 (63%)	.26
Respiratory disease	51 (61%)	53 (64%)	.44
Mortality, n (%)	23 (28%)	17 (21%)	.18
Gram-negative pulmonary infection, n (%)	3 (4%)	1 (1%)	.31
Bronchodilator therapy, n (%)	58 (70%)	49 (59%)	.10
Hospital days, median (IQR)	12 (7, 20)	8 (5, 14)	.007
Total ICU days, median (IQR)	4 (3, 7)	3 (2, 5)	.03
Hours between 4 L/min need and HFNC initiation, median (IQR)	1.4 (0.3, 3.3)	0.3 (0.1, 0.8)	<.001

Lamb et al.

- Summary:
 - No increased adverse outcomes
 - Earlier recognition of respiratory failure and faster escalation of therapy
 - Efficacious protocol generalizable to broad, critically ill populations
 - Shorter hospital and ICU lengths of stay for patients with increasing need for respiratory support
 - Respiratory infection rates were lower when NHF is primarily used in post-extubated patients
 - NHF managed care per protocol may reduce unnecessary medication use

Why go beyond ICU?

- ICU and ED beds are a scarce and costly resource
- Review of internal data (MET team) demonstrated potential benefit in respiratory distress +/- acute hypoxic respiratory failure
 - Not requiring invasive mechanical ventilation
- Patients who meet strict criteria could be effectively and safely managed on therapy on outside the ICU

UPH DM Inclusion Criteria for Outside ICU

Traditional nasal cannula does not meet patient flow demand and/or FiO₂ requirement.

COPD, asthma, respiratory infections causing AHRF, and other cardiopulmonary conditions

Rib fractures or pulmonary contusions

- Splint open of the airways during healing process

Dyspnea and/or increased work of breathing

Hypoxemia requiring >4 lpm oxygen

P/F ratio >150

ED: Above criteria used

- Intolerance to noninvasive mechanical ventilation or CPAP via EMS at 7 cm H₂O or less

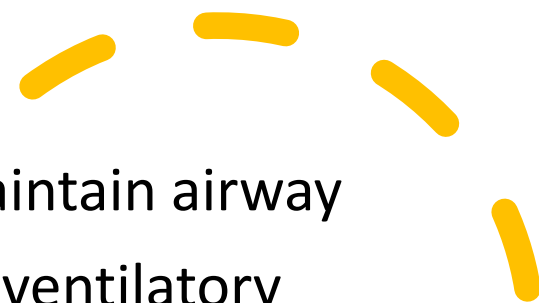
UPH DM Inclusion Criteria for Outside ICU

Hydration of thickened secretions

Tracheostomy patients:

- Requiring higher flows
- Heat and humidity benefit
- Evidence for faster decannulation

Palliation for air hunger, dyspnea, and/or hypoxia at the end of life

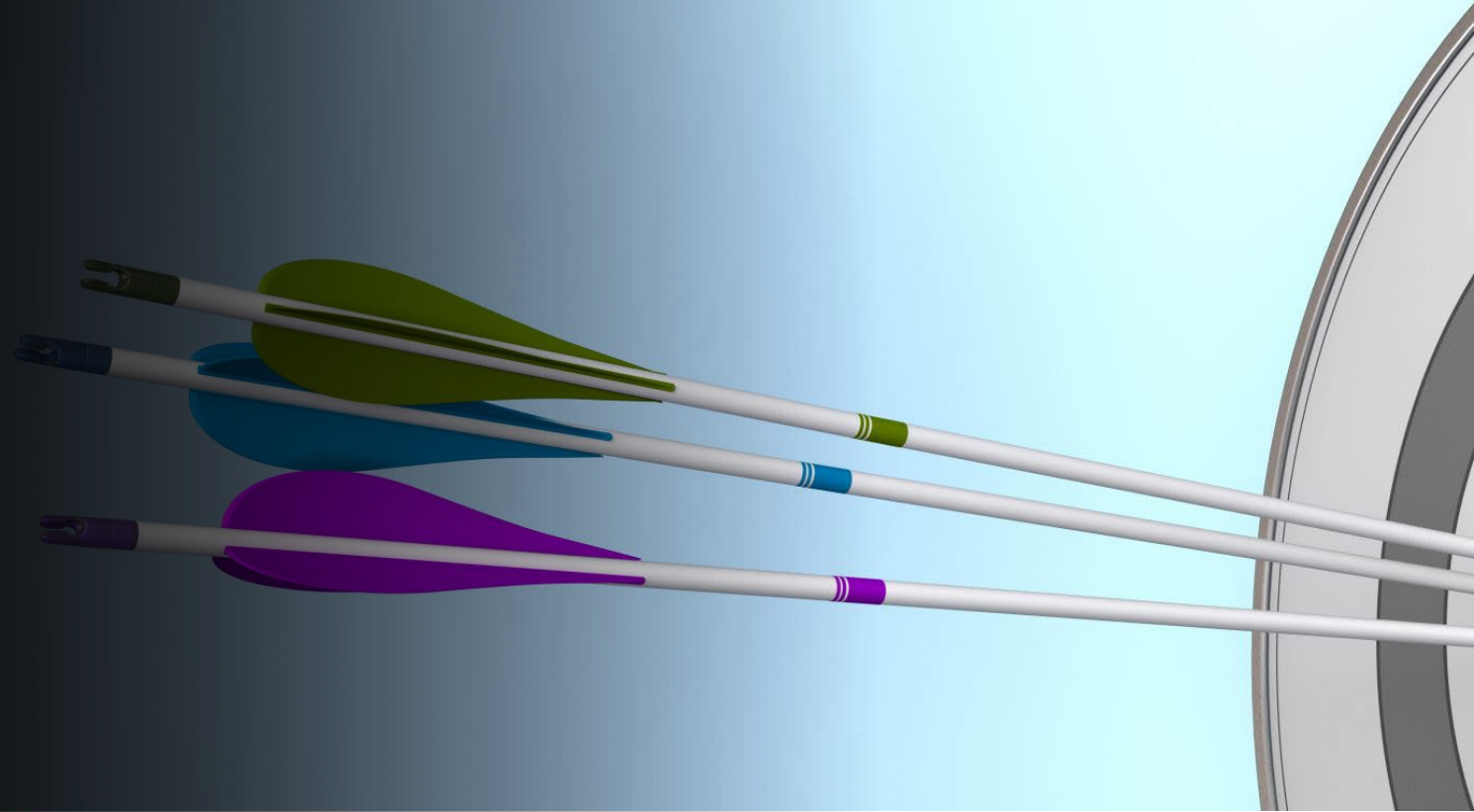


UPH DM Exclusion Criteria for outside ICU

- Obtunded and unable to maintain airway
- Severe respiratory acidosis (ventilatory failure)
- Suspected facial fractures or skull fractures
- Shock
- Upper airway obstruction



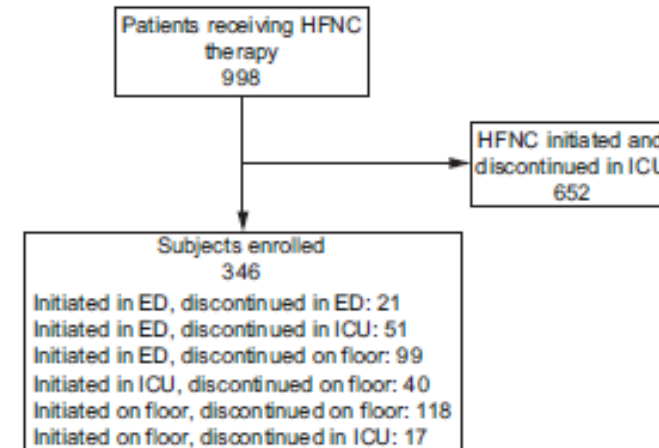
Our results



Use Outside
the ICU is Safe
and Effective

Implementation of High-Flow Nasal Cannula Therapy Outside the Intensive Care Setting

Julie A Jackson, Sarah K Spilman, Lisa K Kingery, Trevor W Oetting, Matthew J Taylor, William M Pruett, Christopher R Omerza, Kaitlin A Branick, Iaswarya Ganapathiraju, Mikayla Y Hamilton, Dakota A Nerland, Philip S Taber, Dustin A McCann, Carlos A Pelaez, and Matthew W Trump



Use Outside the ICU is Safe and Effective

- 66% avoided ICU
- 486 hospital days outside ICU
- 44h duration
- Escalation of care
 - 5% intubated
 - 6% NIV
 - 13h to escalation
- Low mortality 13%

Category	Number (Percentage)
Male	182 (53)
Any days in ICU	162 (47)
Emergency department disposition to home	5 (1)
Therapy delivery	
Start and stop in emergency department	21 (6)
Start and stop on floor	118 (34)
Start in emergency department, stop in ICU	51 (15)
Start in emergency department, stop on Floor	99 (29)
Start in ICU, stop on floor	40 (12)
Start on floor, stop in ICU	17 (5)
Adverse events	
Unplanned ICU admission for any reason	63 (18)
Escalation of care from HFNC to noninvasive ventilation	20 (6)
Escalation of care from HFNC to invasive ventilation	17 (5)
Rapid response team activation while on HFNC	38 (11)
Mortality, all causes	44 (13)
Hospital length of stay, d	8 (4-12)

Our Experience

Received NHF (N=998*)

No study cohort
(n=674)

COPD (n=90)

Trauma (n=63)

ED cohort (n=171)

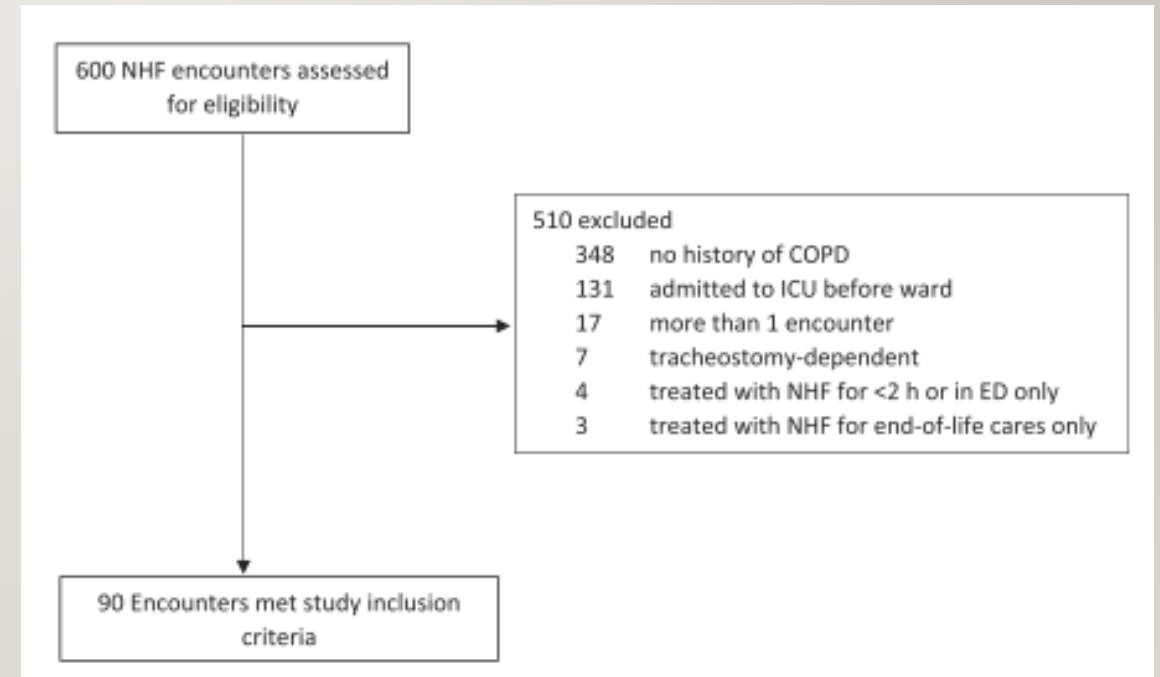
COPD COHORT

Study Inclusion Criteria:

- Hypoxemia requiring > 4 LPM Oxygen
- Admitted directly to floor from ED or direct admission
- History of COPD
- Must have consult from Pulmonology team

Study Exclusion Criteria:

- Trach dependent
- Palliation only
- NHF < 1 hour
- ICU before floor



Nasal high flow therapy use in wards in patients with chronic obstructive pulmonary disease may spare ICU resources

Matthew W. Trump^{1,2} | Iaswarya Ganapathiraju³ | Julie A. Jackson⁴ |
Kate Branick³ | Matt Taylor³ | Trevor W. Oetting⁴ | Carol A. Pelaez^{5,6}

- Less ICU days in study vs control
 - 19% vs 49%
- No difference in intubation
- No mortality difference

Clin Respir J. 2021;1–7.

TABLE 2 Key outcome comparison between control and study groups

	Control sample (<i>n</i> = 90)	Study sample (<i>n</i> = 90)	<i>p</i> value
Hospital days, median (IQR)	6 (4, 8)	7 (5, 13)	0.02
Admission to ICU before ward, <i>n</i> (%)	32 (36%)	0 (0%)	<0.001
Admission to ICU after ward, <i>n</i> (%)	13 (14%)	17 (19%)	0.43
Any ICU days, <i>n</i> (%)	44 (49%)	17 (19%)	<0.001
Mortality, <i>n</i> (%)	11 (12%)	11 (12%)	0.99
Hours between arrival and need for >4 L oxygen support, median (IQR)	2.7 (0.1, 27.8)	0.7 (0.1, 31.5)	0.57
Intubated during hospitalization, <i>n</i> (%)	8 (9%)	7 (8%)	0.79
Initiation of NHF, <i>n</i> (%)			–
Emergency department (ED)	–	44 (49%)	
Medical/surgical ward	–	46 (51%)	
Hours between arrival and NHF initiation, median (IQR)	–	4.7 (1.9, 46.2)	–
Hours of NHF therapy, median (IQR)	–	49 (22, 101)	–
Initial Visual Analog Scale score on NHF therapy, median (IQR)	–	3 (1, 4)	–

TRAUMA COHORT

Study Inclusion Criteria:

- Hypoxemia requiring > 4 LPM Oxygen
- Therapy initiated in ED, ICU, or floor
- Significant chest wall trauma ($3 \geq$ rib fractures)
- Part of multi-modal pain management regimen

Study Exclusion Criteria:

- NHF < 1 hour
- Received mechanical ventilation prior to NHF
- Old or age-indeterminate rib fractures
- Tracheostomy

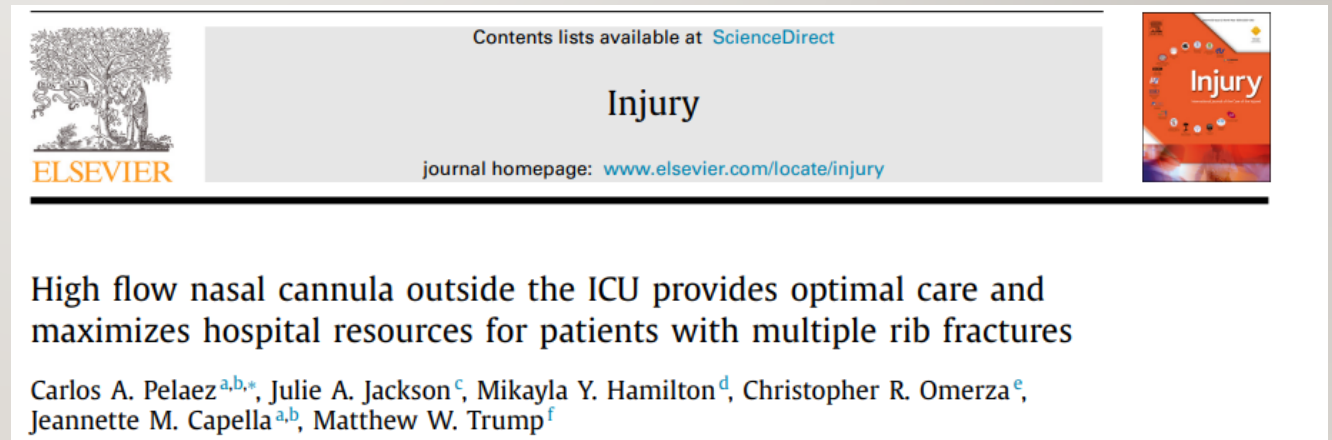


Table 2. High flow nasal cannula (HFNC) oxygen therapy (N=126)

	Control Group (N=63)	Study Group (N=63)	p-value
Hours to HFNC initiation, median (IQR)	7 (3, 17)	5 (2, 15)	.22
Hours of therapy, median (IQR)	32 (15, 50)	51 (20, 90)	.006
Completed pre-HFNC pulmonary function test, n (%)	--	20 (32%)	--
Initial best forced vital capacity (FVC), median (IQR)	--	1.35 (0.88, 1.51)	--
Initial FVC predicted %, median (IQR)	--	34 (27, 44)	--
HFNC initiation, n (%)			<.001
Emergency department (ED)	0 (0%)	22 (35%)	
Intensive care unit (ICU)	63 (100%)	27 (43%)	
Floor	0 (0%)	14 (22%)	
HFNC initial FiO2, median (IQR)	50 (40, 50)	50 (40, 60)	.36
HFNC initial flow, median (IQR)	50 (50, 60)	50 (50, 60)	.94
HFNC initial ROX index, median (IQR)	13.0 (8.9, 17.5)	10.7 (7.8, 15.3)	.12
HFNC discontinuation, n (%)			<.001
Emergency department (ED)	0 (0%)	2 (3%)	
Intensive care unit (ICU)	63 (100%)	34 (54%)	
Floor	0 (0%)	27 (43%)	
Patients with entire HFNC therapy outside the ICU, n (%)	0 (0%)	22 (35%)	<.001

HFNC, high flow nasal cannula; IQR, interquartile range; ED, emergency department; ICU, intensive care unit

More started
outside ICUMore
completed
outside ICU

Table 3. Patient outcomes (N=126)

	Control Group (N=63)	Study Group (N=63)	p- value
Dispositioned from ED to Floor, n (%)	2 (3%)	20 (32%)	<.001
No ICU days, n (%)	0 (0%)	17 (27%)	<.001
ICU Days, median (IQR)	4 (2, 6)	3 (0, 6)	.08
Unplanned transfer from floor to ICU, n (%)	6 (10%)	8 (13%)	.57
Hospital days, median (IQR)	9 (6, 12)	9 (4, 13)	.64
Pneumonia, n (%)	7 (11%)	3 (5%)	.19
Received mechanical ventilation after HFNC for respiratory distress, n (%)	12 (19%)	8 (13%)	.33
Ventilator days, median (IQR)	6 (2, 12)	8 (2, 23)	.79
Hours to HFNC initiation, median (IQR)	8 (2, 23)	3 (1, 18)	.40
Hours of HFNC therapy, median (IQR)	31 (14, 41)	14 (6, 22)	.05
Mortality, n (%)	2 (3%)	3 (5%)	.65
Hospital discharge to home, n (%)	30 (48%)	27 (43%)	.59

ED, emergency department; ICU, intensive care unit; IQR, interquartile range; HFNC, high flow nasal cannula

Avoided
ICUNo difference in
complications

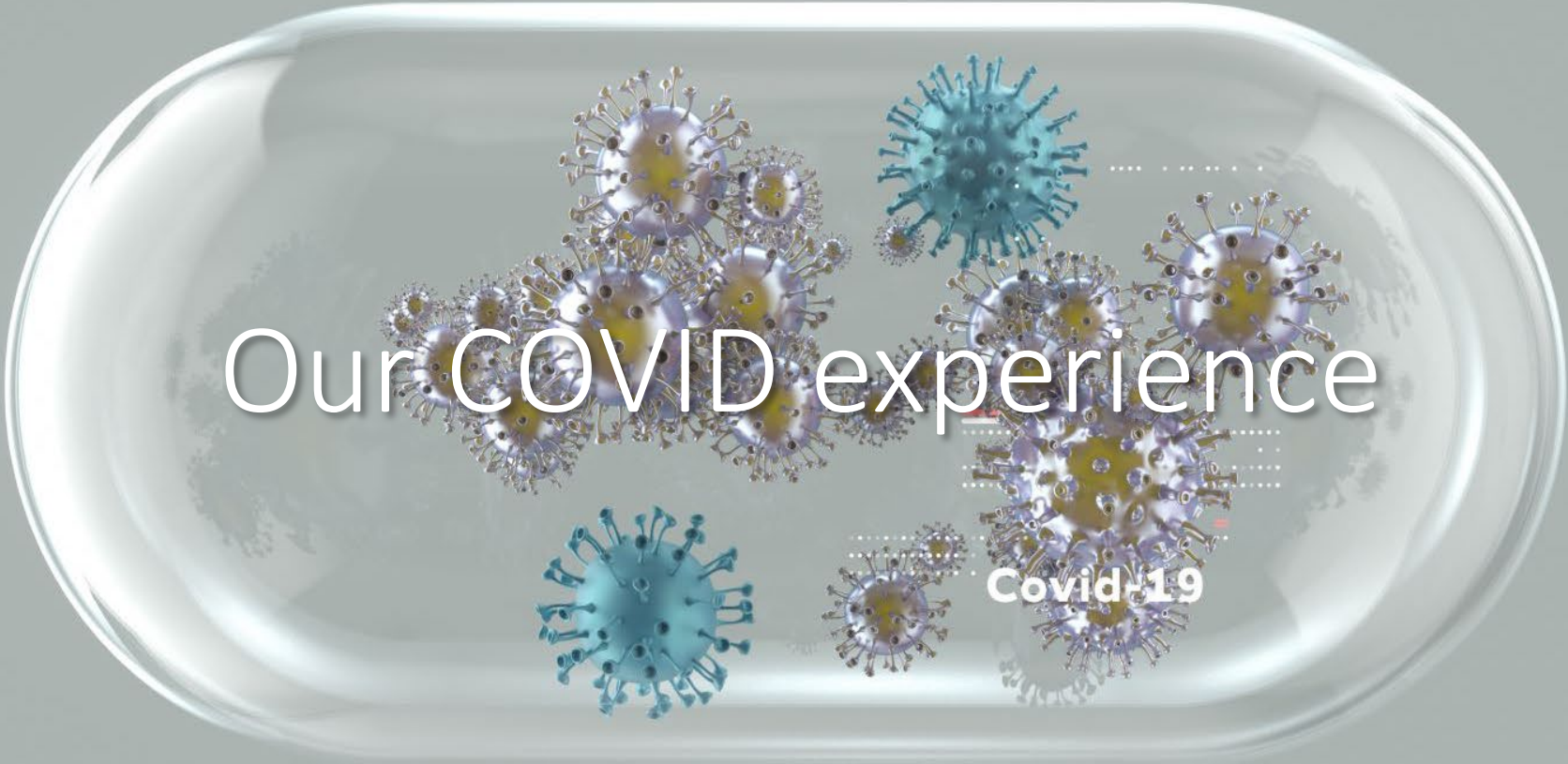
Savings and Conclusions

- Ward patients:
 - 27% avoided the ICU
 - 47% vs 59% of days spent in ICU
- 11% reduction in health care costs
 - \$481,663 (US) saved
- No difference
 - Mortality
 - Intubation rates

Table 4
Healthcare Savings.

	Control Group	Study Group	Difference	% Reduction
Total ICU Days	379	301	–78 days	
Cost ICU Days*	\$3533,038	\$2805,922	–\$727,116	
Total Floor Days	265	344	+ 79 days	
Cost Floor Days**	\$823,355	\$1068,808	+ \$245,453	
Total Hospital Days	644	643	–1 day	
Cost:	\$4356,393	\$3874,730	Save \$481,663	11%
Total ventilator days	121	89	–32 days	26%

ICU, intensive care unit.



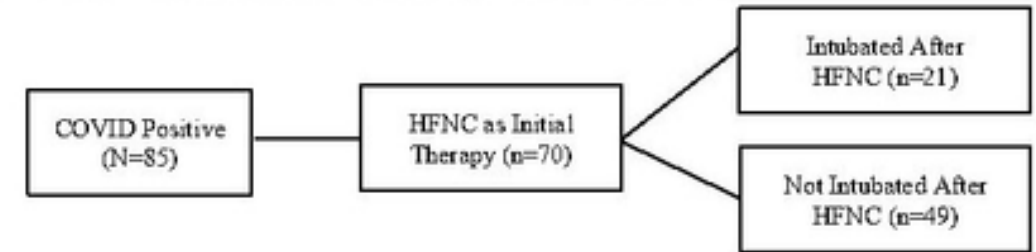
Our COVID experience

Covid-19

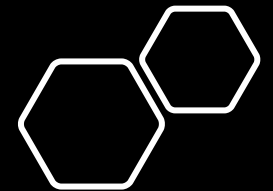
Table 1. COVID positive patients with High Flow Nasal Cannula (HFNC) therapy as escalation respiratory support device and dispositioned at the time of writing (N=70)

COVID-19 Patients N=70	
Age in years, mean (SD)	66 (18)
Male, n (%)	45 (64%)
Body mass index (BMI), mean (SD)	31 (8)
Admission disposition, n (%)	
Intensive care unit (ICU)	29 (41%)
Inpatient ward	41 (59%)
Do Not Resuscitate (DNR) status, n (%)	
Admitted and remained DNR	13 (19%)
Admitted and remained Full Code	34 (49%)
Admitted as Full Code and changed to DNR	23 (33%)
HFNC therapy initiation location, n (%)	
Emergency Department (ED)	21 (30%)
Intensive Care Unit (ICU)	16 (23%)
Inpatient ward	33 (47%)
Escalation of care to mechanical ventilation, n (%)	21 (30%)
Any days in ICU, n (%)	47 (67%)
Transferred from ward to ICU, n (%)	18 (26%)
Hospital disposition, n (%)	
Deceased	24 (34%)
Home	28 (40%)
Rehabilitation facility	9 (13%)
Skilled nursing facility	6 (9%)
Hospice	3 (4%)

Figure 1. COVID positive patients with High Flow Nasal Cannula (HFNC) therapy as escalation respiratory support device and dispositioned at the time of writing, N=85



Summer 2020



- Respiratory Care October 2020, 65 (Suppl 10) 3448481

Our COVID Experience

Locally in 2020-21

- 220+ started on NHF
- 14% intubation rate
- 68% started on medical floor
- med duration 3.3 days
- 55% survival
- Av ROX intubated 2.91
- 70% mortality if escalated to IMV

BY THE NUMBERS: Caring for Our Communities



600K COVID-19 TESTS
Processed by
UnityPoint Health laboratories.



54K COVID-19 PATIENTS
Cared for in inpatient and
outpatient settings.



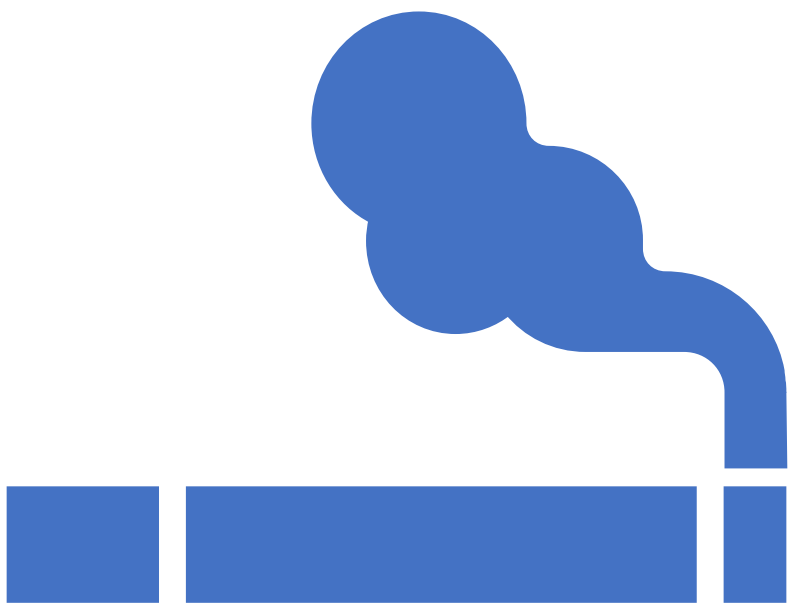
3,600 PATIENTS TREATED WITH
.....
REMDESIVIR



3,500 PATIENTS TREATED WITH
.....
CONVALESCENT PLASMA



2,500 PATIENTS TREATED WITH
.....
NASAL HIGH FLOW THERAPY



COPD

COPD

- Global prevalence 10.3%
 - 11.8% Men
 - 8.3% women
- 3rd leading cause of death worldwide
- 3 million deaths annually
- \$40 billion/year by 2043 in US
- AECOPD greatest proportion of total COPD cost burden in US

AECOPD

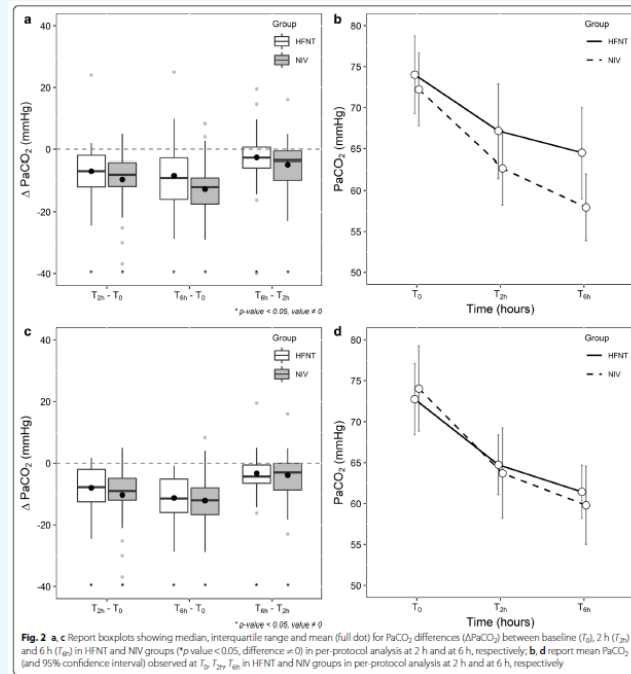


Fig 2 a, c Report boxplots showing median, interquartile range and mean (full dot) for PaCO_2 differences (ΔPaCO_2) between baseline (T_0), 2 h (T_{2h}) and 6 h (T_{6h}) in HFNT and NIV groups (*p-value < 0.05, difference = 0) in per-protocol analysis at 2 h and at 6 h, respectively; b, d report mean PaCO_2 (and 95% confidence interval) observed at T_0 , T_{2h} , T_{6h} in HFNT and NIV groups in per-protocol analysis at 2 h and at 6 h, respectively

- NHF noninferior to NIV for CO_2 reduction
 - 6.8 mm Hg vs 9.5 mm Hg ($p = 0.4$) at 2h
 - 60 lpm flow used
- 1/3 NHF required NIV in 6h
- 57% NHF required NIV entire hospitalization
- 2 (5%) intubated in NHF group
- 3 (7.6%) switched from NIV to NHF
- No differences in mortality, hospital LOS, duration of IMV

Cortegiani et al. Crit Care (2020) 24:692
<https://doi.org/10.1186/s13054-020-03409-0>

Critical Care

RESEARCH

Open Access

High flow nasal therapy versus noninvasive ventilation as initial ventilatory strategy in COPD exacerbation: a multicenter non-inferiority randomized trial

Andrea Cortegiani^{1,2*}, Federico Longhini³, Fabiana Madotto⁴, Paolo Groff⁵, Raffaele Scala⁶, Claudia Crimi⁷, Annalisa Carlucci⁸, Andrea Bruni⁹, Eugenio Garofalo³, Santi Maurizio Raineri^{1,2}, Roberto Tonelli⁹, Vittoria Comellini¹⁰, Enrico Lupia¹¹, Luigi Vetrugno¹², Enrico Clini¹³, Antonino Giaratano¹², Stefano Nava¹⁰, Paolo Navales¹⁴, Cesare Gregoretti¹⁵ and the H.F.-AECOPD study investigators

AECOPD

International Journal of Chronic Obstructive Pulmonary Disease Dovepress

open access to scientific and medical research

Open Access Full Text Article

ORIGINAL RESEARCH

High-Flow Nasal Cannula for Chronic Obstructive Pulmonary Disease with Acute Compensated Hypercapnic Respiratory Failure: A Randomized, Controlled Trial

This article was published in the following Dove Press journal:
International Journal of Chronic Obstructive Pulmonary Disease

- Ward patients
- $\text{pH} > 7.35$, $\text{PaO}_2 < 60$ mmHg, $\text{PaCO}_2 > 45$ mm Hg

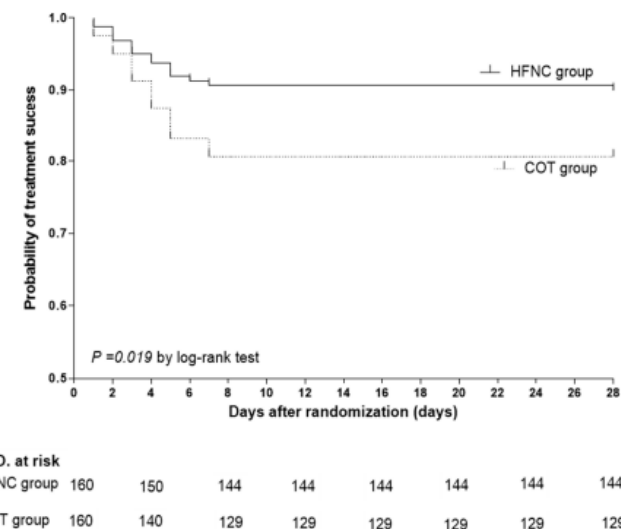


Figure 2 Kaplan-Meier estimates of the probability of treatment success at 28 d between the high-flow nasal cannula oxygen therapy (HFNC) group and the conventional oxygen therapy (COT) group. Significant differences were found for the cumulative probability of treatment success for the two groups (Log rank test: $p = 0.019$).

Table 2 Primary Endpoint and Secondary Endpoints in the Two Groups

Outcome	All Patients (n=320)	HFNC Group (n=160)	COT Group (n=160)	P
Primary end point				
Treatment failure, need of NIV, no. (%)	47(14.7)	16(10.0)	31(19.4)	0.026
Secondary end point				
Patients received NIV, no. (%)	39(12.2)	13(8.1)	26(16.3)	0.039
CAT scores at discharge	15.2±7.8	12.0±7.6	17.0±7.3	0.002
Subjective discomfort score	3.3±1.6	2.3±1.1	3.9±1.6	<0.001
Hospital lengths of stay (days)	12.7±4.8	12.2±5.3	12.9±4.5	0.453
Readmission rate within 3 months, no. (%)	77 (24.1)	32 (20.0)	45 (28.1)	0.116
Reason for NIV				
Respiratory acidosis	36(11.3)	12(7.5)	24(15.0)	0.050
Obvious dyspnea	11(3.4)	4(2.5)	7(4.4)	0.542

Notes: Data are presented as mean ± standard deviation or No. (%). Treatment failure was defined as worsening of the patients' condition to the point that noninvasive or invasive mechanical ventilation was required.

Abbreviations: CAT score, COPD assessment test score; COT, conventional oxygen therapy; HFNC, high-flow nasal cannula oxygen therapy; NIV, noninvasive mechanical ventilation.

Nasal high flow therapy use in wards in patients with chronic obstructive pulmonary disease may spare ICU resources

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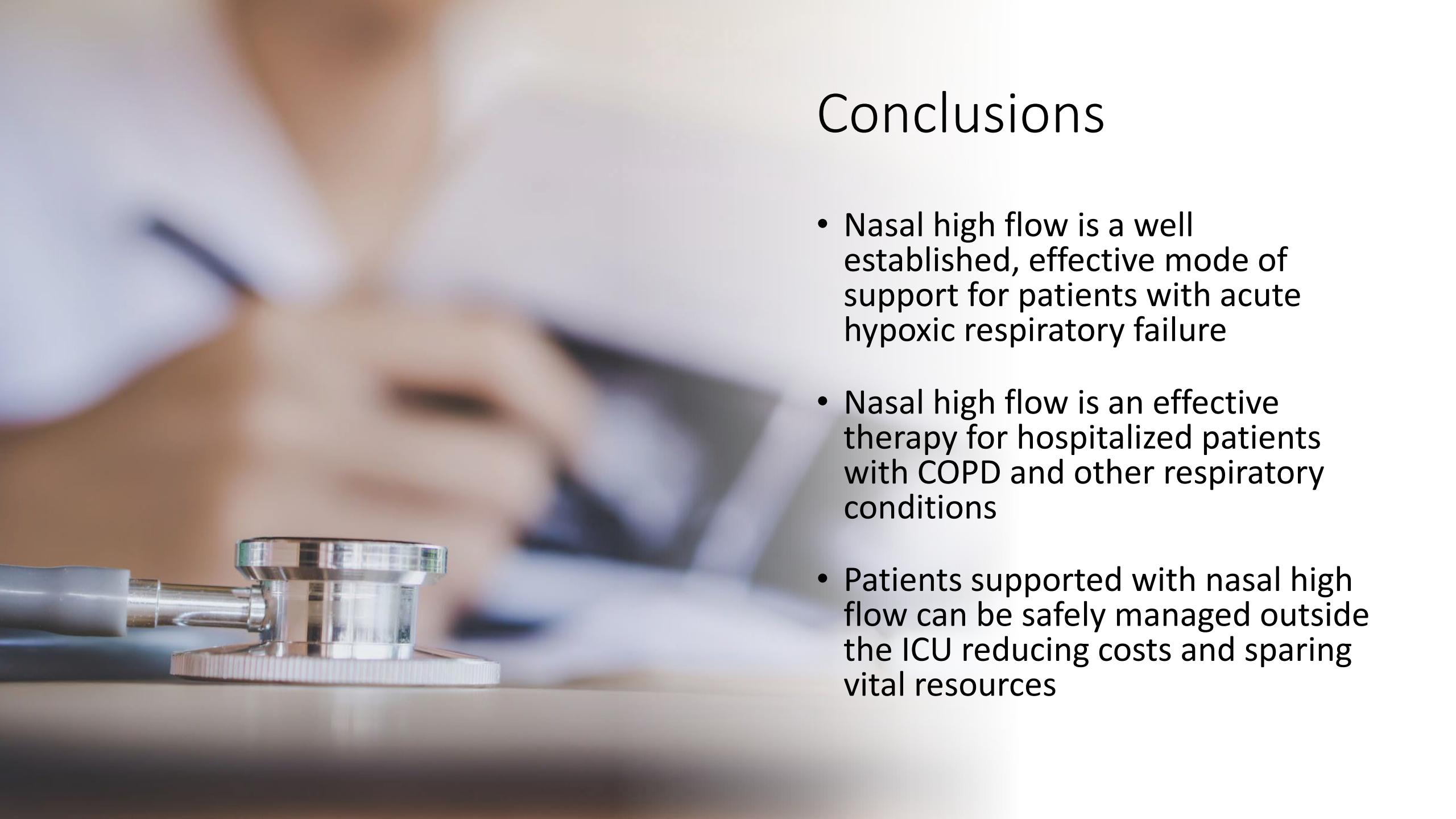
Clin Respir J. 2021;1–7.

TABLE 2 Key outcome comparison between control and study groups

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Hours of NHF therapy, median (IQR)	–	49 (22, 101)	–
Initial Visual Analog Scale score on NHF therapy, median (IQR)	–	3 (1, 4)	–

Conclusions





Conclusions

- Nasal high flow is a well established, effective mode of support for patients with acute hypoxic respiratory failure
- Nasal high flow is an effective therapy for hospitalized patients with COPD and other respiratory conditions
- Patients supported with nasal high flow can be safely managed outside the ICU reducing costs and sparing vital resources



Robert Y. Goldberg, MD

Pulmonary & Critical Care Specialist, Providence Mission Hospital

Using Nasal High Flow in the Critical Care environment



Julie Jackson, RRT

Fisher & Paykel Healthcare, Clinical Affairs Specialist

Introduction

- Can you please describe the Critical Care services at Providence Mission Hospital along with your role and typical patients the hospital serves?
- Can you describe your journey of adoption of high flow? What patients now routinely start on high flow? How has this changed your use of COT and NIV?
- How have these changes affected your patient outcomes and performance metrics?

Impact of the pandemic

- Can you describe the impact of high flow for you during COVID-19?
- What were the challenges of using high flow during COVID-19 and how were these addressed?
- How were other respiratory support strategies affected during COVID-19?
- How has COVID-19 changed the way you treat respiratory compromised patients?

Today and beyond

- How do you see high flow therapy expanding across your hospital?
- Where do you see research and education gaps with high flow?



James B. Price, MD

Emergency Medicine Specialist, Providence Mission Hospital

Using Nasal High Flow in the Emergency Department



Julie Jackson, RRT

Fisher & Paykel Healthcare, Clinical Affairs Specialist

Introduction

- Can you please describe the Emergency Department services at Providence Mission Hospital along with your role? What are your ED goals? How is your performance measured?
- What ED patient types typically receive high flow?
- How does an ED physician decide when to implement high flow? What is your primary goal for these patients?

Impact of the pandemic

- How were you using high flow in your ED prior to COVID-19?
- During the COVID-19 pandemic, what were your challenges with using high flow in your ED? Physician/RT acceptance etc?
- How has your clinical practice with high flow changed post-COVID-19?

Today and beyond

- Do all ED physicians follow the same or similar treatment approach when using high flow (ie. flowrate & FiO_2) – has the therapy become protocolized or is it still variable?
- Similar to the question to Dr Goldberg but now in the ED, where do you see research and education gaps with high flow in the ED?

Daniel B. Graviloni, RCP



St. Jude
Medical Center

Daniel B. Graviloni, RCP

- Executive Director of Respiratory Care, Providence California Division
- Providence St Jude Medical Center, Fullerton, CA

Nasal High Flow Use Across the Hospital

Nasal High Flow Use Across the Hospital

Daniel Graviloni, RCP

September 15, 2023

Focus Topics

- Providence / St Jude Medical Center HF Experience
- How we adopted High Flow
- Future utilization opportunities

Providence St Jude Medical Center

FACTS:

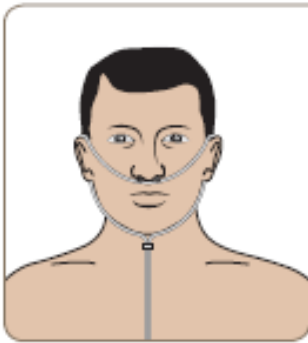
- Established 1957
- 320-bed, acute care hospital
- Approx 2400+ caregivers
- Approx 700+ physicians
- 70,000+ ED visits
- Approx 450,000 OP visits



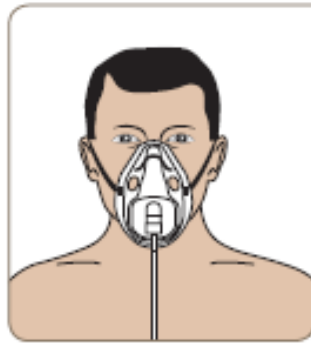
How we adopted High Flow

Understood Clinical Need

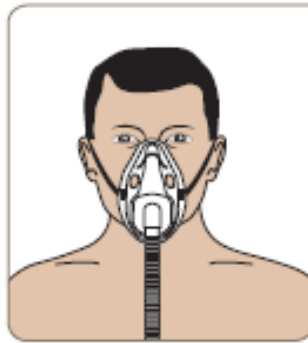
LOW FLOW
NASAL PRONGS



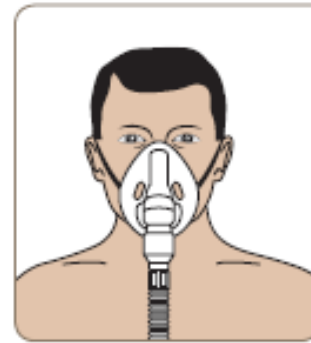
SIMPLE
FACE MASK



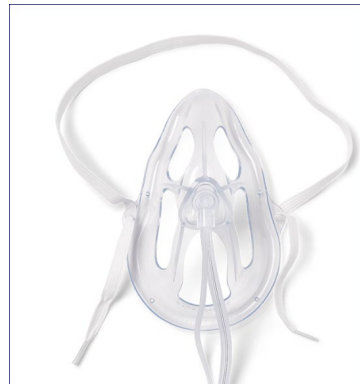
HUMIDIFIED HIGH
FLOW MASK



VENTURI
STYLE MASK



REBREATHER
MASK



How we adopted High Flow

Reviewed Available Clinical Research

Roca - HF Oxygen Therapy Respiratory Care, April 2010	HFNC was better tolerated and more comfortable than face mask; was associated with better oxygenation and lower respiratory rate; could have an important role in treatment of patients with acute respiratory failure.
Parke - RCT Respiratory Care, March 2011	NHF is more successful than the <i>gold standard</i> High Flow Face Mask in the management of mild to moderate hypoxemic respiratory failure.
Corley - NHF EIT British Journal Anesthesia, June 2011	HFNC reduces respiratory rate and improve oxygenation by increasing both EELV and tidal volume and are most beneficial in patients with higher BMI's.
Sztrymf - Pilot HFNC Intensive Care Medicine, September 2011	HFNC has a beneficial effect on clinical signs and oxygenation in ICU patients with acute respiratory failure.

How we adopted High Flow

Conducted Evaluations & Implemented in ICU - Defined the Target Patient Population

- Patients using oxygen masks
- Patients using Oximizer
- Borderline post extubation patients
- Mild-Mod respiratory distress
- Combo NIV/HF therapy

How we adopted High Flow

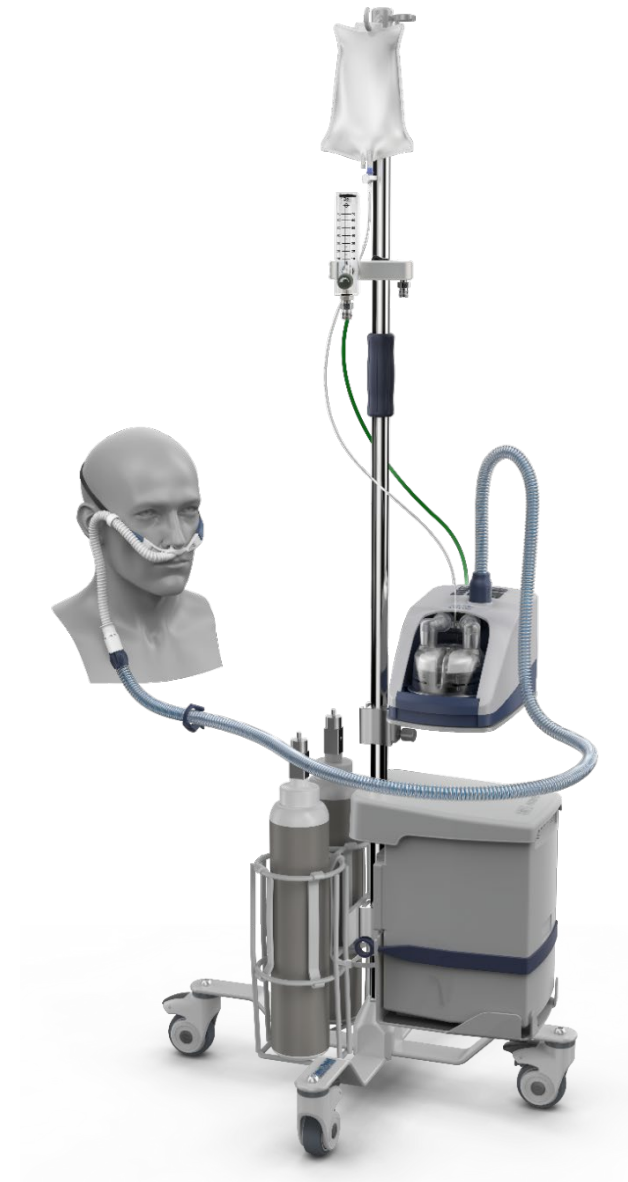
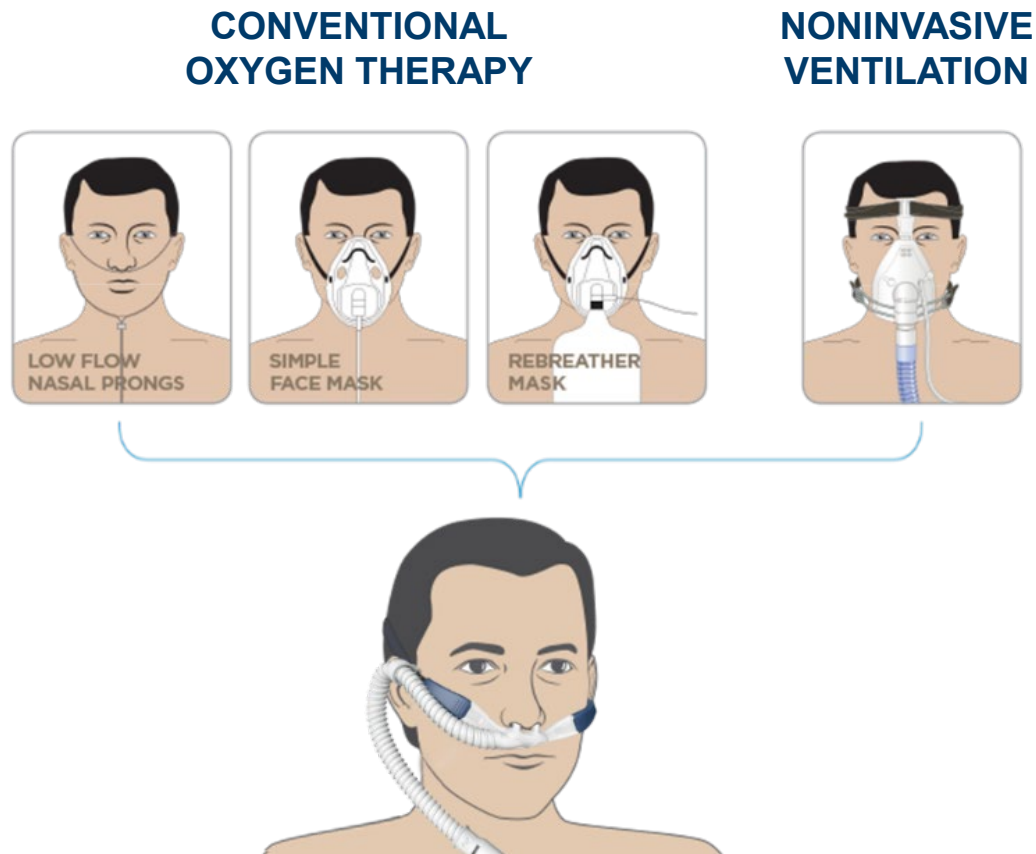
Conducted Evaluations & Implemented in ICU – Prepared equipment



- MR850 Humidifier
- Temp Probe & Pigtail
- RT202 Circuit
- F&P Cannula
- IV Pole w/ Basket
- High Flow Blender
- 70 L/min Flowmeter & Gas Hoses

How we adopted High Flow

Hospital wide adoption prior to, during and after COVID-19



Future Utilization

- Increased high flow use outside Critical Care / Emergency Dept.
- Increased use on higher acuity patients as additional research is available
- Increased flow rate for added patient benefit and improved outcomes
- Increased transport/procedure use; Emergency dept, Post-Op
- Increased use for humidity therapy purposes

Panel Q&A Session



THE IOWA
CLINIC®



UnityPoint Health

Matthew W. Trump, DO

- Pulmonology & Critical Care Specialist
- The Iowa Clinic and UnityPoint Health, Des Moines, IA Adjunct Clinical Associate Professor
- University of Iowa, Carver College of Medicine, Iowa City, IA



Providence

Mission Hospital

James B. Price, MD

- Emergency Medicine Specialist
- Providence Mission Hospital, Mission Viejo, CA



Providence

Mission Hospital

Robert Y. Goldberg, MD

- Pulmonology & Critical Care Specialist
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- Respiratory Director
- Providence St Jude Medical Center, Fullerton, CA

A middle-aged man with glasses and a beard is lying in a hospital bed, smiling. He is wearing a light blue hospital gown and a nasal cannula. He is holding a rolled-up document or tube in his hands. The background is a blurred hospital room with medical equipment.

Educational Symposium

Thank you

North America Operations

Justin Callahan
President North America and Europe

North American medical device market

North America is the **largest**
medical device market in the
world

~\$180B

US medical device industry

6,500+

Hospitals in US and
Canada

Our largest market
accounting for

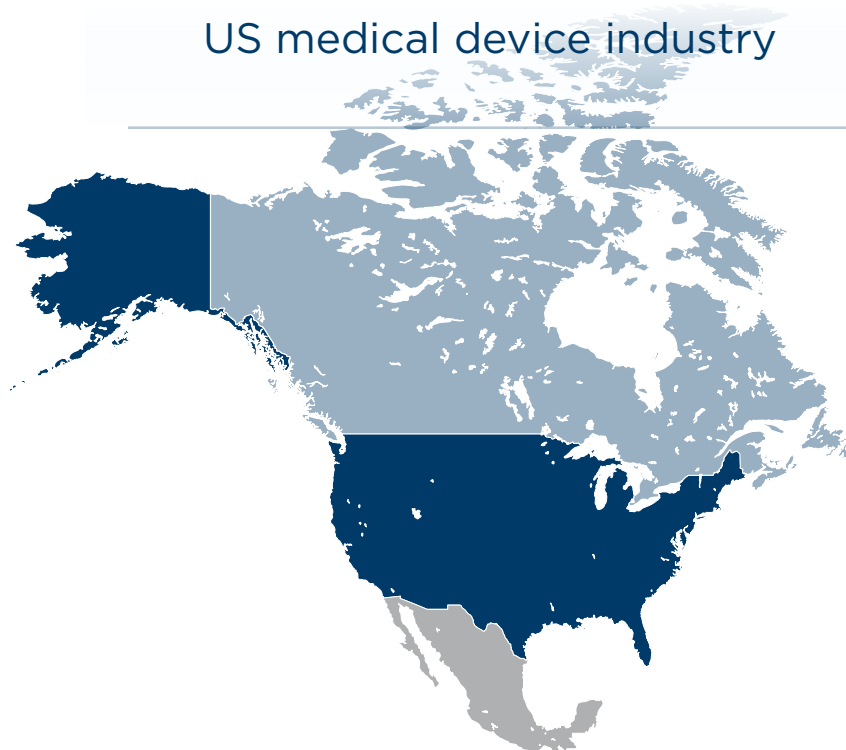
43%

of revenue FY23

3,000+

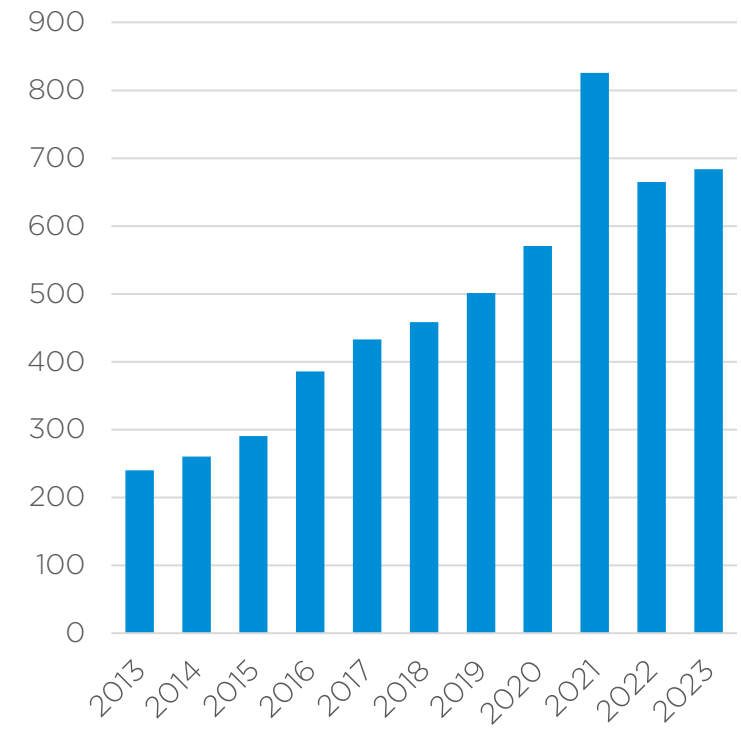
Homecare dealers in
US and Canada

- Complex structure
 - Dynamic
 - Regulated
- Strong demographics
 - Underpenetrated

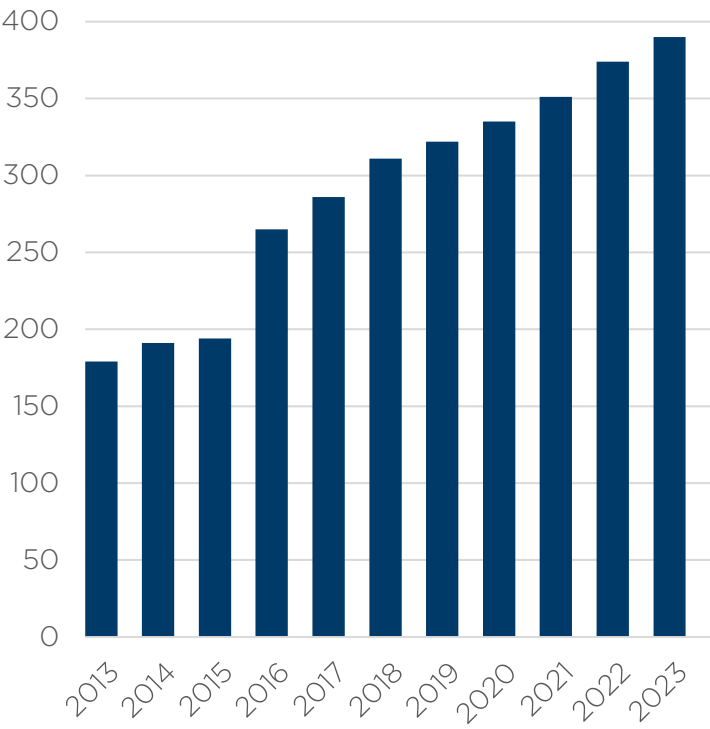


Overview of our North American business

NORTH AMERICAN REVENUE NZD \$M



NORTH AMERICAN EMPLOYEES



400+

F&P employees
supporting

8,000+

customers in
Hospital and Homecare

Proven successful team
in **changing clinical
practice** and driving
**Sustainable, Profitable
Growth**

North America - our people and our culture

Total People: 411

- We value diversity of thought and people. We strive to create a positive and inclusive environment where everyone can contribute the most they can over the long term
- Sales teams focused on changing clinical practice. Working closely with clinicians across the healthcare continuum as Trusted Advisors
- Sales teams are a balance of sales and medical professionals with average tenure of 5+ years
- Strong operations team supporting sales growth with a continuous improvement culture



Our technology

High Flow Therapy

Invasive Humidification

Humidification Technologies

OSA/NIV Interfaces

Surgical/Anesthesia

Enables Core Therapy Capital + Dedicated Consumables

A healthcare professional in blue scrubs is holding a medical device with a coiled tube and a grey strap. The background is blurred, showing other medical equipment and staff in a clinical setting.

US Hospital Overview

Steve Lacke, VP Marketing and Clinical Affairs
Steve Wilson, VP Sales and Marketing North America

US Hospital business model

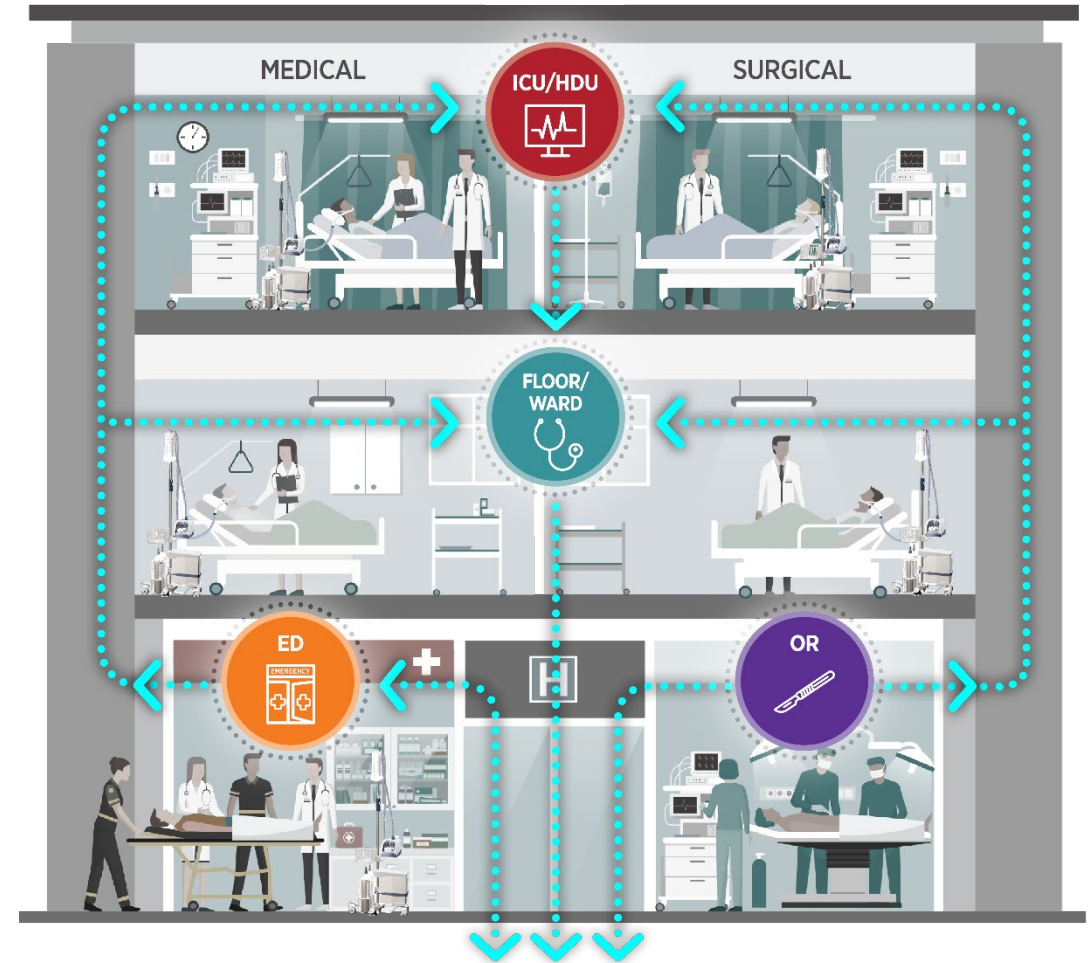


Opportunity across all areas of the hospital

Our product range allows us to treat respiratory patients across all areas of the hospital

- Medical Intensive Care Units
- Surgical Intensive Care Units
- Emergency Departments (ER)
- Floor/Ward
- Operating Room

Our sales teams become experts in the clinical application of our products focused on changing clinical practice



The sustainable sales process



Post-COVID hospital environment

Rapid exposure to a new tool – Many steps in the educational process of utilizing a new clinical tool were skipped during the COVID pandemic.

Access to clinicians – Our teams are re-engaging with clinicians to build on the knowledge and understanding for a more comprehensive usage of High Flow Therapy.

Clinical practice guidelines – Clinical practice guidelines have now been published. These guidelines assist our sales teams in changing clinical practice.

Steady progress – We see ongoing signs of increasing utilization and our sales teams are focused on the journey of changing clinical practice within the Hospital.

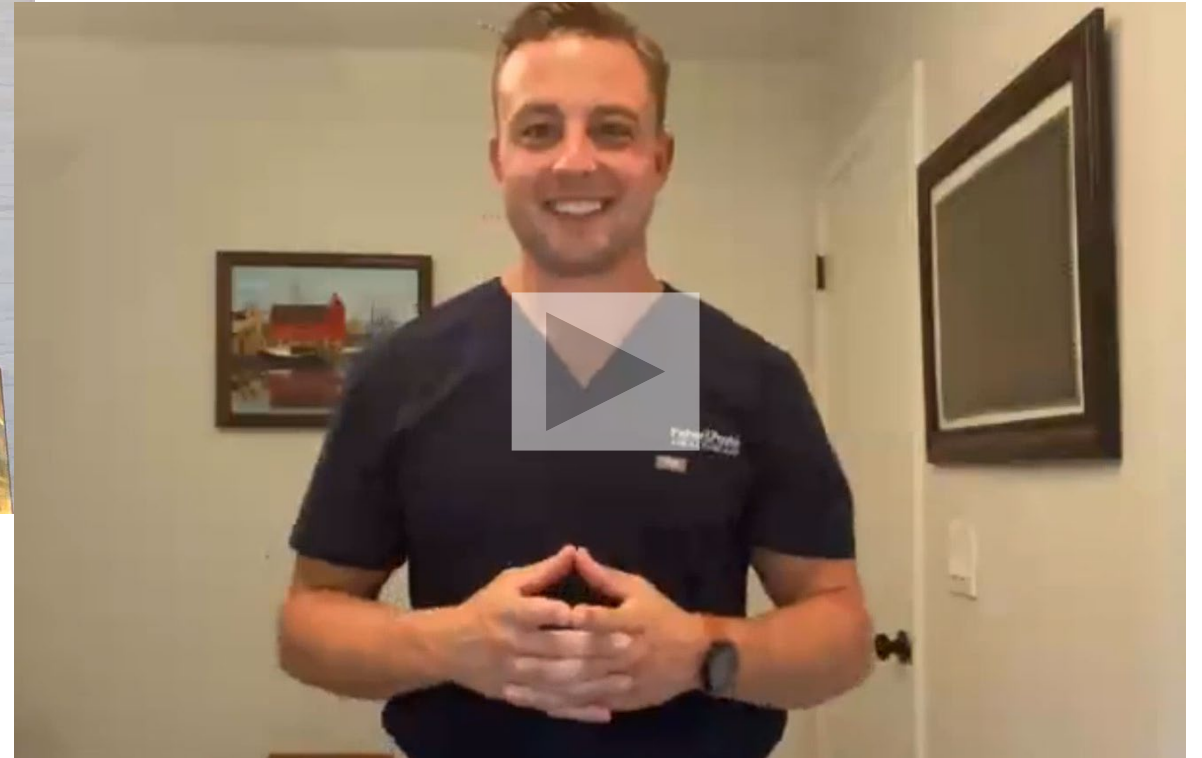


Case studies



Case study – Margaret Murphy

Case study – Mark Miller



Health system standardization - case study

Presented by Megan Hadley – East Regional Manager

- A 40 hospital system, 8,000 beds
- F&P Active Humidification has been the Gold Standard
- Nasal High Flow journey began in 2017
- 2018 & 2019 began expanding and investing in the therapy systemwide
- Post pandemic understand the need to standardize Nasal High Flow Policies systemwide
- What's ahead:
 - Working to implement Nasal High Flow Policies (ED, ICU & Floor) systemwide
 - Standardizing NIV platform to Fisher & Paykel



The sustainable sales process

- Market leading position in Humidification Technologies
- Strong partnerships with GPOs and distribution networks that capture our entire portfolio
- Utilizing clinical evidence to build confidence and demonstrate value
- Working closely with clinicians to support and provide solutions across the care continuum
- Steady progression of acceptance and usage across our customer base

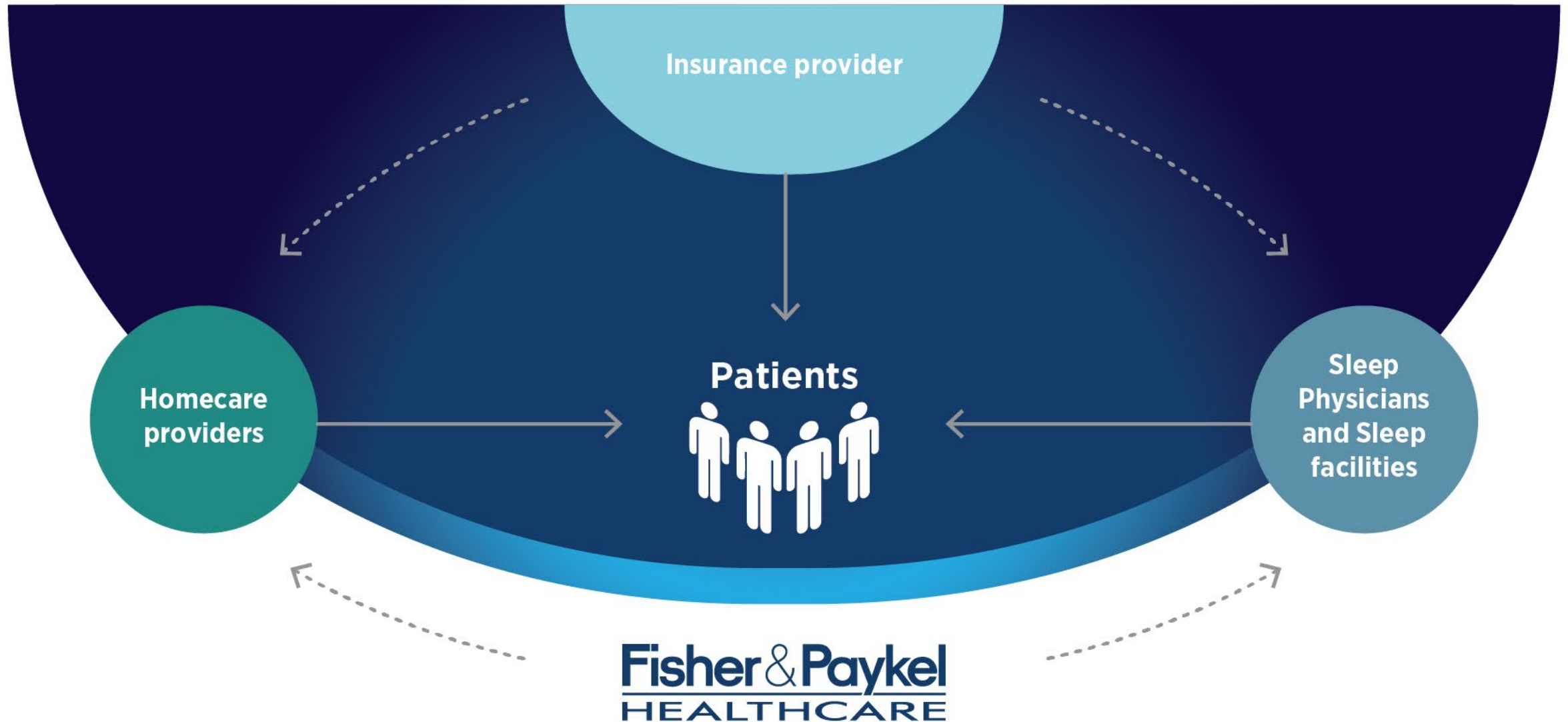


US Homecare Overview

Steve Polgar
VP Sales & Marketing Homecare



US Homecare business model



Over 20 years of mask innovation



Adjustment
Bezel



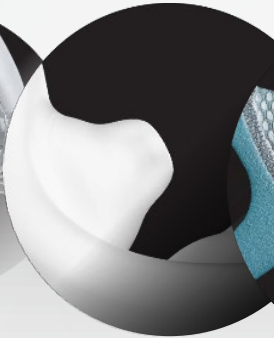
FlexiFoam™



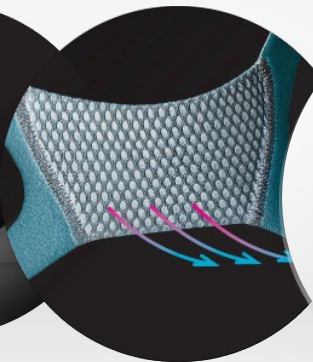
StretchWise™



Diffuser



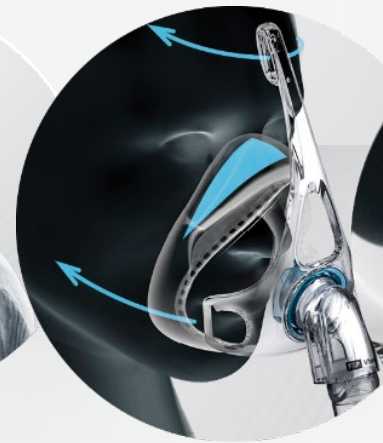
AirPillows™



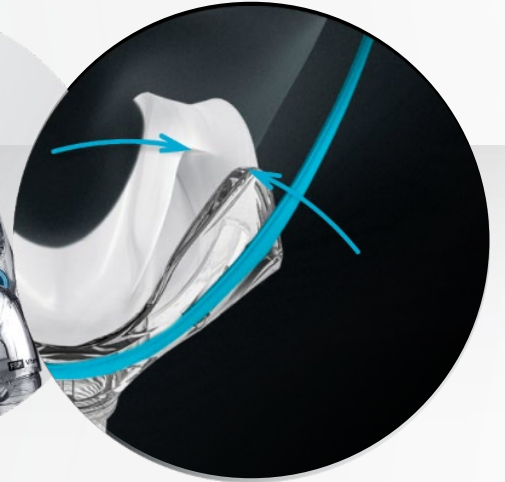
VentiCool™



CapFit™



RollFit™



Stability Wings

Comprehensive approach to Physician, Patient & Provider



myMask™ App

Initial setup and support

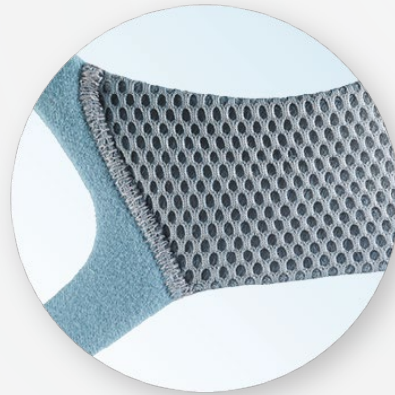
Support patient mask setup. Fit, fine-tune and clean.



VentiCool

Comfort

Breathable headgear designed to allow for heat and moisture to escape.



CapFit

Ease of use

Just like putting on a cap. Intuitive.



Dynamic Support Technology

Performance

Freedom of movement while keeping the mask in place.



Our focus in OSA

Building on 20 years of innovation to develop market leading OSA Mask technologies that focus on:

- Improving Homecare Provider efficiencies
- Referral source satisfaction
- Patient satisfaction





Questions





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Thank you