CPAP Mask Selection Algorithm

Complete 12-Factor Integration System

Comprehensive Documentation

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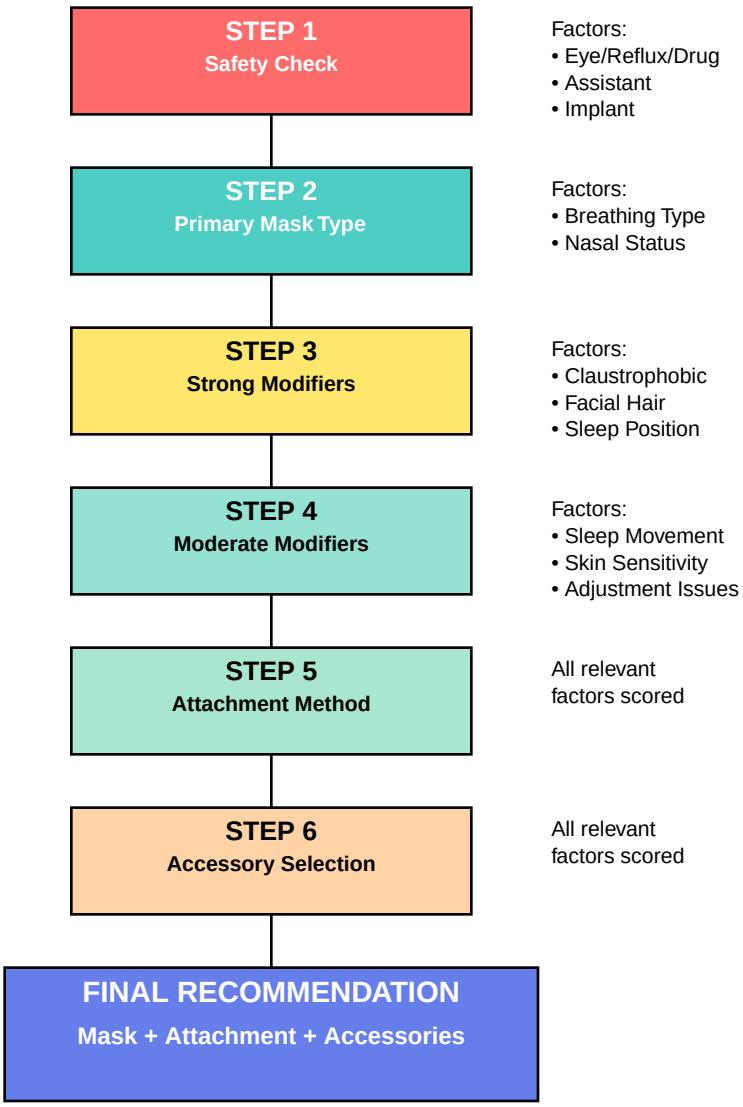
Introduction

This document describes the comprehensive CPAP mask selection algorithm that systematically integrates all 12 assessment factors with proper weighting, interaction logic, and decision routing.

The algorithm uses a 6-step decision process that ensures safety constraints are met first, then determines the primary mask type, applies modifiers, and selects appropriate attachments and accessories.

Algorithm Flow Overview



Factor Hierarchy & Weights

TIER 1: Critical Safety (Weight: 100)

Assistant • Eye/Reflux • Drug • Implant

TIER 2: Primary Determinants (Weight: 95-85)

Breathing Type • Nasal Obstruction

TIER 3: Strong Modifiers (Weight: 80-70)

Claustrophobic • Facial Hair • Sleep Position

TIER 4: Moderate Modifiers (Weight: 60-50)

Sleep Movement • Skin Sensitivity • Adjustment Issues

Factor Hierarchy & Weights

Tier 1: Critical Safety Factors (Weight: 100 - Absolute)

These create hard constraints that override other factors.

Assistant (Weight: 100)

Impact: Attachment method REQUIRED
Decision Rule: Magnetic quick-release or easy-removal mandatory

Eye/Reflux (Weight: 100)

Impact: NO FULL FACE (aspiration risk)
Decision Rule: Must use nasal-only masks

Drug (Vomiting) (Weight: 100)

Impact: NO FULL FACE (aspiration risk)
Decision Rule: Must use nasal-only masks

Implant (Weight: 70)

Impact: NO MAGNETIC (interference risk)
Decision Rule: Use non-magnetic attachments only

Tier 2: Primary Mask Type Determinants (Weight: 95-85)

These are the primary factors that determine mask category.

Breathing Type (Weight: 95)

Impact: Primary mask category
Decision Rule: Mouth !’ Full Face; Nose !’ Nasal; Mixed !’ Approaches

Nasal Obstruction (Weight: 90)

Impact: Modifies mask category
Decision Rule: Severe !’ Full Face; Mild !’ Dual; None !’ Nasal

Tier 3: Strong Modifier Factors (Weight: 80-70)

These significantly influence mask selection within category.

Claustrophobic (Weight: 80)

Impact: Strong preference modifier
Decision Rule: Prefer nasal pillows (minimal contact) over other options

Facial Hair (Weight: 75)

Impact: Seal quality constraint
Decision Rule: AVOID traditional nasal cushions; prefer pillows or total face

Sleep Position (Weight: 70)

Impact: Design feature requirement
Decision Rule: Side/stomach !’ tube-up designs; back !’ any design

Tier 4: Moderate Modifier Factors (Weight: 60-50)

These influence comfort and attachment selection.

Sleep Movement (Weight: 60)

Impact: Stability requirement
Decision Rule: High movement !’ enhanced headgear + prefer pillows

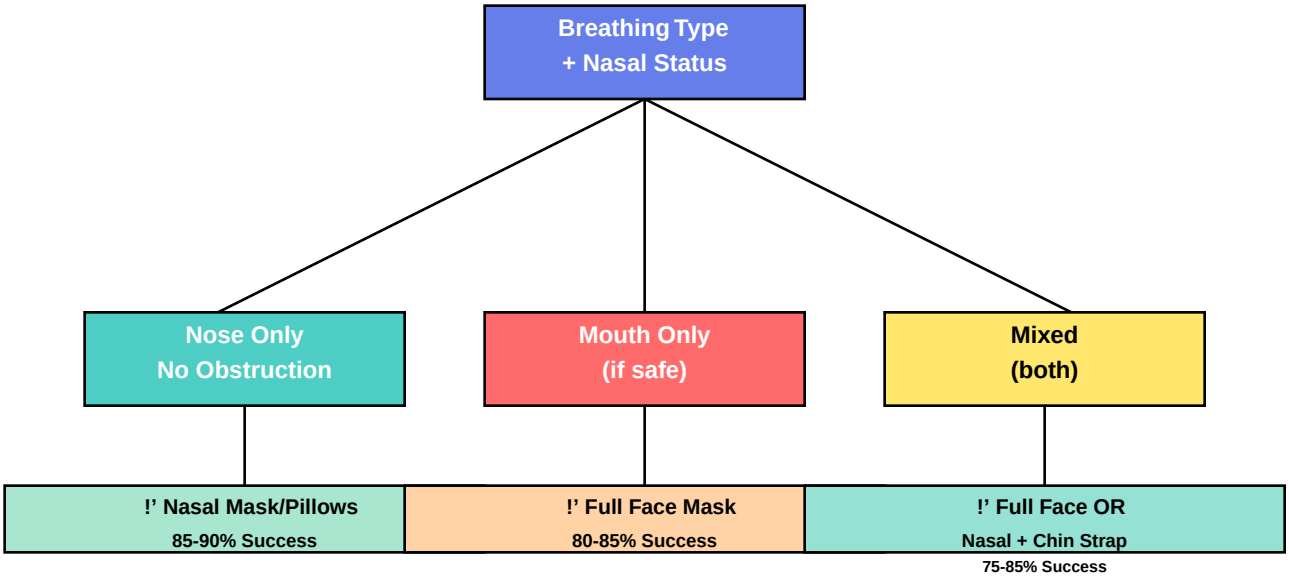
Skin Sensitivity (Weight: 55)

Impact: Material/cushion selection
Decision Rule: Gel/fabric options; hypoallergenic materials required

Adjustment Issues (Weight: 50)

Impact: Attachment simplification
Decision Rule: Auto-adjusting or simplified designs preferred

Decision Tree: Primary Mask Type



Complete Decision Algorithm

STEP 1: Safety Check (Critical Constraints)

The algorithm first checks for critical safety constraints that create hard limitations:

- Eye/Reflux/Drug conditions !’ NO FULL FACE (aspiration risk)
- Assistant required !’ EASY REMOVAL REQUIRED (magnetic or quick-release)
- Implant present !’ NO MAGNETIC attachments

These constraints override all other factors and must be respected.

STEP 2: Primary Mask Type (Breathing + Nasal)

Determines the base mask category based on breathing pattern and nasal status:

- Nose-only + No obstruction !’ Nasal Pillows/Mask (85-90% success)
- Mouth-only !’ Full Face (80-85% success, if not contraindicated)
- Mixed !’ Full Face OR Nasal + Chin Strap (75-85% success)
- Deviated Septum !’ Full Face preferred
- Seasonal Allergies !’ Consider heated humidifier

STEP 3: Apply Strong Modifiers

Applies high-weight factors that significantly modify the recommendation:

Claustrophobic (Weight: 80):

- If Nasal Mask !’ Switch to Nasal Pillows (minimal contact)
- If Full Face !’ Select minimal-contact designs (F40, F30, Amara View)

Facial Hair (Weight: 75):

- If Nasal Mask !’ REQUIRED switch to Nasal Pillows (traditional cushions fail)
- If Full Face !’ Add fabric liners OR use total face design
- Contraindication: AVOID traditional nasal cushion masks

Sleep Position (Weight: 70):

- Side/Stomach !’ Prioritize tube-up designs (P30i, N30i, DreamWear)
- Back !’ Any design acceptable
- Sitting !’ May indicate underlying condition (consider evaluation)

STEP 4: Apply Moderate Modifiers

Applies medium-weight factors that refine comfort and attachment needs:

Sleep Movement (Weight: 60):

- High movement !’ Enhanced 4-point headgear required
- Consider Nasal Pillows for better seal retention

Skin Sensitivity (Weight: 55):

- Select gel/fabric/memory foam options
- Required accessories: Gel cushions, hypoallergenic silicone, fabric covers
- Best options: AirTouch series (memory foam), Gel cushions

Adjustment Issues (Weight: 50):

- Prefer auto-adjusting headgear
- Magnetic clips ideal (if no implants)
- Simplified designs with fewer adjustment points

STEP 5: Attachment Method Selection

Scores all attachment options based on relevant factors:

Magnetic Quick-Release:

- Score: 100 if Assistant required (REQUIRED)
- Score: 90 if Adjustment issues (Highly recommended)
- Score: 0 if Implant present (CONTRAINDICATED)

Auto-Adjusting Headgear:

- Score: 90 if Adjustment issues
- Score: 60 otherwise (generally beneficial)

Enhanced 4-Point Headgear:

- Score: 85 if High movement (REQUIRED)
- Score: 70 if Some movement

Over-the-Head Design:

- Score: 75 if Side/Stomach sleeper (RECOMMENDED)
- Score: 50 otherwise

STEP 6: Accessory Selection

Determines required and recommended accessories:

ESSENTIAL Accessories:

- Heated Humidifier: Required for mouth breathing or seasonal allergies

HIGHLY RECOMMENDED Accessories:

- Gel Cushions/Memory Foam: For skin sensitivity
- Hypoallergenic Silicone: For allergies
- Fabric Cushion Covers: For facial hair or skin sensitivity

RECOMMENDED Accessories:

- Chin Strap: For mixed breathing with nasal mask trial
- Mouth Tape (MyoTape): Alternative to chin strap (if safe)

Complete Integration Example

Example Patient Profile:

- Breathing: Nose-only
- Nasal: No obstruction
- Sleep Position: Side
- Sleep Movement: All the time
- Claustrophobic: Yes
- Facial Hair: Yes
- Adjustment Issues: Yes
- Skin Sensitivity: Yes

Decision Flow:

STEP 1 - Safety Check:

- ' Can use full face (no eye/drug issues)
- ' Can use magnetic (no implants)
- ' No easy removal required

STEP 2 - Primary Mask Type:

- Initial: Nasal Pillows or Nasal Mask (85-90% success)

STEP 3 - Strong Modifiers:

- Claustrophobic !' Switch to Nasal Pillows
- Facial Hair !' Confirm Nasal Pillows REQUIRED
- Side Sleeper !' Prioritize tube-up designs

STEP 4 - Moderate Modifiers:

- High Movement !' Enhanced headgear required
- Skin Sensitivity !' Soft materials + accessories
- Adjustment Issues !' Magnetic or auto-adjusting

FINAL RECOMMENDATION:

- Primary Mask: ResMed AirFit P30i (tube-up, side-sleeper friendly)
- Alternative: Philips DreamWear Silicone Pillows
- Attachment: Magnetic Quick-Release Headgear
- Accessories: Gel cushions, hypoallergenic silicone, fabric covers
- Success Rate: 80-90%

Algorithm Summary

Key Features:

- Systematic 6-step decision process
- Explicit factor weighting (100, 95, 80, 70, 60, 55, 50)
- Complete interaction logic between factors
- Safety constraints override all other factors
- Specific mask model recommendations with rationale
- Complete traceability (why each factor matters)

Factor Coverage:

- ALL 12 factors systematically considered
- Tier 1: Critical safety (absolute constraints)
- Tier 2: Primary mask type (category determination)
- Tier 3: Strong modifiers (significant influence)
- Tier 4: Moderate modifiers (comfort refinement)

Output Quality:

- Specific mask models (not just categories)
- Complete reasoning for each recommendation
- Success rate estimates
- Required and recommended accessories
- Contraindications and warnings