



ACADEMY OF MEDICINE, SINGAPORE  
PATRON: PRESIDENT OF REPUBLIC OF SINGAPORE

# Report of the Taskforce on Aesthetic Medical Practice

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As at 6 June 2016

By

Taskforce on Aesthetic Medical Practice  
Academy of Medicine, Singapore

## Levels of evidence and grades of recommendation

### Levels of evidence

Level	Type of Evidence
1 <sup>++</sup>	High quality meta-analyses, systematic reviews of randomised controlled trials (RCTs), or RCTs with a very low risk of bias.
1 <sup>+</sup>	Well conducted meta-analyses, systematic reviews of RCTs, or RCTs with a low risk of bias.
1 <sup>-</sup>	Meta-analyses, systematic reviews of RCTs, or RCTs with a high risk of bias.
2 <sup>++</sup>	High quality systematic reviews of case control or cohort studies. High quality case control or cohort studies with a very low risk of confounding or bias and a high probability that the relationship is causal.
2 <sup>+</sup>	Well conducted case control or cohort studies with a low risk of confounding or bias and a moderate probability that the relationship is causal.
2 <sup>-</sup>	Case control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal.
3	Non-analytic studies, e.g. case reports, case series.
4	Expert opinion.

### Grades of recommendation

Grade	Recommendation
<b>A</b>	At least one meta-analysis, systematic review of RCTs, or RCT rated as 1 <sup>++</sup> and directly applicable to the target population; or A body of evidence consisting principally of studies rated as 1 <sup>+</sup> , directly applicable to the target population, and demonstrating overall consistency of results
<b>B</b>	A body of evidence including studies rated as 2 <sup>++</sup> , directly applicable to the target population, and demonstrating overall consistency of results; or Extrapolated evidence from studies rated as 1 <sup>++</sup> or 1 <sup>+</sup>
<b>C</b>	A body of evidence including studies rated as 2 <sup>+</sup> , directly applicable to the target population and demonstrating overall consistency of results; or Extrapolated evidence from studies rated as 2 <sup>++</sup>
<b>D</b>	Evidence level 3 or 4; or Extrapolated evidence from studies rated as 2 <sup>+</sup>
<b>GPP</b> (good practice points)	Recommended best practice based on the clinical experience of the guideline development group.

## 1. INTRODUCTION

- 1.1 The field of aesthetic medicine (AM) is evolving rapidly. Aesthetic medical practice is trans-disciplinary and its scope ranges from simple cosmetic procedures to more invasive physical surgery. The goal of aesthetic medical practice is to improve and enhance the non-pathological appearance of a person with the outcome of improving the person's self-esteem and psychosocial well-being.
- 1.2 Other professional bodies have defined AM differently. According to the UK Cosmetic Surgery Interspecialty Committee, AM may refer to operations and other procedures that revise or change the appearance, colour, texture, structure, or position of bodily features, which most would consider otherwise to be within the broad range of 'normal' for that person. While the American Board of Cosmetic Surgery defines cosmetic surgery as a subspecialty of medicine and surgery that uniquely restricts itself to the enhancement of appearance through surgical and medical techniques. It is specifically concerned with maintaining normal appearance, restoring it, or enhancing it beyond the average level toward some aesthetic ideal.
- 1.3 Given the rapid increase in the number of aesthetic medical procedures being performed locally and globally, the Taskforce on Aesthetic Medical Practice was commissioned by the Academy of Medicine, Singapore in 2015 to conduct an in-depth study of all professional aspects of aesthetic medical practice with reference to the Academy of Medicine, Singapore.
- 1.4 The Taskforce acknowledges that there is an overlap of clinical conditions in what is conventionally considered as "pathologic" and "aesthetic". For example, post-partum abdominal laxity or androgenetic alopecia may be considered by some to be a pathological condition, and aesthetic depending on the clinical context and patient perception and preferences. Similarly, most of the listed aesthetic medical procedures may be used for mainly aesthetic indication, mainly therapeutic indications, or very often, a combination of both. Descriptions of procedures aimed primarily at ameliorating existing pathological or congenital anomalies are not included in this document, e.g. hair transplantation for burn scars, or cleft lip repair, although aesthetic improvement may possibly be a secondary benefit in such procedures. Aesthetic medical procedures in which therapeutic component(s) may be addressed are included, e.g. divarication repair in post-partum abdominoplasty patients.
- 1.5 This document is a product of the collaborative effort of the Taskforce. **Section 5** of the report presents a list of common aesthetic surgical and dermatological procedures, and is by no means exhaustive. It aims to:
- a) Provide a safe and effective evidence-based list of aesthetic medical procedures;
  - b) Provide the current level of evidence of individual aesthetic medical procedure with the goal to provide high quality aesthetic medical procedure;
  - c) Serve as a reference for medical professionals and as a source of information for other interested parties.

**Section 6** of the report is a consensus statement which could serve as an advisory on the competence and training requirements for specialists engaging and/or intending to engage in aesthetic medical practice.

**Section 7** of the report is a consensus statement and discusses good clinical practice and professional standards in aesthetic medical practice.

**Section 8** of the report is a consensus statement and discusses professional ethical issues in relation to aesthetic medical practice.

- 1.6 The Guidelines aim to be a useful resource for medical practitioners who are currently engaged in aesthetic medical practice. In addition, it serves as a resource for medical

practitioners and healthcare professionals providing advice on aesthetic medical practice to their patients.

- 1.7 At the time of writing, this document is factual to the best of the authors' knowledge. With advances in knowledge and emergence of new procedures, it is appropriate that the document be updated.

## **2. TERMS OF REFERENCE**

- 2.1 The responsibilities, duties and authority of the Taskforce on Aesthetic Medical Practice shall be to:
- a) Develop a position paper on the guidelines of the practice of aesthetic medical practice in Singapore;
  - b) Advise medical professional bodies on the guidelines in performing aesthetic medical procedures;
  - c) Provide recommendations and professional opinions to key stakeholders on the associated policies and procedures governing the aesthetic medical practice;
  - d) Generate and disseminate information and knowledge to the public on matters related to aesthetic medical practice.
- 2.2 The Chairmen of the Taskforce shall submit an official report to the AMS Council on a monthly basis. Both or either one of the Co-Chairmen will attend the Council Meeting when presenting this report, when necessary.

### 3. COMPOSITION OF THE TASKFORCE

- 3.1 The Academy of Medicine, Singapore invited its Colleges and Chapters to nominate two representatives from all the relevant specialties to participate in the development of the guidelines. The aim was to establish a taskforce with a multidisciplinary composition of medical practitioners, with all relevant clinical specialties represented with a balance between representatives from medical practitioners in both public and private sector institutions and hospitals.
- 3.2 Figure 3-1 represents the list of members who were given letters of appointment by the Academy to serve on the Taskforce. Although their areas of expertise vary, the members have equal status in the group.

<b>Co-Chairman</b>	Dr T. Thirumoorthy Dr Tan Kok Chai	
<b>Ex-Officio</b>	Dr Alan Ng Wei Keong Dr Ong Hock Soo Dr Tan Eng King	Guidelines, Advisories and Consensus Committee, Office of Professional Affairs Guidelines, Advisories and Consensus Committee, Office of Professional Affairs Editor, Annals, Academy of Medicine, Singapore
<b>Members</b>	Dr Benjamin Long Dr Seah Tian Ee Dr Elaine Chee Dr Audrey Looi Dr Priya Sen Dr Aaron Tan Wei Min Dr Tay Yong Kwang Dr Soh Teck Hwee Dr Ng Wee Tong Dr Wong Chiang Yin Dr Esther Chuwa Dr Ian Loh Dr Peter Lu Dr Valerie Tay Dr Matthew Yeo Dr Terence Goh Dr Mok Zhun Rui Dr Serene Tan	Chapter of Endodontists, College of Dental Surgeons, Singapore Chapter of Oral & Maxillofacial Surgeons, College of Dental Surgeons, Singapore College of Ophthalmologists College of Ophthalmologists Chapter of Dermatologists, College of Physicians, Singapore Chapter of Dermatologists, College of Physicians, Singapore Chapter of Dermatologists, College of Physicians, Singapore College of Psychiatrists College of Public Health and Occupational Physicians College of Public Health and Occupational Physicians Chapter of General Surgeons, College of Surgeons, Singapore Chapter of Otorhinolaryngologists, College of Surgeons, Singapore Chapter of Otorhinolaryngologists, College of Surgeons, Singapore Chapter of Otorhinolaryngologists, College of Surgeons, Singapore Chapter of Plastic, Reconstructive and Aesthetic Surgeons, College of Surgeons, Singapore Chapter of Plastic, Reconstructive and Aesthetic Surgeons, College of Surgeons, Singapore Senior Resident, Dermatologist Medical Officer, Ministry of Health Holdings

**Figure 3-1 : Members of the Taskforce**

The Taskforce would like to acknowledge the untiring services of Ms Syairah Samsudin of the Academy of Medicine, Singapore for providing secretarial support to the Taskforce.

The Taskforce would like to acknowledge the editorial assistance of Ms Widia Huang and Ms Grace Lim of the Academy of Medicine, Singapore.

## 4. METHODOLOGY

### OVERVIEW

4.1 The taskforce formulated the first Survey Questionnaire (SQ1) that focuses on the Medical Indications of aesthetic medical procedures. This survey was sent to all the Colleges and Chapters under the Academy with the invitation to list the Common Aesthetic Medical Procedures conducted by their respective specialties and the inputs are collated in an Excel spreadsheet. Each procedure is accompanied by the following information along with the list of published articles and references for evidence:

- 1) The Indications
- 2) The Intended Outcomes
- 3) The Benefits
- 4) The Risk and Side Effects

4.2 Subsequently, the taskforce developed five further Survey Questionnaires which focused on the following topic questions:

- **SQ 2** – Competence, Accreditation and Training
- **SQ 3** – Aesthetic Patients - Assessment, Safety, Welfare and Expectations
- **SQ 4** – Psychosocial, Ethical and Legal Issues
- **SQ 5** – On Financial issues - Conflict of Interest, Fees, Aesthetic advertising
- **SQ 6** – Aesthetic Medical Practice and Professional accountability

4.3 All of the Survey Questionnaires were disseminated in batches to all the Colleges and Chapters for their inputs. The main contributors to the Questionnaires were from the following specialties:

- Dermatology
- Plastic Surgery
- Ophthalmology
- Otorhinolaryngology (ENT)
- Psychiatry

4.4 With the collated inputs received from the Colleges and Chapters, the Taskforce met for a total of seven meetings since May 2015 to discuss and deliberate on the findings.

4.5 **Section 5:** Complete and exhaustive search using PubMed's peer-reviewed journals and the Cochrane Library was done to find most relevant, best-fitting studies of higher evidence levels. Where no well-designed studies were found for a particular procedure, published clinical practice guidelines from Singapore and overseas were used. Textbook chapters served as articles of reference if the above two resources were not available.

The list of procedures included in the Taskforce's report was generally accepted to be procedures performed for predominantly aesthetic purposes. The levels of evidence and grades of recommendation used in this report were consistent with that used in the MOH Clinical Practice Guidelines.

4.6 **Section 6 (on Competence & Training Requirements):** The data was collated based on the responses and opinions provided by the Chapters under the five specialties (*refer to 4.3*).

4.7 **Section 7 (on Good Clinical Practice & Standards):** The data was collated based on the responses and opinions from Survey Questionnaires 4, 5 and 6

- 4.8 **Section 8 (on Professionalising Aesthetic Medical Practice):** The data was collated based on responses and opinions from portions of the Survey Questionnaires 4, 5 & 6. This section was written based on the format consistent with the Physician's Charter<sup>136</sup> (that was initiated by the ABIM Foundation and the ACP Foundation).
- 4.9 The overall methodological approach used to conduct the Survey Questionnaires is Qualitative in nature.

#### **LIMITATIONS OF RESEARCH**

- 4.10 In preparation of this report, there may be inter-observer variability in allocation of levels of evidence and grades of recommendation of the references. Access to some articles requiring payments may have been excluded.



## 5. SCIENTIFIC EVIDENCE FOR AESTHETIC MEDICAL PROCEDURES

### 5.1 CHEMICAL PEELS (eg. glycolic acid, salicylic acid, mandelic acid, Trichloroacetic acid, Jessner's)

The individual practitioner must decide on the chemical class, concentration and frequency of use of the peel to achieve superficial (epidermis), medium (papillary dermis), or deep penetration (reticular dermis)<sup>1</sup>. Considerations include desired skin depth penetration and baseline skin condition.

Common chemical peels used include salicylic acid (SA), glycolic acid (GA), Jessner's solution (JS), resorcinol, trichloroacetic acid (TCA), lactic acid, and salicylic acid-mandelic acid (SM).

The choice of peeling agent, the peel concentration as well as the frequency and duration of peels are all important to achieve optimum results.

#### a. Indications

##### *i. Facial pigmentation (Melasma)*

Small scale studies have demonstrated varied results in using chemical peels in addition to hydroquinone 4%/modified Kligman's formula (hydroquinone 5%, tretinoin 0.05%, hydrocortisone acetate 1% in a cream base)<sup>2,3</sup>, with some showing an added benefit. A review paper in 2012 of comparative clinical studies and other existing review papers, recommends the use of glycolic peels due to its history of safety and efficacy.

##### *ii. Acne scars*

Chemical peels are effective in the treatment of acne scars of all forms<sup>4</sup>. A review paper on salicylic acid, trichloroacetic acid, glycolic acid and phenol peels, consisting of mainly open-label, single-centre designed<sup>5</sup> studies noted lower concentration of peels are useful for boxcar and rolling scars. 100% TCA is helpful in ice pick scars. Superficial scars require only full strength lactic acid peel.

##### *iii. Photodamage/Skin rejuvenation*

Statistically significant improvement in elasticity and hydration<sup>6</sup> is observed in 70% glycolic peels and 15% trichloroacetic peels. Ultrasonographically and histopathologically, the use of glycolic and trichloroacetic peels support dermal remodelling and induce collagen formation<sup>7,8</sup>.

Glycolic acid also showed promise in skin lightening on serial application.

#### b. Intended Outcomes and benefits

Lightening of melasma, flattening of acne scar with homogenisation of skin texture and improvement in elasticity and gross appearance of skin.

#### c. Risks

Pigmentary dyschromia in darker-skin type patients. There is a relative dearth of evidence supporting lactic acid peels<sup>9</sup>. Caution is needed in deep chemical peels, e.g. phenol due to systemic side effects.

## 5.2 INTENSE PULSED LIGHT (IPL)

This is a non-coherent light source emitting at 515-1200nm range of the electromagnetic spectrum.

### a. Indications

#### i. Photoaging/Rejuvenation

The positive effects of IPL on photoaging was attributed to its role in increasing collagen and elastic fibres, hyaluronic acid synthesis, fibroblast activity as well as improving intercellular adhesion<sup>10,11,12</sup>. There was clinical improvement in skin texture, pigmentation and telangiectasia count with histologic increase in the number of fibroblasts and collagen in comparative studies<sup>13</sup>.

#### ii. Depilation

Ex-vivo studies using human scalp skin exposed to IPL light revealed<sup>14</sup> a greater sensitivity of bulb matrix cells in anagen follicles and hair shaft to IPL treatment. Increase in telogen:anagen hair ratio was seen, with close to 90% reduction of terminal hair count 6 months post-treatment<sup>15</sup>. Hair diameter and number were significantly reduced after 6 monthly treatments with IPL, with a response rate of >80%<sup>16</sup>.

A systemic review of IPL alongside alexandrite, diode, neodymium-doped yttrium aluminium garnet (Nd:YAG) lasers lend support for its use, with Nd:YAG lasers being recommended for darker skin types<sup>17</sup>.

In Fitzpatrick skin types II-IV subjects, there is a positive correlation between IPL-induced pain and erythema with 2 factors: IPL dose and skin pigmentation<sup>18</sup>.

#### iii. Keloidal Scars/Burn scars

Studies focussed on a combination of IPL and intralesional corticosteroid injection for keloidal scars<sup>19,20</sup>. A single study of immature burn scars revealed improvement in vascularity, pliability and height of scars in more than half of lesions<sup>21</sup>.

#### iv. Pigmentation (Melasma/Dermal melanosis)

Evidence was limited to mainly comparative or case control studies. A Korean group studying melasma reported a statistically significant decrease in modified Melasma Area Severity Index (MASI) score of 20 patients after 6 weeks – following weekly sessions of 10J and 13J IPL treatments. A greater decrease in score was noted in the 13J IPL group<sup>22</sup>. A separate split face study investigating weekly fractionated IPL and biweekly conventional IPL on the reported non-inferiority of the former, with less incidence of recurrence of melasma<sup>23</sup>.

A case series of 7 family members with aberrant Mongolian spots reported marginal improvement in the majority, with histologic evidence of a decreased number of melanocytes 6 months post-treatment<sup>24</sup>.

More studies, including randomised controlled trials must be undertaken to suitably assess its efficacy in the treatment of pigmentation.

#### v. Erythema/Telangiectasia

Studies investigating erythema and telangiectasias were most often conducted in rosacea patients in case controlled studies. Studies investigating erythrogenic/telangiectatic rosacea and papulopustular rosacea showed significant improvement in rosacea-associated erythema during self and physician assessments<sup>25,26</sup>.

In facial atopic dermatitis-induced erythema, IPL with 590-nm cut-off filter (Broadband light (BBL), Sciton Inc., Palo Alto, CA) using a 590-nm cut-off filter, at a fluence of 12 to 13 J/cm<sup>2</sup> effectively reduced the Eczema Severity Score (ESS) and observed erythema<sup>27</sup>.

**b. Intended Outcomes and benefits**

Homogenisation of skin texture and improvement in elasticity. Flattening of keloidal scars. Reduction in pigmentation of skin (melasma) and lightening of erythema.

**c. Risks**

A Chinese study of 675 patients reported a melasma-like hyperpigmentation in 20 patients, following IPL treatment. This occurred within 3 months. Patients had Fitzpatrick III-IV skin and were non-compliant to sun protection post treatment<sup>28</sup>.

Ocular protection is needed for facial lesions, with complications like photophobia and transillumination defects associated with visual disturbances following IPL treatment<sup>29</sup>. Lastly, paradoxical hypertrichosis can occur<sup>20</sup>.

## 5.3 PIGMENT LASER

Pigment lasers harness the use of photoselective, pigment specific lasers for the lightening of both epidermal and dermal lesions. These include ephelides, labial lentigines, solar lentigines, Hori's naevus, melasma, and benign junctional naevus.

Many laser modalities have been utilised in the treatment of different pigmented lesions, including Erbium-doped yttrium aluminium garnet ablative laser<sup>30</sup>. Other indications include ochronosis, post-inflammatory hyperpigmentation and pigmentation secondary to macular amyloidosis<sup>31,32</sup>.

### a. Indications

#### *i. Pigmentation*

A split-faced comparative study between Q-switched alexandrite laser and intense pulsed light for the treatment of freckles and lentigines in patients of Asian ethnicity recommended the former for freckles, and the latter for lentigenes – based on physician-blinded objective observations.

#### *ii. Tattoos*

Tattoos may generally be classified into 5 main groups – professional, amateur, medicinal, traumatic or cosmetic. Different ink colours have an impact on ease and response to laser removal<sup>33,34</sup> (Black> blue/green> red/yellow).

A study examining 3 commercially available lasers<sup>35</sup> – Q-switched ruby, Q-switched Nd:YAG, and Q-switched alexandrite, found red brown pigment responded best to the Nd:YAG laser (532 nm). Correspondingly, the alexandrite laser was most efficacious in removing blue and green pigment<sup>36</sup>. Similar results were obtained for the Nd:YAG laser (1064 nm) and (532 nm) and the alexandrite laser (755 nm)<sup>37</sup>. Black and red tattoos have better response to treatment (lightening).

### b. Intended Outcomes and benefits

Lightening of acquired (freckles and lentigenes) and congenital benign hyperpigmentation (junctional nevus).

### c. Risks

Post-inflammatory hyperpigmentation, especially with Q-switched alexandrite laser<sup>38</sup>.

## 5.4 VASCULAR LASER

Lasers include pulsed dye lasers, alexandrite laser, Nd:YAG, copper bromide, Krypton and KTP lasers. Guidelines and management concepts have previously been published on the use of lasers in vascular lesions<sup>39,40</sup>. Clinically, infantile hemangiomas remain a common vascular lesion for which vascular laser is used. Other common vascular lesions include telangiectasias, angiomas and port-wine stains.

### a. Indications

#### *i. Port wine stain*

Harnessing the principle of selective photothermolysis, vascular lasers, especially pulsed dye 595-nm lasers, are the treatment of choice in removing vascular lesions. Affected cutaneous blood vessels can be selectively removed with less damage to surrounding tissues<sup>41,42</sup>.

#### *ii. Hemangioma*

Pulsed dye 595-nm lasers remain the vascular laser of choice<sup>43,44</sup>.

### b. Intended Outcomes and benefits

Lightening or eradication of port wine stains, hemangiomas.

### c. Risks

Side effects were minimal and include purpura, pain, blistering, dyspigmentation and minimal scarring<sup>45</sup>.

## 5.5 FRACTIONAL LASER

Fractional laser treatment is a non-invasive treatment that targets both the epidermis and dermis. Current commercial devices include Fraxel® Repair [Solta Medical], Active and Deep FX® [Lumenis], Quadralase® [Candela] and Pearl Fractional® [Cutera].

Fractionation permits deeper tissue penetration with sparing of surrounding skin, remodelling and collagen production. There are both ablative and non-ablative systems in use.

### a. Indications

#### *i. Acne Scar*

Rolling and superficial box scars appeared to be more amenable to laser treatment compared to icepick and box scars.

A review of 26 studies involving ablative and non-ablative fractional photothermolysis (FP) lasers for treating facial acne scars highlighted heterogeneity in study outcomes<sup>46</sup>. Overall, ablative lasers appear to have a significant improvement range of 26-83%, compared to 26-50% (non-ablative laser) and ablative lasers also require fewer treatments compared to non-ablative lasers.

#### *ii. Facial Pigmentation*

A randomised controlled study of non-ablative 1550-nm fractional study compared to hydroquinone, tretinoin and triamcinolone acetonide triple therapy in melasma demonstrated non-inferiority of laser treatment on physician global assessments<sup>47</sup>.

With regards to solar lentigenes and ephelides, a multicentre study of 40 subjects with Fitzpatrick skin type I-IV demonstrated moderate improvement at 3 months post follow-up<sup>48</sup>.

### b. Intended Outcomes and benefits

Lightening of solar lentigenes and ephelides, flattening of acne scar with homogenisation of skin texture and improvement in elasticity and gross appearance of skin.

### c. Risks

Post-treatment complications were higher with the ablative lasers, e.g erythema and post-inflammatory hyperpigmentation<sup>46</sup>.

## 5.6 LASER HAIR REMOVAL

Laser hair removal commonly utilises intense pulsed light, alexandrite, diode and Nd:Yag lasers. Mechanism of action includes targeted destruction of hair follicles through direct coagulation and induction of follicular cell death<sup>49</sup>.

### a. Indications

#### *i. Depilation*

Objective decrement in mean hair density, terminal/vellus hair ratio, and hair thickness has been reported<sup>50</sup>.

In darker skin types (Fitzpatrick IV-IV), Nd:YAG laser resulted in a mean hair reduction of 54.3%. Subsequent hair regrowth was finer and slower in close to 80% of patients<sup>51</sup>.

Studies favour a short pulse duration, low fluences with multiple passes to reduce side effects on darker skin<sup>52</sup>.

### b. Intended Outcomes and benefits

Reduction in hair density or removal of hair in unwanted areas.

### c. Risks

Complications include anterior uveitis<sup>53</sup> (if performed on eyebrows), urticaria<sup>54</sup>, hyperhidrosis<sup>55</sup> and paradoxical hypertrichosis<sup>56</sup>.

## 5.7 RADIOFREQUENCY/ULTRASOUND SKIN REJUVENATION

Application of non-ablative radiofrequency and ultrasound waves to tissue can induce skin tightening and dermal remodelling.

### a. Indications

#### *i. Skin rejuvenation*

Histological examination of focussed ultrasound and radiofrequency of skin demonstrated neocollagenesis and ne elastogenesis, with ultrasound showing greater changes in the deep reticular dermis<sup>57</sup>.

A review article noted increased efficacy in microneedling and fractional bipolar radiofrequency<sup>58</sup>.

Another review paper compared radiofrequency ablation, laser therapy, injection lipolysis and high-intensity focussed ultrasound, and highlighted ultrasound as being able to visualise response after a single session<sup>59</sup>.

### b. Intended Outcomes and benefits

Improvement in elasticity and gross appearance of skin.

### c. Risks

No systemic side effects were reported. Transient side effects were mild, and include pain, bruising, tingling, erythema and small blisters<sup>60</sup>.



## 5.8 BOTULINUM TOXIN INJECTION

Botulinum toxin is a neurotoxin produced by *Clostridium botulinum*. Two main commercial types are available: botulinum toxin type A and botulinum toxin type B. Botulinum toxin A is commonly used for aesthetic dermatological procedures, for which 3 toxin As are available – Onabotulinum Toxin A (Botox<sup>®</sup>), Abobotulinum Toxin A (Dysport<sup>®</sup>) and Incobotulinum (Xeomin<sup>®</sup>).

### a. Indications

#### *i. Reduction in facial skin crease prominence*

A meta-analysis of onabotulinum A on glabellar lines showed 84.2% responding at day 30, with half having consistent results 4 months later<sup>61</sup>. This was assessed using Facial Wrinkle scale (FWS) scores and subject global assessment (SGA).

#### *ii. Hyperhidriosis*

With regards to hyperhidriosis, randomised double-blind trials have been performed, with similar efficacies in both Onabotulinum Toxin A and Abobotulinum Toxin A<sup>62</sup>.

#### *iii. Muscle contouring*

There is limited evidence. Botulinum toxin has also been used in muscle contouring, e.g medial gastrocnemius muscle, albeit in small case series<sup>63</sup>. Effects persisted for at least 6 months.

### b. Intended Outcomes and benefits

Reduction in facial skin creases and rhytides.

### c. Risks

While allergic reactions have been reported<sup>64</sup>, a system review of randomised or open label clinical trials of botulinum toxin A involving 817 subjects showed mild adverse treatment-related effects<sup>65</sup>. Asymmetry occurred in 6.9%, which spontaneously resolved.

## 5.9 FILLERS

Soft tissue fillers can be divided broadly into absorbable and non-absorbable materials. Absorbable fillers include collagen, hyaluronic acid, calcium hydroxylapatite, and Poly-L-lactic acid (PLLA). Non-absorbable fillers include Polymethylmethacrylate beads (PMMA microspheres) and silicone.

### a. Indications

#### *i. Augmentation of sagging skin folds/wrinkles*

The utility in fillers has been demonstrated with radiological imaging. Reflectance confocal microscopy 1 year post-injected hyaluronic acid (nasolabial fold) in a comparative double-blind trial of 119 patients showed a one-third increase in the height of the dermoepidermal junction<sup>66</sup>. Non-absorbable Polymethylmethacrylate filler has similarly been evaluated<sup>67</sup>.

#### *ii. Acne scars*

A 64% response rate was achieved after 2 injections of suspended polymethylmethacrylate microspheres for atrophic rolling scars in a randomised controlled double-blind study<sup>68</sup>.

### b. b. Intended Outcomes and benefits

Smoothering of skin folds, acne scars and rhytides. Improvement in elasticity and gross appearance of skin.

### c. Risks

Complications include foreign body granulomas<sup>69</sup> presenting as plaques, nodules, skin discolouration or necrosis<sup>70</sup>, ulcers<sup>71</sup>, or vision loss<sup>72</sup> (particularly autologous fat<sup>73,74</sup>), or systemic inflammatory granulomatous and autoimmune diseases<sup>75</sup>. These complications happen infrequently, with prospective follow-up trials demonstrating good tolerability after 1-2 years with no significant adverse effects<sup>76,77</sup>.

## 5.10 ACNE SUBCISION

Acne subcision is a surgical technique used in refinement of post acne scarring to ameliorate gross appearance.

### a. Indications

#### *i. Acne scar (Rolling type)*

There is limited evidence in skin resurfacing or rejuvenation for acne subcision. Studies were observed to have a 50% improvement in acne scarring in rolling acne scars (from moderate and severe grade to mild grade)<sup>78,79</sup>.

### b. Intended Outcomes and benefits

As above.

### c. Risks

No current literature exists on risks of acne subcision due to limited data on this procedure. It is logical to extrapolate that risks associated with skin incision, e.g. worsening of scars, pigmentation changes, superficial skin infections, exist for such procedures<sup>80</sup>.

## 5.11 ABDOMINOPLASTY

Abdominoplasty involves excision of redundant abdominal skin and fat, and may include tightening of the abdominal musculature with correction of rectus muscle diastasis, umbilical repositioning, and skin closure<sup>81,82</sup>. Liposuction is sometimes used concurrently for further correction of excess lipoadiposity<sup>81,82</sup>. It is sometimes performed following massive weight loss in patients who have undergone bariatric surgery.

### a. Indications

These include restoration of pre-pregnancy abdominal contour, reduction of abdominal pannus, repair of divarication of recti muscles, and post-bariatric surgery body contouring. In cases where large overhanging abdominal pannus is present, concurrent intertrigo may be present and may be considered as an indication for surgery as well. An aesthetic-only indication include the removal of an abdominal pannus for purposes of improvement of body contour: this is common in male abdominoplasty.

### b. Intended outcomes and benefits

Abdominoplasty is aimed at<sup>81,82</sup>: (1) reduction of excess vertical and horizontal skin and adipose tissue of the abdominal wall and achieving an aesthetically pleasing, youthful contour; (2) tightening of musculofascial laxity and/or rectus divarication resulting from previous pregnancy or obesity; (3) elimination of intertrigo resulting from deep skin folds; (4) reduction of weight of pannus and associated “dragging” sensation and back pain, in particular post-bariatric surgery cases; (5) allowing patients to fit into normal clothes, as patients with excess skin folds often experience difficulty in finding appropriate clothing, and; (6) improvement of psychological well-being<sup>83</sup>.

### c. Risks

Patients undergoing abdominoplasty are frequently overweight or obese and present increased anaesthetic risks<sup>81</sup>. These include airway problems, pressure sores and deep venous thrombosis<sup>81</sup>. Surgical risks<sup>81,82</sup> include necrosis of the abdominal skin, irregularities, wound infection, wound dehiscence, seroma formation and visceral injury, in particular, obese patients in whom an abdominal hernia was not recognised preoperatively.

## 5.12 BLEPHAROPLASTY

Blepharoplasty is a common procedure aimed at improving the aesthetic appearance of the upper and/or lower eyelids. It may be combined with other ancillary procedures, such as browlifts, midcheek lifts, fat grafting, botulinum toxin and/or filler injections<sup>84-86</sup>.

### a. Indications

These include upper eyelid dermatochalasis and prolapse/herniation of fat compartments of the upper or lower orbits. In Asian/Oriental patients, additional indications include congenital absence of supratarsal creases of the upper eyelids, and prominent medial epicanthic folds resulting in an un-aesthetic appearance<sup>84-86</sup>.

### b. Intended outcomes and benefits

Aims of blepharoplasty include<sup>84-87</sup>:

- (1) improvement of periocular aesthetic appearance;
- (2) elimination of excess skin on upper eyelid with possible improvement of superior visual field in cases with severe dermatochalasis;
- (3) creation of a supratarsal crease in patients who have a congenital absence of crease;
- (4) reduction in medial epicanthic fold;
- (5) improvement of self-esteem and psychological parameters.

### c. Risks

Potential complications of surgery include:

#### *i. Upper eyelid<sup>84-86</sup>*

Prolonged bruising/swelling, asymmetry, secondary ptosis, under- or over-correction, dry eyes, lagophthalmos with potential for exposure keratopathy, and visual loss (retrobulbar haemorrhage). Risks of complications are higher in patients with pre-existing dry eyes and those with vasculopathy. For those who undergo suture upper blepharoplasty, loss of the upper lid crease over time is possible should the suture break or disintegrate. Loss of the upper eyelid crease is also occasionally seen in incisional cases. Suture-related complications such as stitch granuloma formation may be encountered.

#### *ii. Lower Eyelid<sup>84-88</sup>*

Prolonged bruising/swelling, chemosis, dry eyes, lagophthalmos, asymmetry, under- or over-correction, lower lid retraction and lower lid ectropion. Less common complications may include diplopia (inferior oblique injury) and visual loss (due to retrobulbar haemorrhage). Risks of complications are higher in patients with pre-existing dry eyes, and in patients with negative vector morphology of the lower periorbital region.

## 5.13 BREAST AUGMENTATION, MAMMAPLASTY AND MASTOPEXY

Aesthetic procedures of the breast are common requests in many cosmetic surgery practices. Breast augmentation<sup>89</sup> often involves insertion of implants or grafting of autologous fat. Mammoplasty may include use of implants to simulate the appearance of a lifted breast, or the use of reduction mammoplasty<sup>90</sup> techniques to reduce breast volume and lift the ptotic parenchyma and skin envelope. Mastopexy may be performed to improve the appearance of an un-aesthetic nipple-areolar complex and/or breast gland position.

### a. Indications

The indications<sup>89,90</sup> of breast surgeries include: (1) augmentation of breast volume for developmental hypoplasia; (2) reduction of breast volume in patients with macromastia; these patients may present with back or shoulder pain, and a heavy, dragging sensation ascribed to the breasts, or intertrigo of the skin folds; (3) post-partum breast ptosis and deflation. These patients may benefit from volume augmentation as well as nipple-areolar complex repositioning; (4) patients with developmental asymmetry of the breasts seeking to correct the asymmetry; (5) following bariatric surgery, where breasts are severely ptotic and undergo significant volume deflation, leaving multiple skin folds and difficulty in fitting standard undergarments; and (6) repositioning of the nipple in instances where the nipple lies in an un-aesthetic position.

### b. Intended outcomes and benefits

These include reduction of breast asymmetry, volume adjustment to fit an aesthetic ideal, reduction in back or shoulder pain and intertrigo in cases of macromastia or post-bariatric contouring, and improved self-esteem and psychological profile<sup>91,92</sup>.

### c. Risks

Possible sequelae<sup>89,90</sup> include irregularities, asymmetry, necrosis of breast gland and nipple, and development of calcifications. In the context of implant augmentation, other complications include presence of implant rupture, rippling and double-bubble deformities, capsular contractures, infections and hematoma formation. Uncommon complications include pneumothorax and injuries to the thoracic skeleton. There is currently a reported rare association of breast implants with anaplastic large cell lymphoma (ALCL) but definite causality has not been proven.

## 5.14 DERMABRASION

Dermabrasion is a minor surgical procedure that may be performed in the outpatient or day surgery setting and involves the use of a rotating burr to remove the epidermis and the superficial layers of the dermis<sup>93,94</sup>.

### a. Indications<sup>93-95</sup>

Dermabrasion is commonly used for the resurfacing of scars, treatment of skin pigmentation or dyschromias, and skin resurfacing and/or tightening as part of facial rejuvenation procedures. Aesthetic-only indications generally include those undergoing dermabrasion for facial rejuvenation secondary to skin changes due to senescence (dermal thinning, fine wrinkles, dyschromias) and striae distensae.

### b. Intended outcomes and benefits<sup>95,96</sup>

Depending on the initial indication for dermabrasion, benefits may include improvement in contour of scars, reduction of skin dyschromias, in particular pigmentation residing in the superficial dermal layers, and stimulation of wound healing resulting in better quality skin that is consistent with the appearance of a youthful appearance.

### c. Risks<sup>93,94</sup>

Dermabrasion may result in paradoxically worse scarring and/or keloid formation as compared with the pre-procedural state. Furthermore, scar contractures may form resulting in functional impairment, especially in the periorbital or perioral region, as well as the joints. There may be post-dermabrasion pigmentary abnormalities, including hypopigmentation and hyperpigmentation (postinflammatory hyperpigmentation). The risk is increased in dark-skinned patients who generally have a higher prevalence of keloidal tendencies and is relevant in our local context.

## 5.15 HAIR TRANSPLANTATION

Hair transplantation is a minor surgical procedure that may be performed in an outpatient or day surgery setting. The process involves harvesting a strip of hair (usually from the occiput) and separating hair follicles using a blade. Recent advances in technology have seen the introduction of devices which automate the process of individual hair follicle unit extraction directly from the scalp and increases its harvesting efficiency and success rate.

### a. Indications

The indications for hair transplantation include alopecia in male or female patients of various etiologies<sup>97,98</sup>. The most common indication, which is an aesthetic-only indication, is that of androgenetic alopecia.

### b. Intended outcomes and benefits

In cases of androgenetic alopecia, the intended outcome is restoration and lowering of the anterior hairline, as well as increasing follicle density in regions with thin or sparse hair. For other causes of alopecia, hair transplantation is aimed at increasing the hair density and camouflaging the area of pathology (e.g. burns alopecia)<sup>97,98</sup>.

### c. Risks

Potential risks and complications arising from surgery<sup>97,99</sup> include irregular hairline or appearance due to variable “take” of graft follicles, and scarring of donor and/or recipient sites, hypertrophic and/or keloidal scars.



## 5.16 LIPOSUCTION AND FAT GRAFTING

Liposuction was first described by Dujarrier in 1926 and popularised by Illouz in the 1970s<sup>100</sup>. It is now one of the most common aesthetic procedures. Depending on the volume of lipoaspirate intended, this procedure may be performed under general anaesthesia, or local anaesthesia with/without sedation, and as an inpatient procedure, day surgery or outpatient procedure. A variety of devices have been used to perform liposuction<sup>100</sup>, including power-assisted liposuction, cryolipolysis<sup>101,102</sup>, ultrasound-assisted liposuction, and laser-assisted liposuction<sup>103</sup>. Large volume liposuction is defined as the removal of 5000cc or greater of total lipoaspirate in a single procedure. There is no scientific data available to support a specific volume maximum at which point liposuction is no longer safe, especially when performed in the inpatient setting. However, the risk of complications may be higher as the volume of aspirate and the number of anatomical sites treated increase<sup>104</sup>. Recent advances in the understanding of fat grafting has also made fat grafting an increasingly utilised procedure in cosmetic surgery<sup>102</sup>. Fat grafting may similarly be performed under general or local anaesthesia, and as inpatient or outpatient procedures.

### a. Indications

Liposuction indications include localised lipoadiposity of any anatomical region, e.g. neck, breasts, arms, flanks, abdomen, thighs, buttocks etc causing an un-aesthetic appearance. Liposuction may be used as an adjunctive procedure, e.g. as a part of necklift, abdominoplasty and reduction mammoplasty. An increasingly common indication of liposuction is for harvesting of fat (and associated adipose-derived stem cells) for fat grafting. Aesthetic indications of fat grafting include volumetric rejuvenation of the face<sup>105,106</sup>, neck<sup>105,106</sup>, hands, breasts<sup>107,108</sup>, buttocks<sup>109</sup>, and other anatomical regions. Fat grafting may also be used for treatment of rhytides, scars, and correction of contour deformities resulting from a wide range of previous aesthetic procedures.

### b. Intended outcomes and benefits

Liposuction is aimed at<sup>100</sup> reduction of localised adipose deposits that may be associated with weight gain, senescence, post-bariatric weight loss or post-partum changes, and restoration of an aesthetically pleasing contour and appearance consistent with that of a youthful individual of healthy weight. In cases where liposuction is aimed at obtaining fat graft for harvest, the intent is to obtain a desired amount of fat graft from chosen donor site(s) in an atraumatic manner so as to optimise “take” of the fat graft. The intended outcome and benefits of fat grafting include<sup>105</sup>: (1) volumetric restoration of deflated areas associated with senescence<sup>106-109</sup> (e.g. periorbital region, temporal region, brow, midface and jowls, breasts, hands, buttocks etc.); (2) effacement of facial rhytides; (3) treatment of dermal scars (e.g. acne); (4) correction of asymmetry (e.g. congenital or developmental asymmetries of any anatomical region), and; (5) psychological well-being resulting from restoration of youthful appearance.

### c. Risks

Surgical risks associated with liposuction<sup>100,101</sup> include contour irregularities, necrosis of underlying fat and formation of firm subcutaneous calcific nodules, dermal scarring, dermal hyper- or hypopigmentation, and infection (including necrotising fasciitis and atypical mycobacterial infections). Infrequently, vascular injury may occur resulting in haemorrhage or haematoma formation. Visceral injury is an uncommon but potentially catastrophic complication. Liposuction is also associated with unique anesthesia risks, especially in the context of large-volume liposuction. These include fluid overload, and overdose of local anaesthetic used in infiltration solutions, and potential airway complications arising from the use of deep sedation. The American Society of Plastic Surgeons Task Force on Liposuction recommends that all liposuction procedures in excess of 2 litres of lipoaspirate require overnight monitoring in an accredited facility<sup>101</sup>. Risks associated with fat grafting include fat embolism and its attendant complications, e.g. blindness, stroke and skin necrosis, irregular

resorption of graft resulting in a displeasing contour and/or appearance, calcification of fat grafts, formation of oil cysts, wound infection and vascular injury leading to haemorrhage or haematoma formation.

## 5.17 OTOPLASTY

Cosmetic otoplasty is usually performed for the correction of prominent ears<sup>110,111</sup>. This may be done as an outpatient or day surgery procedure.

### a. Indications

Otoplasty is usually indicated for the correction of prominent ears. Patients are often of school-going age and may face some degree of ridicule and social embarrassment, resulting in reduced self-esteem and compromised psychosocial function.

### b. Intended outcomes and benefits

The aims of the surgery are<sup>110,111</sup>: (1) reduction of prominence of the ear by alteration of the auriculocephalic and conchal-scaphal relationship, and; (2) improved self-esteem and psychosocial functioning.

### c. Risks

Risks<sup>112</sup> include haematoma formation, wound infection, asymmetry, cartilage contour irregularities (especially if cartilage breaking techniques are utilised), recurrence of prominent ears (especially if only cartilage suture techniques are utilised), and formation of telephone ear deformity.

## 5.18 RHINOPLASTY

Rhinoplasty encompasses a wide variety of procedures<sup>113-115</sup>. It is difficult and arbitrary to separate the functional and aesthetic components of the nose. Nasal morphology also varies greatly with ethnicity. Consequently, procedures are tailored for individual patients and their deformities.

### a. Indications

Indications for rhinoplasty may include<sup>113-115</sup> deviation of the nasal septum or dorsal strut, augmentation of the nasal dorsum, reduction of the nasal hump, alteration of the nasal wall width, alteration of the appearance of the nasal tip (tip rotation, tip projection or tip morphology), ala or columellar deformities. With the exception of procedures that are aimed at correction of dysfunctional nasal skeletal and cartilaginous structures and soft tissue abnormalities which may result in dysfunction of the internal and external nasal valves, most of the other procedures serve the purpose of improving the nasal aesthetics. However, secondary deformities may result from functional procedures and should be corrected at the same time<sup>116,117</sup>.

### b. Intended outcomes and benefits

Rhinoplasty is aimed at correction of various possible deformities of the nose towards an aesthetic ideal, and restoration of internal nasal architecture to ensure smooth passage of air during respiration. A successful rhinoplasty procedure is also associated in psychosocial parameters<sup>118-120</sup>.

### c. Risks

Rhinoplasty may itself result in secondary deformities<sup>116-117</sup> of the septum, bony side walls, or cartilage framework resulting in both functional nasal obstruction as well as a wide variety of possible aesthetic deformities. Other complications include swelling, haemorrhage, bruising, wound infection, necrosis of nasal skin and scarring, and hyposmia/anosmia. In cases where osteotomies are performed, cerebrospinal fluid leak may occur uncommonly. Rhinoplasty sometimes requires harvesting of cartilage or fascia and may result in donor site complications, such as pneumothorax, contour irregularities of the chest wall or ear.

## 5.19 RHYTIDECTOMY (INCLUDING BROWLIFT, FACELIFT AND NECKLIFT)

Rhytidectomy is commonly performed to create an appearance of a “lift” to various anatomical regions as part of facial rejuvenation. This includes procedures involving the upper third of the face (browlift)<sup>121,122</sup>, middle third (facelift)<sup>123,124</sup> or lower third (facelift, necklift)<sup>125,126</sup>. Rejuvenation may be achieved by combining rhytidectomy with various laser resurfacing procedures, chemical peels, botulinum toxin injections, and/or fat grafting.

### a. Indications

Senescence leads to increase in laxity of all the soft tissue layers including the skin, subcutaneous, superficial musculoaponeurotic system (SMAS), and suspensory ligaments of the face<sup>127</sup>. Patients often complain of a tired appearance leading to lowered self-esteem<sup>128-130</sup>. With the exception of rhytidectomy performed for the purposes of correction of facial nerve paralysis, most cases are performed for aesthetic-only indications.

### b. Intended outcomes and benefits

Rhytidectomy is aimed at elevating the ptotic tissue to its original position in youth, and elimination of tissue excess by resection or plication<sup>121-127</sup>. In the context of the upper face, the aims are: (1) restoration of the brow to its original position at, or above the orbital rim; (2) achieving an aesthetic brow contour; (3) elimination or effacement of forehead rhytides; (4) reduction of upper eyelid hooding secondary to brow ptosis, and (5) restoration of an aesthetic brow-to-hairline distance. In the context of the midface, the aims of surgery are: (1) restoration of the ptotic malar eminence; (2) effacement of the nasolabial folds; (3) effacement of the jowls; (4) resuspension of the ptotic ligamentous or myofascial soft tissue by resection or plication; (5) resection of excess skin laxity; (6) minimising the sequelae of a facelift procedure, e.g. scarring, ear deformities etc. For the lower face and neck, aims of surgery include: (1) restoration of an aesthetically pleasing neck contour, in particular, restoration of the cervicomental angle; (2) resection of ptotic or protruberant neck fat and/or submandibular gland and debulking of digastric muscle (where indicated); (3) plication or transection of platysma muscle to form a muscular sling, or elimination of neck bands.

### c. Risks

Potential risks and complications<sup>131-133</sup> include bruising and swelling, haematoma formation (especially in hypertensive male patients), asymmetry, scar formation. In rhytidectomy procedures that involve mobilisation of the SMAS and/or their underlying ligaments, injury to the facial nerve or its branches may occur, leading to temporary or permanent paralysis of the various muscle groups of the face, or synkinesis.

## **6. COMPETENCE AND TRAINING REQUIREMENTS FOR SPECIALISTS ENGAGING IN AESTHETIC MEDICAL PRACTICE**

This section is a consensus statement of the Taskforce and discusses the Taskforce's recommendations for competence and training requirements for specialists engaging in aesthetic medical practice.

- 6.1 There is clear agreement that Fellows of AMS and Specialists who intend to engage in aesthetic medical practice undergo formal accredited training with assessment at the end of their training. This training is to take place both within the residency and post-residency fellowships. This is to ensure patient safety and patient centered medicine standards are met and the public's trust in the profession preserved.
- 6.2 All Specialists in their Residency should acquire a knowledge base in the basic medical sciences (anatomy, physiology, pathology and pharmacology) and clinical sciences in relation to the areas of aesthetic medical practice relevant to their specialties. This could be in the form of large and small group teaching, book clubs, journal clubs and clinical case reviews.
- 6.3 The effectiveness of acquisition and retention of the knowledge base should be formally assessed and tested to ensure good understanding and application by MCQ/OSCE/Viva examination or other objective methods of assessment and evaluation.
- 6.4 All Specialists in their training should acquire a good theoretical knowledge of the scientific basis of the aesthetic medical procedures and interventions relevant to their specialty by large group, small group and self-study.
- 6.5 All Specialists in their training should undergo practical acquisition of procedural skills which involves a graded skills acquisition consisting of simulation training, observation, assisting in the procedure and performance under supervision. Supervisors and faculty should ensure appropriate development of the trainees by enabling the trainees to assist and perform procedures of increasing complexity under formal and direct supervision.
- 6.6 The development of the trainees and acquisition of procedural skills must be captured in a Log book or Portfolio. This Logbook is to be validated regularly and signed off by an accredited supervisor. The Log book is to be regularly reviewed with the Supervisor in mentoring sessions. Difficult encounters and adverse outcomes must be subjected to reflective learning by the trainee and guided by the mentor. Formative assessment and feedback should be the feature of the procedural skills acquisition and learning process.
- 6.7 In addition to the biomedical knowledge and procedural skills, Specialists who intend to engage in aesthetic medical practice should undergo special modules covering areas relevant to aesthetic medical practice in professionalism, clinical ethics and health law. This includes topics of informed consent, privacy and confidentiality, conflict of interest, duty of care, professional standards, patient safety and management of adverse outcomes. Proper documentation and effective communication skills are essential in aesthetic medical practice.
- 6.8 For specialties where aesthetic medical procedures are an integral part of their residency syllabus but the practice of aesthetic medical procedures is performed only by specialists who have received further training in this area (i.e. Occuloplastic Surgery in Ophthalmology, Otolaryngologists trained in Facial Plastic Surgery), an accredited Post-residency fellowship of at least 1 year's duration is recommended for these specialists to engage and supervised training in aesthetic medical practice.
- 6.9 Post-residency fellowships are recommended for all Specialists especially those who intend to take up positions of Supervisors or Core faculty to teach in the Residency and other courses in the areas of aesthetic medical practice. In addition, Supervisors and Core faculty aesthetic

medical practice should be in current active clinical practice and have a recommended 5 years of active clinical experience and skills in teaching and mentoring of residents and trainees.

- 6.10 In addition to Clinical experience and skills, Supervisors of trainees in aesthetic medical practice should acquire skills in teaching, assessing and mentoring of trainees.
- 6.11 Specialists who are engaging in aesthetic medical practice should within and across their Colleges and Chapters attend and organise courses, journal clubs, mortality and morbidity rounds, workshops and audit of practice for the continued maintenance and improvement of knowledge, skills and practice. By professionalising the practice and in working to achieve excellence in knowledge, skills and practice, Specialists can continue to gain the confidence of patients and the public in aesthetic medical practice.

## **7. GOOD CLINICAL PRACTICE AND STANDARDS IN AESTHETIC MEDICAL PRACTICE**

This section is a consensus statement of the Taskforce and covers the Taskforce's recommendations on good clinical practice and standards in aesthetic medical practice to ensure a high standard of care delivery and maintenance to patients.

- 7.1 All patients requesting for aesthetic medical consultation, therapy or procedures should have a comprehensive medical history including medical and medication history to exclude contraindications to aesthetic medical procedure and surgery. The history should include a psychosocial history to rule out psychiatric disorders and psychological risk for aesthetic medical procedures. Where there is a reason to believe the patient may have a psychiatric disorder, a referral to a psychiatrist should be made.
- 7.2 All persons for aesthetic medical procedures and surgery should be competent adults with good decision making capacity and be able to give informed consent for the procedures and surgery. For minors and persons lacking capacity, aesthetic medical procedures should only be provided when it is clearly in the best interest of the person.
- 7.3 All Specialists engaging in aesthetic medical practice should be skilled in the informed consent process using appropriate comprehensive consent forms supplemented by written information and risk acknowledgement. An example of good consent forms as used by Oculoplastic ophthalmologists at the SNEC is attached in Appendix 1.
- 7.4 All patients seeking aesthetic medical procedures should be provided with adequate information so that they are enabled to understand and participate effectively in a shared decision consent process. The discussion should include the nature of the condition, the risk and benefits, intended outcome, alternative procedures including doing no treatment at all, and the potential for sub-optimal outcomes needing further procedures.
- 7.5 All patients seeking aesthetic medical procedures should be provided with comprehensive financial counselling of a reasonable estimation of the cost of procedures and other additional costs including further procedures and counselling on booking fees, cancellation fees and the refund policy of the clinic.
- 7.6 A cooling-off period should be considered for patients at the initial consultation, who intend to undergo invasive procedures. The duration and nature of the cooling-off period would depend on the patient's preference, the doctor's assessment of the patient's understanding and voluntariness and the complexity of the treatment and procedures.
- 7.7 Aesthetic medical procedures performed under sedation by non-anaesthesiologists should follow the MOH guidelines<sup>134</sup>. Sedation, monitored anaesthesia care and general/regional anaesthesia for aesthetic medical procedures under the care of anaesthesiologists are governed by the appropriate professional standards.
- 7.8 Appropriate consent should be sought for photography and other forms of visual documentation for purposes of documentation, evaluation and audit of aesthetic medical procedures, where indicated. Photographs and other visual documentation should be of a standard high enough for effective pre- and post-procedures evaluation. Explicit consent should be obtained for the purposes of using photographs for medical presentations, conferences, publications and other educational purposes.
- 7.9 All specialists in aesthetic medical practice should ensure all documentation and visual recordings are stored by reasonably secure methods to ensure there is no loss of privacy and medical confidentiality.



- 7.10 Any use of medical data and visual documentation of patients must conform to the prevailing regulations and guidelines on medical advertising.
- 7.11 All patients who have undergone aesthetic medical procedures should be reviewed at least once after the procedure with good documentation of the outcome which could include photographic documentation.
- 7.12 All specialists involved in aesthetic medical practice must perform due diligence to ensure that equipment used have been appropriately certified for efficacy and safety by the relevant bodies such as the HSA Singapore and FDA USA or similarly reputable and competent authorities. Patient safety is to be the uppermost consideration of the aesthetic medical practice doctor when purchasing, loaning or leasing equipment.
- 7.13 Facilities used for aesthetic medical practice and procedures should conform to the current statutes and guidelines required under the PHMC Act and other Ministry of Health Singapore guidelines. All specialists should be appropriately familiar and comply with any other guidelines that are relevant in aesthetic medical practice including sedation guidelines.

## 8. PROFESSIONALISING AESTHETIC MEDICAL PRACTICE

Aesthetic medical practice has given rise to professional, ethical and legal challenges for the medical profession and practitioners. The rapid growth of aesthetic medical practice and surgery in recent decades to become a global medical and sociological phenomenon fuelled by the consumer, industry, media, commercial marketing and advertisement has thrown doubts on the ethical and professional standards of aesthetic medical practice.

The current state of aesthetic medical practice has posed the following challenges on the medical profession and practitioners:

- Vulnerability of patients in making impulsive decisions;
- Unrealistic or simplistic expectations of patients and public in aesthetic medical practice;
- Commercialisation of aesthetic medical practice and risk for financial exploitation of patients;
- Aesthetic medical practice being viewed as Consumer, Media and Industry driven medicine risks derailing medical standards and ethics;
- Perceived lack of scientific evidence or scientific scrutiny on aesthetic medical procedures and clinical outcomes;
- The wide variation in professional competence of practitioners in aesthetic medical practice;
- The rise in medico-legal issues, medical indemnity and insurance fees in relation to aesthetic medical practice;
- The draining of resources from therapeutic medicine to aesthetic medical practice, giving rise to imbalance in the allocation of healthcare resources.

To overcome these issues, aesthetic medical practice needs to be reframed in relation to other traditional aspects of medicine. Medicine is a complex system which can be divided into several functional parts namely:

- Preventive medicine
- Diagnostic medicine
- Therapeutic medicine
- Rehabilitative medicine
- Palliative medicine
- Aesthetic medicine

The goals of aesthetic medical practice are to improve and enhance the non-pathological appearance of a person with the outcome of promoting the person's self-esteem and psychosocial well-being.

The goals of healthcare as defined by the Institute of Medicine are **Safe** (avoiding injuries in care of patients), **Effective** (providing beneficial services based on evidence), **Patient-centred** (respectful of and responsive to patient preferences, needs, and values), **Timely** (reduce harmful delays), **Efficient** (avoid waste), and **Equitable** (consistent quality across all patients)<sup>135</sup>.

Aesthetic medical practice should be aligned to the above attributes of being safe, effective, patient-centred, timely, efficient and equitable to seek inclusion in the greater umbrella of medicine.

It is important to explicitly reiterate the professional principles and commitments with regards to aesthetic medical practice, to ensure the trust and confidence of patients and society on the professional conduct and performance of Fellows of the Academy of Medicine, Singapore

whom are engaging in aesthetic medical practice. To professionalise aesthetic medical practice among the Fellows of the Academy of Medicine, Singapore (who are involved in aesthetic medical practice), there is an agreement to reaffirm commitment to the professional principles and responsibilities as enunciated in the Physician's Charter<sup>136</sup>.

**A. Principle of primacy of the patient welfare**

Aesthetic medical practice should be dedicated to serving the best interest of the patient beyond that of the interest of the clinician, market forces, societal pressures and other factors. The principle underlines the fiduciary nature of the professional relationship and the virtue of altruism in developing trust and confidence in the profession and practice.

**B. Principle of respect for patient autonomy**

Aesthetic medical practice is committed to shared decision making and responsive to individual patient preferences, needs, and values. Respecting patient autonomy also includes educating and empowering patients with appropriate medical and health education.

**C. Principle of social justice**

Aesthetic medical practice should actively eliminate any form of social discrimination whether based on race, gender, religion, ethnicity, or any other social category.

**D. Principle of medical confidentiality and privacy**

To ensure trust and confidence in aesthetic medical practice, the patients' privacy and confidentiality has to be preserved. The collection, storage and disclosure of patient information, electronic records and documents must meet professional ethical standards. Disclosure would be preceded by consent of the patient unless overriding legal requirements otherwise necessitates disclosure.

**E. Principle of veracity-honesty with patients**

Fellows of the Academy of Medicine, Singapore should ensure that patients seeking aesthetic medical procedures are honestly and appropriately informed before consenting to a procedure. There is to be open and transparent discussion on all matters related to patient inquiries. When patients are injured as a consequence of an aesthetic medical procedure, patients should be informed and in an appropriate and timely manner.

**F. Principle of fidelity to the doctor-patient relationship**

Recognising the vulnerability and dependency of the patient, practitioners are committed to maintain a professional relationship with patients and not breach professional boundaries. This commitment involves appropriate termination of relationship if it so necessitates, without compromise to the patient's interest and welfare.

**G. Managing conflicts of interest**

Medical professionals and their organisations have many opportunities to compromise the primacy of the patient's welfare and interest in the pursuit of financial and private gain. This pursuit involves interactions with equipment manufacturers, pharmaceutical firms and other investors in medical organisations. Conflicts of interest must be managed by pro-active financial counselling, transparency of pricing, open disclosure and peer review and audit. Managing conflicts of interest, especially financial interest, is essential in maintaining the trust of the patients and public.

#### **H. Professional competence**

Fellows of the Academy of Medicine, Singapore who engage in aesthetic medical practice should be committed to lifelong learning and the improvement of professional skills. Commitment to competence extends to working collaboratively to reduce medical errors, improve patient safety and optimise the outcomes of aesthetic medical practice.

#### **H. Commitment to scientific knowledge**

Integrity and commitment to the use of scientific and evidence-based practice is central to the social contract between doctors and society. Evidence-based practice involves the integration of clinical expertise, patient values, and the best research evidence into the decision-making process for aesthetic medical practice. Fellows of the Academy of Medicine, Singapore who engage in aesthetic medical practice are committed to advancing the science of aesthetic medical practice by promoting research, creating new knowledge and dissemination of knowledge and skills.

#### **J. Principle of Collegiality**

As Fellows of the Academy of Medicine, Singapore, aesthetic medical practitioners are committed to work collaboratively to improve patient care, being respectful of one another and participate in peer-review and self-regulation, and at the same time collectively accepting and complying with appropriate external scrutiny of all aspects of professional performance. The fellows should organise and define the educational and professional standards of aesthetic medical practice for the present and future fellows.

## 9. RECOMMENDATIONS

The Academy of Medicine, Singapore continues to have an on-going Committee on Aesthetic Medical Practice consisting of multi-disciplinary specialties to monitor developments and advise the Council in this area as well as updating the report on a yearly basis.

The Academy recommends the submission of the report to *Annals* for consideration for publication.

The soft copy of the same report is to be disseminated to all Fellows of the Academy of Medicine, Singapore.

The report will finally be uploaded onto the website of the Academy of Medicine, Singapore.

## APPENDIX 1:

### PATIENT INFORMATION SHEET

#### Patient Information

## AESTHETIC PROCEDURE

### General Information

This document has been prepared to help you make an informed decision regarding AESTHETIC PROCEDURE. Please read through it thoroughly before signing the consent form. You are strongly encouraged to ask your surgeon any questions and have them answered to your satisfaction before you give your permission for surgery. Every surgery has risks and each person must evaluate the risks and benefits for himself or herself in the light of the information which follows.

### Nature of Procedure

AESTHETIC PROCEDURE is a surgical procedure to remove excess skin and muscle from the upper eye lids in patients with obstruction of vision.

### Expected Benefit and Outcome

The Patient's vision and visual field will be improved once the line of sight is cleared. This enhances his / her functional status.

### Possible Side Effects, Risks and Complications

#### BLEEDING

Bleeding can result in a collection of blood under the skin causing bruising. There will be swelling and healing of the wound may be delayed. It may also affect the intended result of the surgery. You must inform your surgeon if you are taking aspirin or any anti-platelet medication as this increases the risk of bleeding during surgery or in the post-operative period.

#### VISUAL LOSS

As with all forms of eye surgery, blepharoplasty surgery can cause visual loss in very rare circumstances. This happens when deep orbital bleeding occurs during or after the operation causing compression of the optic nerve or the blood supply to the eye ball.

#### ASYMMETRY

Although the same surgery is performed on both sides of the face, there may be a slight difference

#### INFECTION

Infection of the wound site is unusual but can happen after the operation and would require treatment with antibiotics. When this happens, healing is delayed and a scar can form eventually.

#### SCARRING

After surgery, abnormal scars may occur within the skin or in deeper tissues. Scars may be unattractive and be of different colour compared to the surrounding skin. Generally, scars become fainter over time, but they may never go away completely.

#### CORNEAL EXPOSURE PROBLEMS

Some patients experience difficulties closing their eyes after surgery and problems may occur in the

## PATIENT INFORMATION SHEET

in appearance between the right and left at the end. This is due to the variable healing process of each side. In addition, the human face is not completely symmetrical in most individuals. This also applies to patients who had unilateral surgery performed, and a slight asymmetry between the two sides may ultimately exist.

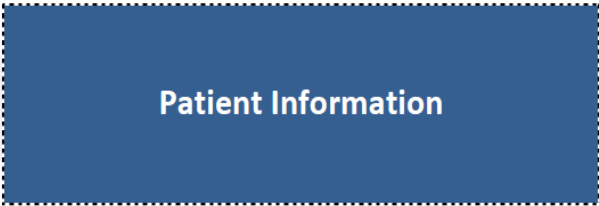
cornea due to exposure and dryness. Should this happen, treatment with ocular lubricants or additional surgery may be required.

### Alternative Treatments

This document has been prepared to help you make an informed decision regarding AESTHETIC PROCEDURE. Please read through it thoroughly before signing the consent form. You are strongly encouraged to ask your surgeon any questions and have them answered to your satisfaction before you give your permission for surgery. Every surgery has risks and each person must evaluate the risks and benefits for himself or herself in the light of the information which follows.

PATIENT INFORMATION SHEET

Acknowledgement Form



Part I To be filled in by Patient

I have read and understood the potential complication(s) that can arise from the procedure. I acknowledge that the complication(s) listed are no intended to be exhaustive. I have had an opportunity to ask for more information about any of the above-mentioned complications, as well as the risks in general, or specific condition of concern to me.

Additional information, if any, conveyed to patient:

Three horizontal lines for additional information.

(Signature / Thumbprint (\*Right / Left) of \*Patient / Parent / Guardian / Next of Kin)

(Name & NRIC of \*Patient / Parent / Guardian / Next of Kin)

(Name of Witness)

(Designation of Witness)

(Signature of Witness)

(Date of Signing)

Part II To be filled in by Medical Practitioner

(Name & Signature of Medical Practitioner)

(Date of Signing)

Part III To be filled by Interpreter (If Applicable)

I, \_\_\_\_\_ confirmed that I have explained to the patient the reason for and the nature of potential complication(s) that may arise from the procedure in \_\_\_\_\_.

(Name & Signature of Medical Practitioner)

(Date of Signing)



## REFERENCES

1. Fischer TC, Perosino E, Poli F, Viera MS, Dreno BJ. Chemical peels in aesthetic dermatology: an update 2009; Cosmetic Dermatology European Expert Group. *Eur Acad Dermatol Venereol*. 2010 Mar;24(3):281-92. **[Grade B, Level 2++ Evidence]**
2. Kodali S, Guevara IL, Carrigan CR, Daulat S, Blanco G, Boker A, et al. A prospective, randomized, split-face, controlled trial of salicylic acid peels in the treatment of melasma in Latin American women. *J Am Acad Dermatol*. 2010 Dec;63(6):1030-5. **[Grade C, Level 2+ Evidence]**
3. Chaudhary S, Dayal S. Efficacy of combination of glycolic acid peeling with topical regimen in treatment of melasma. *J Drugs Dermatol*. 2013 Oct;12(10):1149-53. **[Grade C, Level 2+ Evidence]**
4. Agarwal N, Gupta LK, Khare AK, Kuldeep CM, Mittal A. Therapeutic response of 70% trichloroacetic acid CROSS in atrophic acne scars. *Dermatol Surg*. 2015 May;41(5):597-604. **[Grade D, Level 3 Evidence]**
5. Handog EB, Datuin MS, Singzon IA. Chemical peels for acne and acne scars in asians: evidence based review. *J Cutan Aesthet Surg*. 2012 Oct;5(4):239-46. **[Grade B, Level 2++ Evidence]**
6. Kubiak M, Mucha P, Dębowska R, Rotsztein H. Evaluation of 70% glycolic peels versus 15% trichloroacetic peels for the treatment of photodamaged facial skin in aging women. *Dermatol Surg*. 2014 Aug;40(8):883-91. **[Grade D, Level 3 Evidence]**
7. Omi T, Sato S, Numano K, Kawana S. Ultrastructural observations of chemical peeling for skin rejuvenation (ultrastructural changes of the skin due to chemical peeling). *J Cosmet Laser Ther*. 2010 Feb;12(1):21-4. **[Grade D, Level 3 Evidence]**
8. Han SH, Kim HJ, Kim SY, Kim YC, Choi GS, Shin JH. Skin rejuvenating effects of chemical peeling: a study in photoaged hairless mice. *Int J Dermatol*. 2011 Sep;50(9):1075-82. **[Grade D, Level 3 Evidence]**
9. Sarkar R, Bansal S, Garg VK. Chemical peels for melasma in dark-skinned patients. *J Cutan Aesthet Surg*. 2012 Oct;5(4):247-53. **[Grade B, Level 2++ Evidence]**
10. Patriota RC, Rodrigues CJ, Cucé LC. Intense pulsed light in photoaging: a clinical, histopathological and immunohistochemical evaluation. *Cell An Bras Dermatol*. 2011 Nov-Dec;86(6):1129-33. **[Grade D, Level 3 Evidence]**
11. Cuerda-Galindo E, Díaz-Gil G, Palomar-Gallego MA, Linares-GarcíaValdecasas R. Intense pulsed light induces synthesis of dermal extracellular proteins in vitro. *Lasers Med Sci*. 2015 Sep;30(7):1931-9. **[Grade D, Level 3 Evidence]**
12. Cho EB, Park H, Park EJ, Kwon IH, Kim SS, Kim KH, Kim KJ, Park HR. Effect of intense pulsed light on rat skin. *Dermatol Surg*. 2012 Mar;38(3):430-6. **[Grade D, Level 3 Evidence]**
13. Feng Y, Zhao J, Gold MH. Skin rejuvenation in Asian skin: the analysis of clinical effects and basic mechanisms of intense pulsed light. *J Drugs Dermatol*. 2008 Mar;7(3):273-9. **[Grade D, Level 3 Evidence]**
14. Larouche D, Kim DH, Ratté G, Beaumont C, Germain L. Effect of intense pulsed light treatment on human skin in vitro: analysis of immediate effects on dermal papillae and hair follicle stem cells. *Br J Dermatol*. 2013 Oct;169(4):859-68. **[Grade D, Level 3 Evidence]**
15. Trelles MA, Ash C, Town G. Clinical and microscopic evaluation of long-term (6 months) epilation effects of the ipulse personal home-use intense pulsed light (IPL) device. *J Eur Acad Dermatol Venereol*. 2014 Feb;28(2):160-8. **[Grade C, Level 2+ Evidence]**
16. Khodaeyani E, Amirnia M, Babaye-Nazhad S, Alikhah H, Brufeh B. Efficacy of intense pulsed light in hirsutism. *Pak J Biol Sci*. 2010 Jul 1;13(13):635-41. **[Grade D, Level 3 Evidence]**
17. Gan SD, Graber EM. Laser hair removal: a review. *Dermatol Surg*. 2013 Jun;39(6):823-38. **[Grade B, Level 2++ Evidence]**
18. Thaysen-Petersen D, Lin JY, Nash J, Beerwerth F, Wulf HC, Philipsen PA, Haedersdal M. The role of natural and UV-induced skin pigmentation on low-fluence IPL-induced side effects: a randomized controlled trial. *Lasers Surg Med*. 2014 Feb;46(2):104-11. **[Grade B, Level 1- Evidence]**

19. Kim DY, Park HS, Yoon HS, Cho S. Efficacy of IPL device combined with intralesional corticosteroid injection for the treatment of keloids and hypertrophic scars with regards to the recovery of skin barrier function: A pilot study. *J Dermatolog Treat.* 2015 Oct;26(5):481-4. **[Grade D, Level 3 Evidence]**
20. Shamsi Meymandi S, Rezazadeh A, Ekhlasi A. Studying intense pulsed light method along with corticosteroid injection in treating keloid scars. *Iran Red Crescent Med J.* 2014 Feb;16(2):e12464. **[Grade D, Level 2- Evidence]**
21. Sarkar A, Dewangan YK, Bain J, Rakshit P, Dhruw K, Basu SK, Saha JK, Majumdar BK. Effect of intense pulsed light on immature burn scars: A clinical study. *Indian J Plast Surg.* 2014 Sep-Dec;47(3):381-5. **[Grade D, Level 3 Evidence]**
22. Bae MI, Park JM, Jeong KH, Lee MH, Shin MK. Effectiveness of low-fluence and short-pulse intense pulsed light in the treatment of melasma: A randomized study. *J Cosmet Laser Ther.* 2015 Aug 19;1-4 **[Grade C, Level 2+ Evidence]**
23. Yun WJ, Lee SM, Han JS, Lee SH, Chang SY, Haw S, Lee JB, Won CH, Lee MW, Choi JH, Chang SE. A prospective, split-face, randomized study of the efficacy and safety of a novel fractionated intense pulsed light treatment for melasma in Asians. *J Cosmet Laser Ther.* 2015;17(5):259-66. **[Grade C, Level 2+ Evidence]**
24. Shirakawa M, Ozawa T, Tateishi C, Fujii N, Sakahara D, Ishii M. Intense pulsed light therapy for aberrant Mongolian spots. *Osaka City Med J.* 2012 Dec;58(2):59-65. **[Grade D, Level 3 Evidence]**
25. Liu J, Liu J, Ren Y, Li B, Lu S. Comparative efficacy of intense pulsed light for different erythema associated with rosacea. *J Cosmet Laser Ther.* 2014 Dec;16(6):324-7. **[Grade C, Level 2+ Evidence]**
26. Kassir R, Kolluru A, Kassir M. Intense pulsed light for the treatment of rosacea and telangiectasias. *J Cosmet Laser Ther.* 2011 Oct;13(5):216-22. **[Grade C, Level 2+ Evidence]**
27. Oh SH, Bae BK, Kim TG, Kwon YS, Lee JH, Lee KH. Effective treatment of facial redness caused by atopic dermatitis using intense pulsed light systems. *Dermatol Surg.* 2010 Apr;36(4):475-82. **[Grade D, Level 2- Evidence]**
28. Fang L, Gold MH, Huang L. Melasma-like hyperpigmentation induced by intense pulsed light treatment in Chinese individuals. *J Cosmet Laser Ther.* 2014 Dec;16(6):296-302. **[Grade D, Level 3 Evidence]**
29. Lee WW, Murdock J, Albin TA, O'brien TP, Levine ML. Ocular damage secondary to intense pulse light therapy to the face. *Ophthal Plast Reconstr Surg.* 2011 Jul-Aug;27(4):263-5. **[Grade D, Level 3 Evidence]**
30. Chaptini C, Huilgol SC. Erbium-doped yttrium aluminium garnet ablative laser treatment for endogenous ochronosis. *Australas J Dermatol.* 2015 Aug;56(3):212-4. **[Grade D, Level 3 Evidence]**
31. Ostovari N, Mohtasham N, Oadras MS, Malekzad F. 532-nm and 1064-nm Q-switched Nd:YAG laser therapy for reduction of pigmentation in macular amyloidosis patches. *J Eur Acad Dermatol Venereol.* 2008 Apr;22(4):442-6. **[Grade C, Level 2+ Evidence]**
32. Wang CC, Chen CK. Effect of spot size and fluence on Q-switched alexandrite laser treatment for pigmentation in Asians: a randomized, double-blinded, split-face comparative trial. *J Dermatolog Treat.* 2012 Oct;23(5):333-8. **[Grade D, Level 2- Evidence]**
33. Fitzpatrick RE, Goldman MP, Ruiz-Esparza J. Use of the alexandrite laser (755 nm, 100 nsec) for tattoo pigment removal in an animal model. *J Am Acad Dermatol.* 1993 May;28(5 Pt 1):745-50. **[Grade D, Level 3 Evidence]**
34. Dozier SE, Diven DG, Jones D, Brysk M, Sanchez RL, Motamedi M. The Q-switched Alexandrite laser's effects on tattoos in guinea pigs and harvested human skin. *Dermatol Surg.* 1995 Mar;21(3):237-40. **[Grade D, Level 3 Evidence]**
35. Zelickson BD, Mehregan DA, Zarrin AA, Coles C, Hartwig P, Olson S, Leaf-Davis Clinical, histologic, and ultrastructural evaluation of tattoos treated with three laser systems. *J Lasers Surg Med.* 1994;15(4):364-72. **[Grade D, Level 3 Evidence]**
36. Brauer JA, Reddy KK, Anolik R, Weiss ET, Karen JK, Hale EK, Brightman LA, Bernstein L, Geronemus RG. Successful and rapid treatment of blue and green tattoo pigment with a novel picosecond laser. *Arch Dermatol.* 2012 Jul;148(7):820-3. **[Grade D, Level 3 Evidence]**

37. Bencini PL, Cazzaniga S, Tournalaki A, Galimberti MG, Naldi L. Removal of tattoos by q-switched laser: variables influencing outcome and sequelae in a large cohort of treated patients. *Arch Dermatol*. 2012 Dec;148(12):1364-9. **[Grade C, Level 2+ Evidence]**
38. Wang CC, Sue YM, Yang CH, Chen CK. A comparison of Q-switched alexandrite laser and intense pulsed light for the treatment of freckles and lentiginos in Asian persons: a randomized, physician-blinded, split-face comparative trial. *J Am Acad Dermatol*. 2006 May;54(5):804-10. **[Grade D, Level 2- Evidence]**
39. Adamič M, Pavlović MD, Troilius Rubin A, Palmetun-Ekbäck M, Boixeda P. Guidelines of care for vascular lasers and intense pulse light sources from the European Society for Laser Dermatology. *J Eur Acad Dermatol Venereol*. 2015 Sep;29(9):1661-78. **[GPP]**
40. Wall TL. Current concepts: laser treatment of adult vascular lesions. *Semin Plast Surg*. 2007 Aug;21(3):147-58. **[Grade D, Level 4 Evidence]**
41. Brightman LA, Geronemus RG, Reddy KK. Laser treatment of port-wine stains. *Clin Cosmet Investig Dermatol*. 2015 Jan 12;8:27-33. **[Grade B, Level 2++ Evidence]**
42. Craig LM, Alster TS. Vascular skin lesions in children: a review of laser surgical and medical treatments. *Dermatol Surg*. 2013 Aug;39(8):1137-46. **[Grade B, Level 2++ Evidence]**
43. Ortiz AE, Nelson JS. Port-wine stain laser treatments and novel approaches. *Facial Plast Surg*. 2012 Dec;28(6):611-20. **[Grade B, Level 2++ Evidence]**
44. Faurischou A, Olesen AB, Leonardi-Bee J, Haedersdal M. Lasers or light sources for treating port-wine stains. *Cochrane Database Syst Rev*. 2011 Nov 9;(11):CD007152. **[Grade A, Level 1+ Evidence]**
45. Clark C, Cameron H, Moseley H, Ferguson J, Ibbotson SH. Treatment of superficial cutaneous vascular lesions: experience with the KTP 532 nm laser. *Lasers Med Sci*. 2004;19(1):1-5. **[Grade D, Level 2- Evidence]**
46. Ong MW, Bashir SJ. Fractional laser resurfacing for acne scars: a review. *Br J Dermatol*. 2012 Jun;166(6):1160-9. **[Grade A, Level 1+ Evidence]**
47. Kroon MW, Wind BS, Beek JF, van der Veen JP, Nieuweboer-Krobotová L, Bos JD, Wolkerstorfer A. Nonablative 1550-nm fractional laser therapy versus triple topical therapy for the treatment of melasma: a randomized controlled pilot study. *J Am Acad Dermatol*. 2011 Mar;64(3):516-23. **[Grade C, Level 2+ Evidence]**
48. Brauer JA, McDaniel DH, Bloom BS, Reddy KK, Bernstein LJ, Geronemus RG. Nonablative 1927 nm fractional resurfacing for the treatment of facial photopigmentation. *J Drugs Dermatol*. 2014 Nov;13(11):1317-22. **[Grade B, Level 2++ Evidence]**
49. Zeng D, Yu WL, Bi Y, Yang CH, Lai HW, Hu ZQ. Effect of alexandrite laser treatment for hair removal in Tibet mini-pigs. *Nan Fang Yi Ke Da Xue Xue Bao*. 2009 Apr;29(4):697-700. **[Grade D, Level 3 Evidence]**
50. Mohamed EM, Ahmed AM, Tawfik KM, Ibrahim SM. Trichoscopic changes in hair during treatment of hirsutism with 1064-nm neodymium:yttrium-aluminum-garnet laser. *J Cosmet Dermatol*. 2015 Jul 29. **[Grade B, Level 2++]**
51. Rao K, Sankar TK. Long-pulsed Nd:YAG laser-assisted hair removal in Fitzpatrick skin types IV-VI. *Lasers Med Sci*. 2011 Sep;26(5):623-6. **[Grade C, Level 2+]**
52. Braun M. Permanent laser hair removal with low fluence high repetition rate versus high fluence low repetition rate 810 nm diode laser--a split leg comparison study. *J Drugs Dermatol*. 2009 Nov;8(11 Suppl):s14-7. **[Grade C, Level 2+]**
53. Yalçındağ FN, Uzun A. Anterior uveitis associated with laser epilation of eyebrows. *J Ophthalmic Inflamm Infect*. 2013 Apr 15;3(1):45. **[Grade D, Level 3 Evidence]**
54. Bernstein EF. Severe urticaria after laser treatment for hair reduction. *Dermatol Surg*. 2010;36(1):147-51. **[Grade D, Level 3 Evidence]**
55. Obeid G, Helou J, Maatouk I, Moutran R, Tomb R. Depilatory laser: a potential causative factor for inguinal hyperhidrosis: report of three cases. *J Cosmet Laser Ther*. 2013 Oct;15(5):286-9. **[Grade D, Level 3 Evidence]**
56. Desai S, Mahmoud BH, Bhatia AC, Hamzavi IH. Paradoxical hypertrichosis after laser therapy: a review. *Dermatol Surg*. 2010 Mar;36(3):291-8. **[Grade D, Level 3 Evidence]**

57. Suh DH, Choi JH, Lee SJ, Jeong KH, Song KY, Shin MK. Comparative histometric analysis of the effects of high-intensity focused ultrasound and radiofrequency on skin. *J Cosmet Laser Ther.* 2015 Oct;17(5):230-6. **[Grade D, Level 3 Evidence]**
58. Simmons BJ, Griffith RD, Falto-Aizpurua LA, Nouri K. Use of radiofrequency in cosmetic dermatology: focus on nonablative treatment of acne scars. *Clin Cosmet Investig Dermatol.* 2014 Dec 12;7:335-9. **[Grade B, Level 2++ Evidence]**
59. Jewell ML, Solish NJ, Desilets CS. Noninvasive body sculpting technologies with an emphasis on high-intensity focused ultrasound. *Aesthetic Plast Surg.* 2011 Oct;35(5):901-12. **[Grade B, Level 2++ Evidence]**
60. Sklar LR, El Tal AK, Kerwin LY. Use of transcutaneous ultrasound for lipolysis and skin tightening: a review. *Aesthetic Plast Surg.* 2014 Apr;38(2):429-41. **[Grade c, Level 2+ Evidence]**
61. Glogau R, Kane M, Beddingfield F, Somogyi C, Lei X, Caulkins C, Gallagher C. OnabotulinumtoxinA: a meta-analysis of duration of effect in the treatment of glabellar lines. *Dermatol Surg.* 2012 Nov;38(11):1794-803. **[Grade A, Level 1+ Evidence]**
62. Simonetta Moreau M, Cauhepe C, Magues JP, Senard JM. A double-blind, randomized, comparative study of Dysport vs. Botox in primary palmar hyperhidrosis. *Br J Dermatol.* 2003 Nov;149(5):1041-5. **[Grade A, Level 1+ Evidence]**
63. Lee HJ, Lee DW, Park YH, Cha MK, Kim HS, Ha SJ. Botulinum toxin a for aesthetic contouring of enlarged medial gastrocnemius muscle. *Dermatol Surg.* 2004 Jun;30(6):867-71; discussion 871. **[Grade D, Level 3 Evidence]**
64. Careta MF, Delgado L, Patriota R. Report of Allergic Reaction After Application of Botulinum Toxin. *Aesthet Surg J.* 2015 Jul;35(5):P102-5. **[Grade D, Level 3 Evidence]**
65. Cavallini M, Cirillo P, Fundarò SP, Quartucci S, Sciuto C, Sito G, Tonini D, Trocchi G, Signorini M. Safety of botulinum toxin A in aesthetic treatments: a systematic review of clinical studies. *Dermatol Surg.* 2014 May;40(5):525-36. **[Grade A, Level 1+ Evidence]**
66. Royo de la Torre J, Moreno-Moraga J, Isarría MJ, Muñoz E, Cruz I, Pérez G, Cornejo P. The evaluation of hyaluronic acid, with and without lidocaine, in the filling of nasolabial folds as measured by ultrastructural changes and pain management. *J Drugs Dermatol.* 2013 Mar;12(3):e46-52. **[Grade A, Level 1+ Evidence]**
67. Lee YB, Song EJ, Kim SS, Kim JW, Yu DS. Safety and efficacy of a novel injectable filler in the treatment of nasolabial folds: polymethylmethacrylate and cross-linked dextran in hydroxypropyl methylcellulose. *J Cosmet Laser Ther.* 2014 Aug;16(4):185-90. **[Grade C, Level 2+ Evidence]**
68. Karnik J, Baumann L, Bruce S, Callender V, Cohen S, Grimes P, Joseph J, Shamban A, Spencer J, Tedaldi R, Werschler WP, Smith SR. A double-blind, randomized, multicenter, controlled trial of suspended polymethylmethacrylate microspheres for the correction of atrophic facial acne scars. *J Am Acad Dermatol.* 2014 Jul;71(1):77-83. **[Grade A, Level 1+ Evidence]**
69. Lee JM, Kim YJ. Foreign body granulomas after the use of dermal fillers: pathophysiology, clinical appearance, histologic features, and treatment. *Arch Plast Surg.* 2015 Mar;42(2):232-9. **[Grade D, Level 3 Evidence]**
70. Kwon SG, Hong JW, Roh TS, Kim YS, Rah DK, Kim SS. Ischemic oculomotor nerve palsy and skin necrosis caused by vascular embolization after hyaluronic acid filler injection: a case report. *Ann Plast Surg.* 2013 Oct;71(4):333-4. **[Grade D, Level 3 Evidence]**
71. El-Khalawany M, Fawzy S, Saied A, Al Said M, Amer A, Eassa B. Dermal filler complications: a clinicopathologic study with a spectrum of histologic reaction patterns. *Ann Diagn Pathol.* 2015 Feb;19(1):10-5. **[Grade D, Level 3 Evidence]**
72. Carle MV, Roe R, Novack R, Boyer DS. Cosmetic facial fillers and severe vision loss. *JAMA Ophthalmol.* 2014 May;132(5):637-9. **[Grade D, Level 3 Evidence]**
73. Carruthers JD, Fagien S, Rohrich RJ, Weinkle S, Carruthers A. Blindness caused by cosmetic filler injection: a review of cause and therapy. *Plast Reconstr Surg.* 2014 Dec;134(6):1197-201. **[Grade D, Level 3 Evidence]**
74. Park KH, Kim YK, Woo SJ, Kang SW, Lee WK, Choi KS, Kwak HW, Yoon IH, Huh K, Kim JW; Korean Retina Society. Iatrogenic occlusion of the ophthalmic artery after cosmetic facial filler injections: a national survey by the Korean Retina Society. *JAMA Ophthalmol.* 2014 Jun;132(6):714-23. **[Grade D, Level 3 Evidence]**

75. Alijotas-Reig J, Fernández-Figueras MT, Puig L. Inflammatory, immune-mediated adverse reactions related to soft tissue dermal fillers. *Semin Arthritis Rheum*. 2013 Oct;43(2):241-58. **[Grade D, Level 3 Evidence]**
76. Grimes PE, Thomas JA, Murphy DK. Safety and effectiveness of hyaluronic acid fillers in skin of color. *J Cosmet Dermatol*. 2009 Sep;8(3):162-8. **[Grade A, Level 1+ Evidence]**
77. Lee JH, Choi YS, Kim SM, Kim YJ, Rhie JW, Jun YJ. Efficacy and safety of porcine collagen filler for nasolabial fold correction in Asians: a prospective multicenter, 12 months follow-up study. *J Korean Med Sci*. 2014 Nov;29 Suppl 3:S217-21. **[Grade A, Level 1+ Evidence]**
78. Al-Dhalimi MA, Arnoos AA. Subcision for treatment of rolling acne scars in Iraqi patients: a clinical study. *J Cosmet Dermatol*. 2012 Jun;11(2):144-50. **[Grade C, Level 2+ Evidence]**
79. Alam M, Omura N, Kaminer MS. Subcision for acne scarring: technique and outcomes in 40 patients. *Dermatol Surg*. 2005 Mar;31(3):310-7; discussion 317. **[Grade C, Level 2+ Evidence]**
80. Katz B, McBean J. Laser-assisted lipolysis: a report on complications. *J Cosmet Laser Ther*. 2008 Dec;10(4):231-3. **[Grade D, Level 3 Evidence]**
81. Hurvitz KA, Olaya WA, Nguyen A, Wells JH. Evidence-based medicine: Abdominoplasty. *Plast Reconstr Surg* 2014;133(5),1214-21. **[Level 2++, Grade C]**
82. Friedland JA, Maffi TR. MOC-PS CME Article: Abdominoplasty. *Plast Reconstr Surg* 2008;121,1-11. **[Level 2++, Grade C]**
83. Brunton G, Paraskeva N, Caird J et al. Psychosocial Predictors, Assessment, and Outcomes of Cosmetic Procedures: A Systematic Rapid Evidence Assessment. *Aesthetic Plast Surg* 2014;38,1030-40. **[Level 2++, Grade C]**
84. Drolet BC, Sullivan PK. Evidence-based medicine; blepharoplasty. *Plast Reconstr Surg* 2014;133(5),1195-205. **[Level 2++, Grade C]**
85. Trussler AP, Rohrich RJ. MOC-PSSM CME article: Blepharoplasty. *Plast Reconstr Surg* 2008;121(Suppl):1-10. **[Level 2++, Grade C]**
86. Friedland JA, Lalonde DH, Rohrich RJ. An evidence-based approach to blepharoplasty. *Plast Reconstr Surg* 2010;126,2222-9. **[Level 2++, Grade C]**
87. Massry GG, Hartstein ME. The lift and fill lower blepharoplasty. *Ophthalmol Plast Reconstr Surg* 2012;28(3),213-8. **[Level 2+, Grade D]**
88. Undavia S, Briceno CA, Massry GG. Quantified incision placement for postseptal approach transconjunctival blepharoplasty. *Ophthalmol Plast Reconstr Surg* 2015 Apr 20 [Epub ahead of print]. **[Level 2+, Grade D]**
89. Lista F, Ahmad J. Evidence-based medicine: augmentation mammoplasty. *Plast Reconstr Surg* 2013;132(6),1684-96. **[Level 2++, Grade C]**
90. Kerrigan CL, Slezak SS. Evidence-based medicine: reduction mammoplasty. *Plast Reconstr Surg* 2013;132(6),1670-83. **[Level 2++, Grade C]**
91. Brunton G, Paraskeva N, Caird J et al. Psychosocial Predictors, Assessment, and Outcomes of Cosmetic Procedures: A Systematic Rapid Evidence Assessment. *Aesthetic Plast Surg* 2014;38,1030-40. **[Level 2++, Grade C]**
92. Honigman RJ, Phillips KA, Castle DJ. A review of psychosocial outcomes for patients seeking cosmetic surgery. *Plast Reconstr Surg* 2004;113,1229-37. **[Level 2++, Grade C]**
93. Alkhawam L, Alam M. Dermabrasion and microdermabrasion. *Facial Plast Surg* 2009;25(5),301-10. **[Level 2+, Grade C]**
94. Roenigk HH. Dermabrasion: state of the art 2002. *J Cosmet Dermatol* 2002;1(2),72-87. **[Level 4, Grade D]**
95. Surowitz JB, Shockley WW. Enhancement of facial scars with dermabrasion. *Facial Plast Surg Clin North Am* 2011;19(3),517-25. **[Level 2+, Grade C]**
96. Fernandes M, Pinheiro NM, Crema VO, Mendonça AC. Effects of microdermabrasion on skin rejuvenation. *J Cosmet Laser Ther*. 2014 Jan;16(1):26-31. **[Level 3, Grade D]**
97. Vogel JE, Jimenez F, Cole J, Keene SA, Harris JA, Barrera A, Rose PT. Hair restoration surgery: the state of the art. *Aesthet Surg J* 2013;33(1),128-51. **[Level 4, Grade D]**

98. Lam SM. Hair transplant and local anesthetics. *Clin Plast Surg* 2013;40(4),615-25. **[Level 4, Grade D]**
99. Lam SM. Complications in hair restoration. *Facial Plast Surg Clin North Am* 2013;21(4),675-80. **[Level 4, Grade D]**
100. Matarasso A, Levine SM. Evidence-based medicine: liposuction. *Plast Reconstr Surg* 2013;132(6),1697-705. **[Level 2++, Grade C]**
101. Ingargiola MJ, Motakef S, Chung MT, Vasconez HC, Sasaki GH. Cryolipolysis for fat reduction and body contouring: safety and efficacy of current treatment paradigms. *Plast Reconstr Surg*. 2015 Jun;135(6):1581-90. **[Level 2+, Grade C]**
102. Derrick CD, Shridharani SM, Broyles JM. The Safety and Efficacy of Cryolipolysis: A Systematic Review of Available Literature. *Aesthet Surg J*. 2015 Sep;35(7):830-6. **[Level 2++, Grade C]**
103. Wolfenson M, Hochman B, Ferreira LM. Laser lipolysis: skin tightening in lipoplasty using a diode laser. *Plast Reconstr Surg*. 2015 May;135(5):1369-77. **[Level 3, Grade D]**
104. Haeck PC, Swanson JA, Gutowski KA et al. Evidence-based patient safety advisory: liposuction. *Plast Reconstr Surg* 2009;124(4 Suppl),28S-44S. **[Level 2++, Grade C]**
105. Ross RJ, Shayan R, Mutimer KL, Ashton MW. Autologous fat grafting: current state of the art and critical review. *Ann Plast Surg* 2014;73(3),352-7. **[Level 2++, Grade C]**
106. Marten TJ, Elyassnia D. Fat grafting in facial rejuvenation. *Clin Plast Surg* 2015;42(2),219-52. **[Level 3, Grade D]**
107. Auclair E, Anavekar N. Combined use of implant and fat grafting for breast augmentation. *Clin Plast Surg* 2015;42(3),307-14. **[Level 3, Grade D]**
108. Coleman SR, Saboeiro AP. Primary breast augmentation with fat grafting. *Clin Plast Surg* 2015;42(3),301-6. **[Level 3, Grade D]**
109. Toledo LS. Gluteal augmentation with fat grafting: the Brazilian buttock technique: 30 years' experience. *Clin Plast Surg* 2015;42(2),253-61. **[Level 3, Grade D]**
110. Janis JE, Rohrich RJ, Gutowski KA. Otoplasty. *Plast Reconstr Surg* 2005;115(4),60e-72e. **[Level 2++, Grade C]**
111. Kelley P, Hollier L, Stal S. Otoplasty: evaluation, technique, and review. *J Craniofac Surg* 2003;14(5),643-53. **[Level 4, Grade D]**
112. Limandjaja GC, Breugem CC, Mink van der Molen AB, Kon M. Complications of otoplasty: a literature review. *J Plast Reconstr Aesthet Surg* 2009;62(1),19-27. **[Level 3, Grade D]**
113. Beck DO, Kenkel JM. Evidence-based medicine: Rhinoplasty. *Plast Reconstr Surg* 2014;134(6),1356-71. **[Level 2++, Grade C]**
114. Cannon DE, Rhee JS. Evidence-based practice: functional rhinoplasty. *Otolaryngol Clin North Am* 2012;45(5),1033-43. **[Level 2++, Grade C]**
115. Menick FJ. Aesthetic and reconstructive rhinoplasty: a continuum. *J Plast Reconstr Aesthet Surg* 2012;65(9),1169-74. **[Level 2-, Grade D]**
116. Surowitz JB, Most SP. Complications of rhinoplasty. *Facial Plast Surg Clin North Am* 2013;21(4),639-51. **[Level 3, Grade D]**
117. Cuzalina A, Qaqish C. Revision rhinoplasty. *Oral Maxillofac Surg Clin North Am* 2012;24(1),119-30. **[Level 3, Grade D]**
118. Brunton G, Paraskeva N, Caird J et al. Psychosocial Predictors, Assessment, and Outcomes of Cosmetic Procedures: A Systematic Rapid Evidence Assessment. *Aesthetic Plast Surg* 2014;38,1030-40. **[Level 2++, Grade C]**
119. Shridharani SM, Magarakis M, Manson PN, Rodriguez ED. Psychology of plastic and reconstructive surgery: a systematic review. *Plast Reconstr Surg* 2010;126,2243-51. **[Level 2++, Grade C]**
120. Honigman RJ, Phillips KA, Castle DJ. A review of psychosocial outcomes for patients seeking cosmetic surgery. *Plast Reconstr Surg* 2004;113,1229-37. **[Level 2++, Grade C]**
121. Arneja JS, Larson DL, Gosain AK. Aesthetic and reconstructive browlift: current techniques, indications, and applications. *Ophthal Plast Reconstr Surg* 2005;21(6),405-11. **[Level 2-, Grade D]**

122. Graham DW, Heller J, Kurkjian TJ, Schaub TS, Rohrich RJ. Brow lift in facial rejuvenation: a systematic literature review of open versus endoscopic techniques. *Plast Reconstr Surg* 2011;128(4),335e-341e. **[Level 2++, Grade B]**
123. Mustoe TA, Park E. Evidence-based medicine: face lift. *Plast Reconstr Surg* 2014;133(5),1206-13. **[Level 2+, Grade C]**
124. Marcus BC. Rhytidectomy: current concepts, controversies and the state of the art. *Curr Opin Otolaryngol Head Neck Surg* 2012;20(4),262-6. **[Level 2-, Grade D]**
125. Matarasso A. Managing the components of the aging neck: from liposuction to submentalplasty, to neck lift. *Clin Plast Surg* 2014;41(1),85-98. **[Level 3, Grade D]**
126. Ristow B. Rejuvenation of the aging neck: 40 years experience. *Clin Plast Surg* 2014;41(1),125-9. **[Level 3, Grade D]**
127. Rasko YM, Beale E, Rohrich RJ. Secondary rhytidectomy: comprehensive review and current concepts. *Plast Reconstr Surg* 2012;130(6),1370-8. **[Level 2+, Grade C]**
128. Brunton G, Paraskeva N, Caird J et al. Psychosocial Predictors, Assessment, and Outcomes of Cosmetic Procedures: A Systematic Rapid Evidence Assessment. *Aesthetic Plast Surg* 2014;38,1030-40. **[Level 2++, Grade C]**
129. Shridharani SM, Magarakis M, Manson PN, Rodriguez ED. Psychology of plastic and reconstructive surgery: a systematic review. *Plast Reconstr Surg* 2010;126,2243-51. **[Level 2++, Grade C]**
130. Honigman RJ, Phillips KA, Castle DJ. A review of psychosocial outcomes for patients seeking cosmetic surgery. *Plast Reconstr Surg* 2004;113,1229-37. **[Level 2++, Grade C]**
131. Byun S, Mukovozov I, Farrokhyar F, Thoma A. Complications of browlift techniques: a systematic review. *Aesthet Surg J* 2013;33(2),189-200. **[Level 2++, Grade C]**
132. Bloom JD, Immerman SB, Rosenberg DB. Face-lift complications. *Facial Plast Surg* 2012;28(3),260-72. **[Level 2++, Grade C]**
133. Batniji RK. Complications/sequelae of neck rejuvenation. *Facial Plast Surg Clin North Am* 2014;22(2),317-20. **[Level 2++, Grade C]**
134. MOH Guidelines available at <https://elis.moh.gov.sg/elis/publishInfo.do?task=download&pkId=174>. Accessed in May 2015.
135. Institute of Medicine. *Crossing the Quality Chasm: A New Health System for the 21st Century*. Washington, DC: The National Academies Press, 2001.
136. Brennan T, Blank L, Cohen J, Kimball H, Smelser N, Copeland R, et al. Medical professionalism in the new millennium: a physician charter. *Ann Intern Med*. 2002; 136:243-246.