

Menses to the Menopause: Optimising the Performance, Health & Wellbeing of Female Aircraft as a MAME

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Panel Introduction

- Aerospace medicine has the potential conditions for a gender data gap:
 - Assumptions male = applicable to all humans
 - Overlooking female-specific physiology and physicality in design and research
- This may present unknown or under-appreciated risk to health, safety and performance of our female aircrew.



Timing	Serial	Speaker
13:15 – 13:20	A small study on UK military female aircrew attitudes towards menstrual suppression .	Wg Cdr Jemma Austin
13:20 – 13:30	Practical and Pharmacological Menstrual Support to Aircrew.	Wg Cdr Elaine Rutland
13:30 – 13:40	Menopause – Symptoms of Aeromedical Concern.	Wg Cdr Elaine Rutland
13:40 – 13:50	To pee or not to pee?	Wg Cdr Jemma Austin
13:50 – 14:10	Optimising Female Performance within Aircrew Equipment Integration.	Dr Erica Jackson
14:10 – 14:40	BREAK	
14:40 – 15:00	Pregnancy in Aviators: International Policies	Lt Col David Gregory
15:00 – 15:30	Pregnancy Risk Assessment Matrix	Dr Ryan Mayes
15:30 – 16:10	Panel Discussion: Medical Management of Female Aircrew	Introduced by Lt Col David Gregory
	1. Military Flying Whilst Pregnant – Lt Col Gregory (25 mins)	
	2. Women's Health Specific Policies within NATO – Wg Cdr Austin (25 mins)	

Panel Introduction

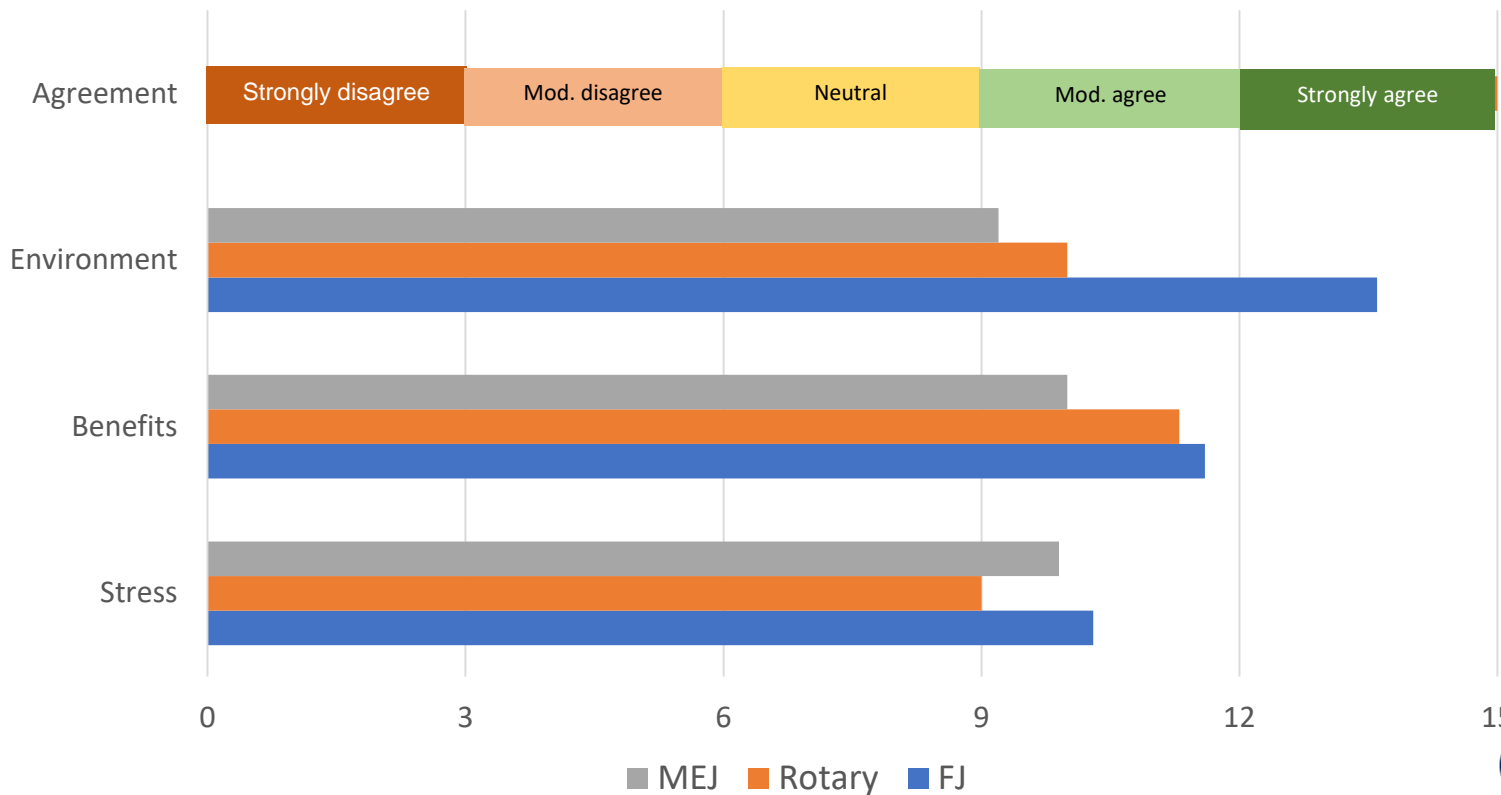
- Wg Cdr Elaine Rutland BSc MA MBChB DRCOG MRCGP PGCME FHEA DAvMed
DAeroSpMed MRAeS RAF
 - Command Flight Medical Officer
- Dr Erica Jackson BSc MBChB Adv Dip Occ Med
 - SMO, Aircrew Equipment Integration Group
- Wg Cdr Jemma Austin MBChB DFSRH DRCOG DMCC MAcadMEd MRCGP DAvMed
MSc RAF
 - Servicewomen's Health Initiatives Focus Team

A small study on UK female military aircrew attitudes towards menstrual suppression.

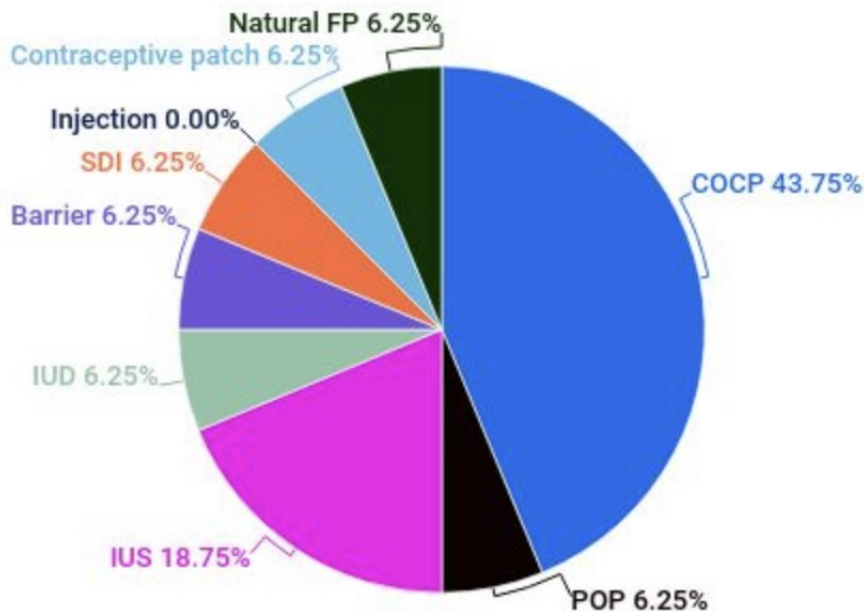
Wg Cdr Jemma Austin

Military Women's Attitudes to Menstrual Suppression

Mean agreement scale by platform type of impact of factors within flying duties on menstrual experience.



UK military female aircrew use methods that could potentially achieve suppression

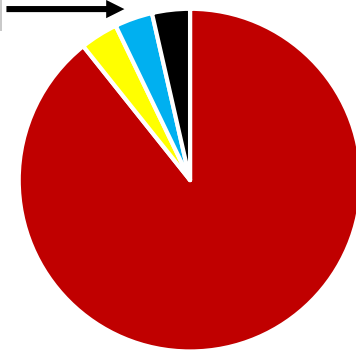


- 16/28 currently had a need for contraception.
- 13/16 used a hormonal method of contraception
 - 5/16 were classed as a long-acting reversible method of contraception (LARC)

Menstrual Suppression Desire ≠ Outcome

Do you have any form of vaginal bleed that requires menstrual management?

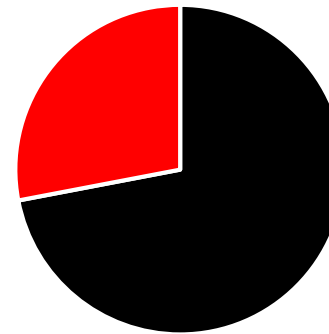
3/28 achieved total amenorrhoea



■ Bleed ■ POP ■ IUS ■ Menopause

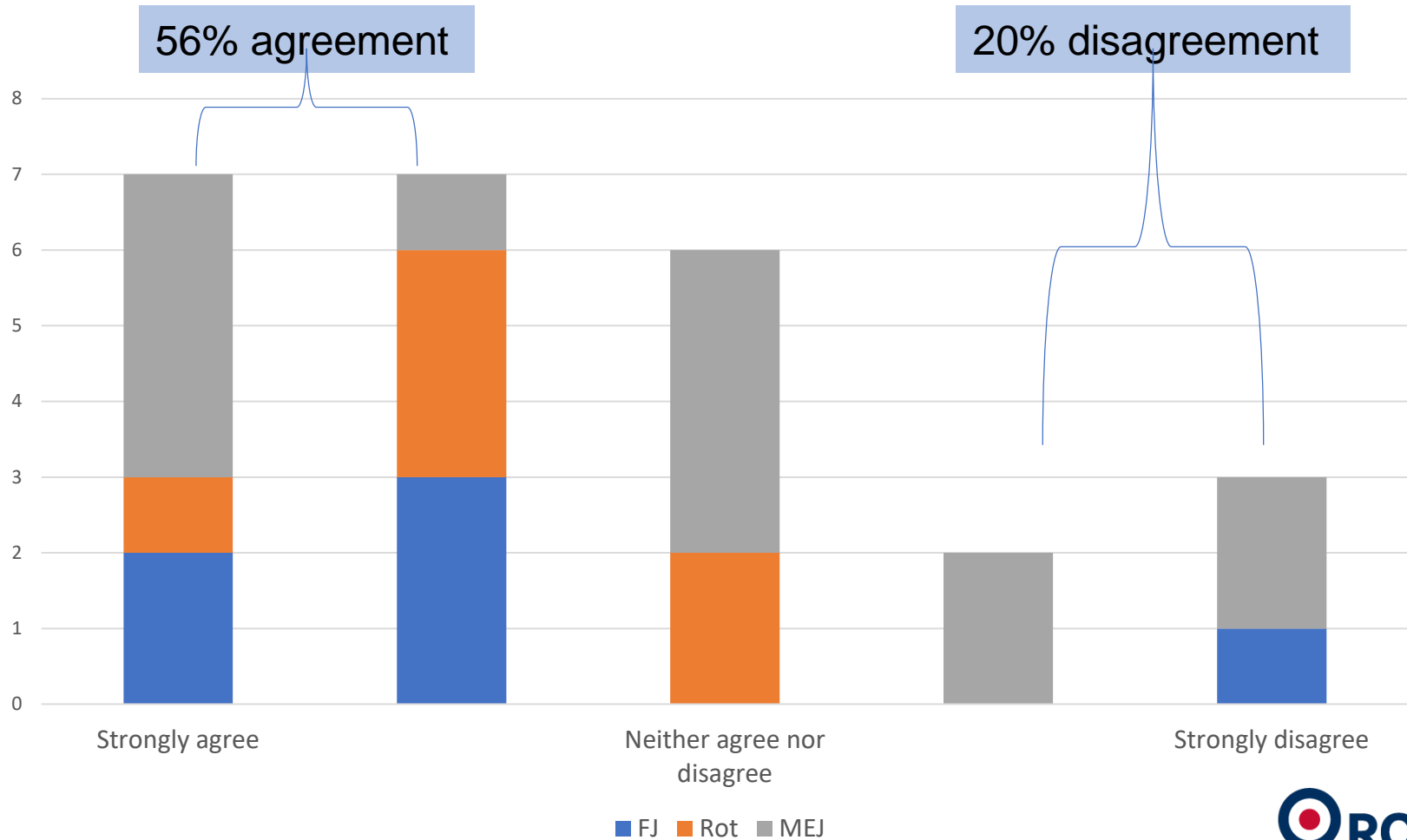
Would you wish to suppress menstruation whilst you're flying if you could?

18/25 wished to suppress bleeding whilst flying if they could

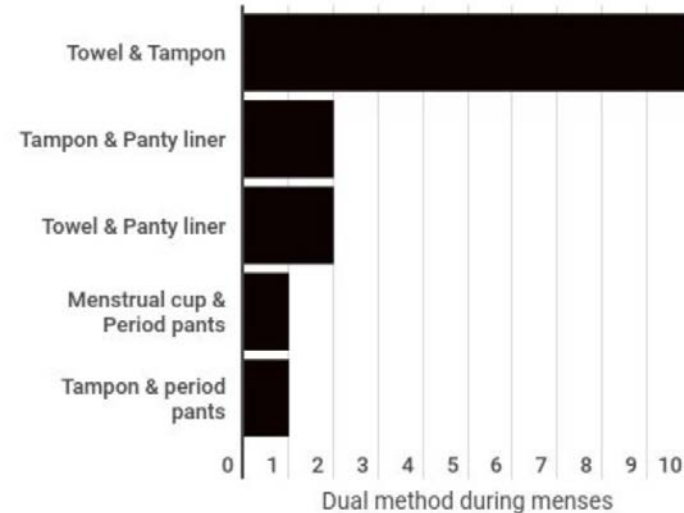
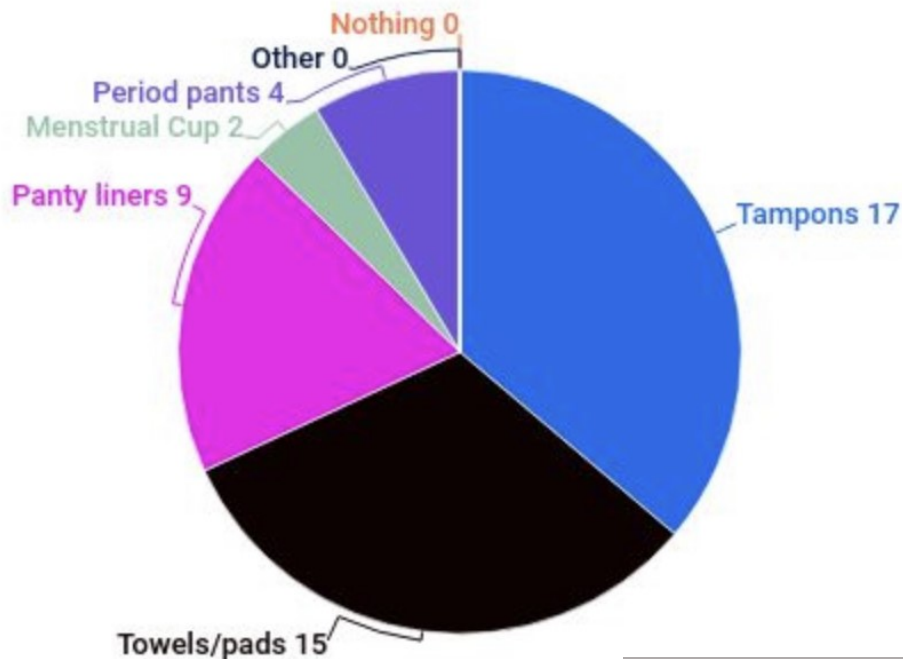


■ Yes ■ No

I worry about the effect stopping periods will have on my overall health:



Methods of menstrual management in UK female military aircrew:



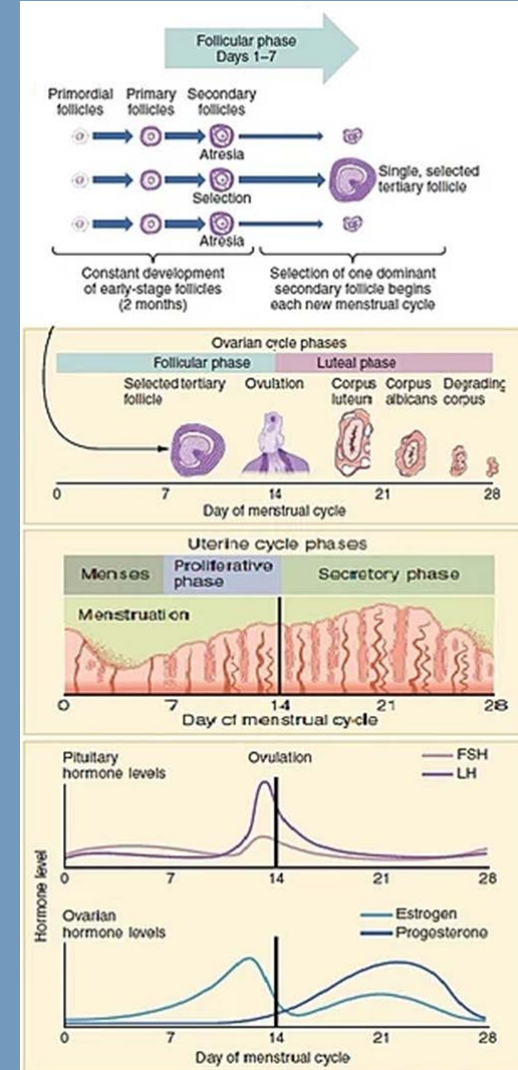
- Anxiety over leakage
 - Seating
 - Uniform
 - Sortie duration (>8 hours)

Practical and Pharmacological Menstrual Support to Aircrew.

Wg Cdr Elaine Rutland

Menstruation

- **Hormone Changes drive Menstrual Cycle**
- **Normal Cycle**
 - Cycle of 21-40 days
 - 2-7 days menses
 - 45-75 ml menstruation (heavier at start)
 - Cycle may vary
 - Varying levels of discomfort
 - Breast Tenderness
 - Mood changes



Menstruation

Aeromedical Concerns

- irregularity, duration, frequency, pain,
- distraction because of fear of leakage,
- changing sanitary protection esp in remote locations / single seat & rotary

MAME Support

- Offer discussion and advice on menstruation control, pain management, operational considerations

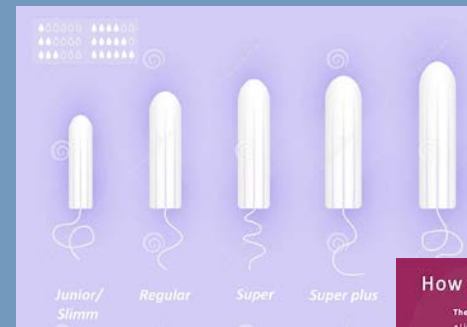
Sanitary Protection

Individual Preference and Variable Absorbency

- Tampons – 4-6 hours
- ‘Cups’ = 10-12 hours – cleaning may be difficult
- Sanitary Pads – 4-6 hours
- ‘Period Pants’ – varying protection,
- Liners

Considerations

- Disposal?
- Hygiene?
- Use with urination devices?



Menstruation Control



Combined Oral Contraception

- Common, reasonably safe and acceptable to CAA and RAF provided no SE
- Can tri-cycle or take continuously (unlicensed)
- Beware COCP usage to treat 'other' conditions and whether the condition itself needs further Ix.
- Thromboembolic risk acceptable? NB - Other risk factors.

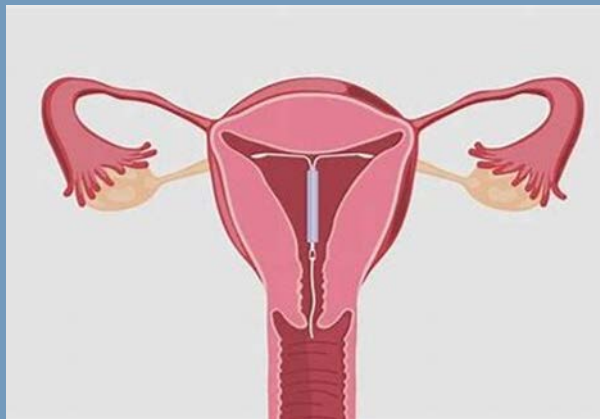
Progesterone Only Pill

- Systemic progesterone
- Initial irregular bleeding can be troublesome, but often stops menstruation
- Irregular bleeding— most common SE
- Side effects – acne, nausea, headache, Mood swings, breast tenderness (body armour / harnesses)

Menstruation Control

IUS

- Progesterone local release, prevents uterine proliferation
- Potential for 6/12 irregular bleeding on initiation
- 86% reduction in blood loss at 3/12, up to 97% at 12/12.
- Mood swings, breast tenderness (body armour / harnesses)
- Headache – ensure side effect free



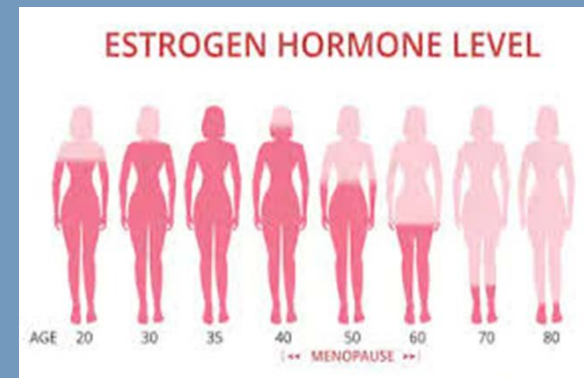
MAME Support

- **Open questioning:**
 - “How are your periods?”/ “When was your last menstrual period?”
 - Explore expectations: menstrual control vs fertility etc
 - Normalise conversations
- **Provide Advice on:**
 - Sanitary protection suitable to their operational environment
 - Menstrual control

Menopause – Symptoms of Aeromedical Concern

Wg Cdr Elaine Rutland

Menopause



- **The point 12 months after the last menstruation**
- Gradual decline in oestrogen levels eventually results in cessation of menstruation
- 45 to 55, average ~ age 51-52
- Climacteric / symptoms , average 4-8 yrs, 1 in 10 lasts 12 yrs
- Temporary situation
- Supporting aircrew through this time aids retention, reducing workforce costs

Aeromedical Concerns

- 30-60% of women suffer symptoms (>35 different symptoms)
- Hot flushes / sweats – 20-25% find these troublesome
- Night sweats
- Sleep disturbance
- Headache
- Fatigue
- Mood changes
- Anxiety
- Osteoporosis – later effect

- NB – Is the risk of untreated symptoms worse than treatment risks?

Menopause Management

- **Most need nothing**, other than potentially advice and support.
- Enquire about symptoms during medical / consultations.
- Hot flushes / night sweats – advise simple measures:
 - Clothing: layers, natural fibres eg Merino wool
 - cool bedroom,
 - avoid triggers,
 - reduce stress,
 - exercise regularly,
 - lose weight if needed.



Menopause – Pharmacological Support

Treatment

- **Oestrogen** is most effective treatment – UK NICE state should be offered to women with menopausal symptoms after discussion of risks and benefits.
- **Combined HRT** - 9% reduction in All-Cause mortality.
- **Alternatives** eg Clonidine, gabapentin, antidepressants (Venlafaxine and Escitalopram - unlicensed) only treat flushing / sweats, potential 50% placebo effect. Not listed in aviation guidelines. Mostly inappropriate for use in aviation environment, review case by case with regulator if required.
- **SSRI** (eg Escitalopram) may be suitable if effective and side effect free
- **Vitamin E** for flushes – marginal (if any) benefit, high dosage, not proven safe.
- **Black Cohosh, St John's Wort** etc. not regulated and unlikely to be able to assure safety

Hormone Replacement Therapy

- Oestrogen can be topical/ transdermal/ oral/ implant / vaginal
- Oestrogen-only if post-hysterectomy
- Progesterone needed to prevent endometrial hyperplasia
- Cyclical or continuous therapy
- Utrogestan may induce mild sedation in some – initial grounding period
- IUS effective at contraception and opposition



Hormone Replacement Therapy

RAF (policy in progress):

- HRT will likely be acceptable
- 4 week ground trial
- Dual vs Solo – VTE risk – preparation and age dependent (<0.1% up to age 59)

CAA (flying or controlling):

- 2 weeks ground trial on start or change dose to ensure no adverse SE
- Unfit until stable on appropriate medication
- GP or Gynae report to include:
 - cardiovascular risk assessment (unclear why),
 - no side effects and adequate symptom control,
- review by the AME – no limitations if above achieved

MAME Support

- Enquire about Menopause symptoms in > age 45
- Normalise the conversation!
- Offer support and discussion
- Try non-pharmacological measures first
- HRT has small relative risks and is very effective
- Risk of HRT is likely to be less than uncontrolled distracting symptoms

- Don't forget contraception!

NB - Menopause is a journey not a destination.

To pee or not to pee?

Wg Cdr Jemma Austin

Urinate

Physical

- AEA
- Anatomy

Physiological

- Sortie duration
- Menstruation

Psychological

- Culture & privacy

Flight Safety & Performance

- Situational awareness
- Ejector seat

Genitourinary Health & Wellbeing

- Confidence
- Anxiety
- Embarrassment/shame

Fluid is an essential component of physiological function



Required intake varies by individual & workload

Dehydrate

Flight Safety & Performance

- ↓Cognitive and physical perf.
- ↓Gz endurance
- ↑DCS risk
- ↑Heat illness risk

Genitourinary Health & Wellbeing

- ↑Urinary tract infection
- ↑Urinary incontinence

Hold

Flight Safety & Performance

- ↑Distraction
- ↑Disassociation behaviour

Genitourinary Health & Wellbeing

- ↑Urinary tract infection
- ↑Urinary incontinence
- ↓Bladder size

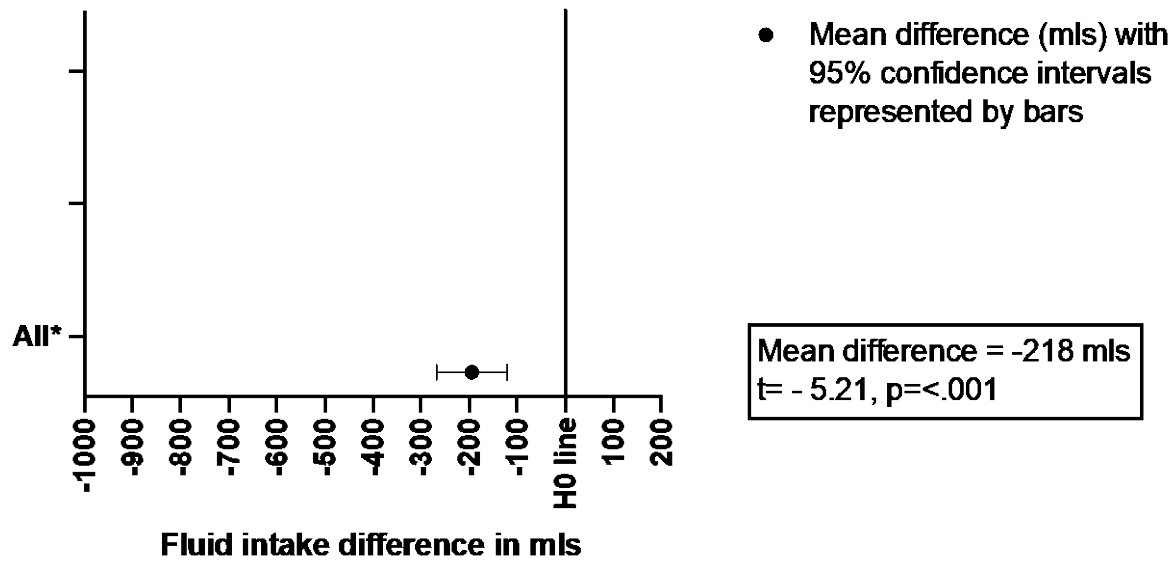
Kidneys filter 150-180L per day



1% becomes urine which every human must eliminate

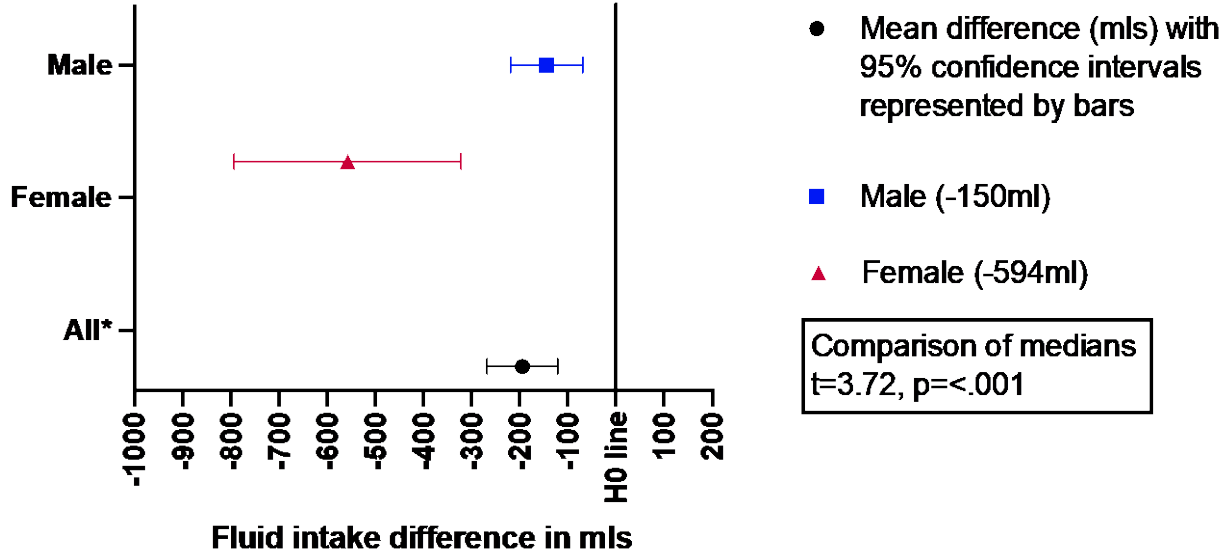
UK military aircrew self-report a reduction in fluid intake on flying days:

Difference in self-reported fluid intake (in mls) on flying days versus non-flying days in UK military aircrew.

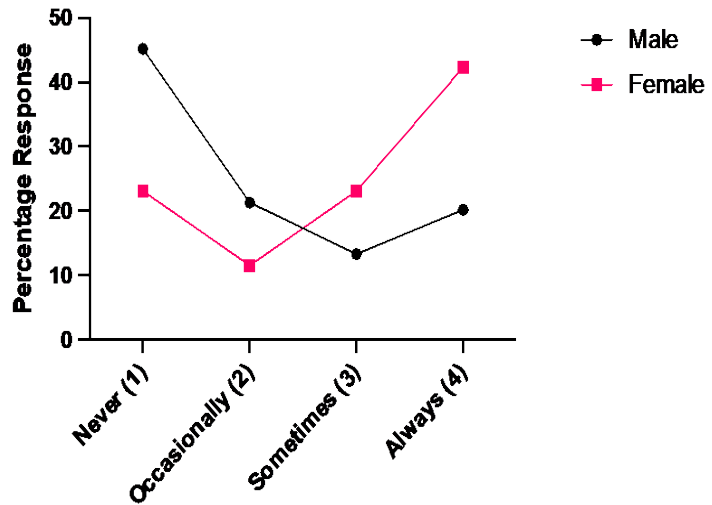


Sex-disaggregation of data shows a 4-fold difference in self-reported fluid intake change:

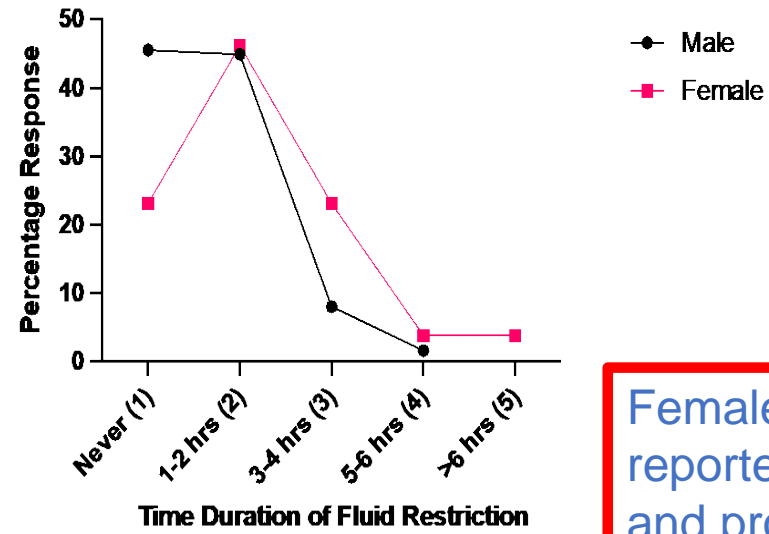
Difference in self-reported fluid intake (in mls) on flying days versus non-flying days in UK military aircrew with sex disaggregation.



UK military aircrew self-report restricting fluids frequently and for prolonged periods:

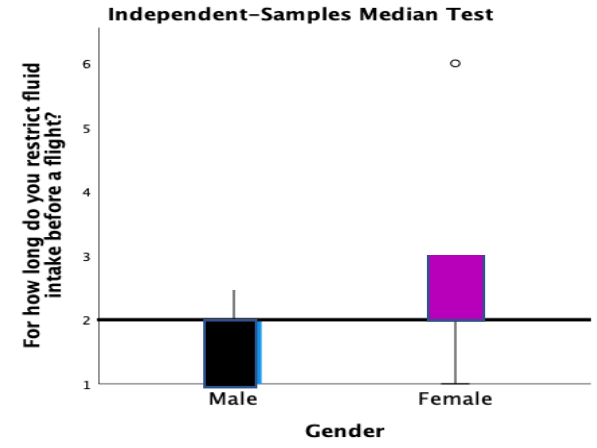
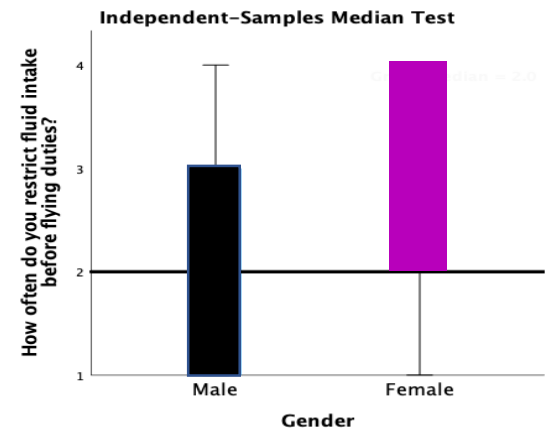


Frequency of Fluid Restriction

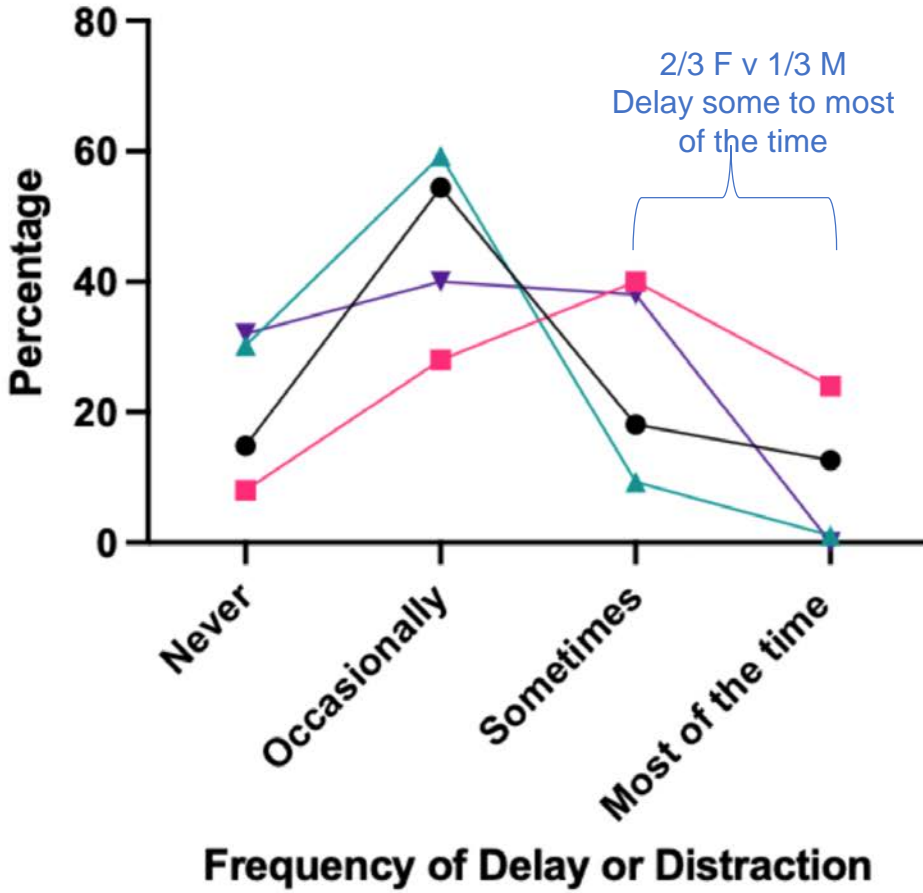


Time Duration of Fluid Restriction

Female aircrew reported more frequent and prolonged fluid restriction



UK military aircrew self-report holding urine for prolonged periods and experiencing distraction:

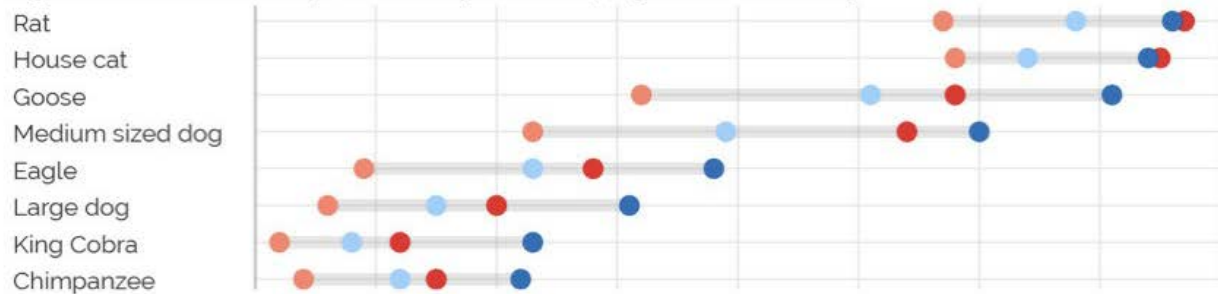


- 30% of male and 64% of female aircrew delayed urination some to most of the time.
- 70% of all aircrew reported being distracted to some degree by the need to urinate.

So, why are women making more risky behaviour modifications?

● American men ● American women ● British men ● British women

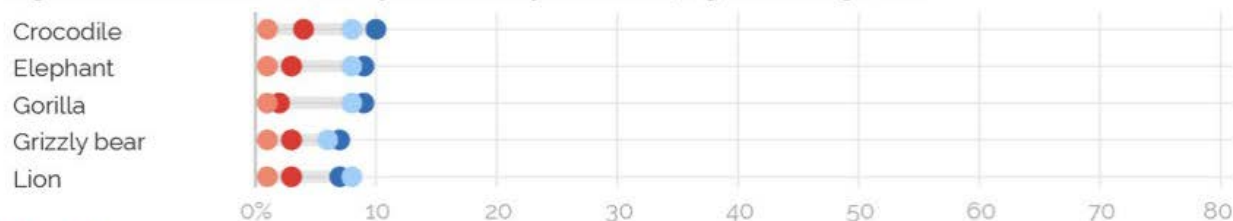
Fights men are more likely to think they would win, regardless of country



Statistically insignificant difference between American women and British men



Fights Americans are more likely to think they would win, regardless of gender



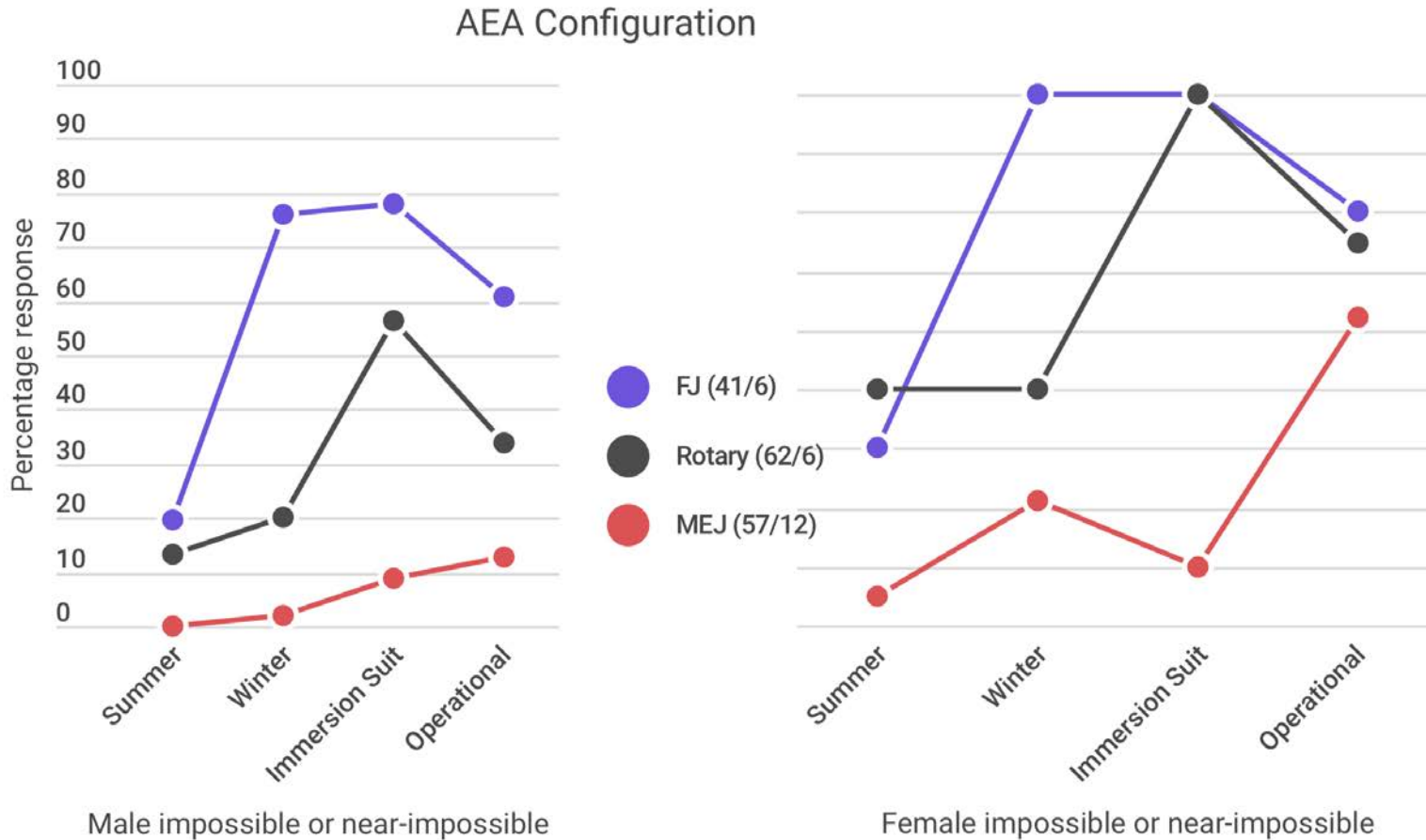
YouGov

(US) 12-13 April / (GB) 18-19 May 2021

So how do you pee on an aircraft?



Design and configuration of AEA affects ability to urinate:



Prohibitive Factors

Aircraft Role

- Remain strapped in
- Sitting side by side
- Unscheduled landings
- Freight and pax (professionalism)
- Always handling pilot
- Ejector seat safety
- Occupational hazard
 - Spray, air flow, blockage

Aircrew Equipment Assembly

- 2 piece, 2 piece, 2 piece
 - Bodily exposure
 - Cubicle size
- Immersion garments
- Zip length
- Peeing uphill

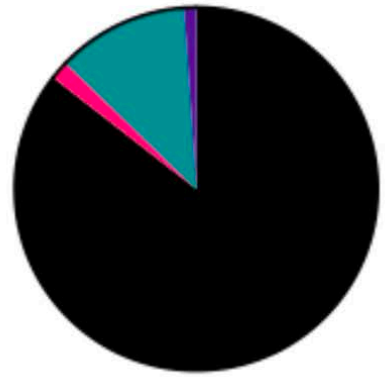
Facilities Provided

- Cubicle size
- Forward-facing
- Vulnerable behind curtain
- Availability of serviceable devices
- Loss of situational awareness
- Last resort attitude
- She-wee use whilst flying

Operational Role

- Freight loading
- Turbulence
- BALCS restricting egress

Urinating whilst airborne is not an equitable experience:



Self-rating of Shame (Male)

- Never (85.6%)
- Sometimes (1.7%)
- Usually (11.7%)
- All of the Time (1.1%)



Self Rating of Shame (Female)

- Never (25%)
- Sometimes (16.7%)
- Usually (54.1%)
- All of the Time (4.2%)

14% male v. **75% female** aircrew report experiencing some form of shame or embarrassment urinating in the airborne environment – **their primary workplace.**

How we can support urination as a MAME:

- Acknowledge the challenges of urination management as part of staying hydrated which can have a disproportionate effect on female aircrew.
 - Type of facility/device available (or not) has a significant effect on fluid intake.
 - Flight safety and mission profile considerations are a significant barrier to using available facilities and devices
 - AEA configuration limits access to toilet opportunity.
- Familiarise yourself with the available options on your platforms
- Normalise conversation around hydration vs. urination management for female aircrew and whether they use the available options.

Recognising the need to Optimise Female Performance within Aircrew Equipment Integration.

Dr Erica Jackson

Overview

- Outline recent UK female aircrew perspectives' and focus group evidence on performance challenges.
- Summarise areas highlighted within Aircrew Equipment and integration

Aircrew Equipment and Integration Group (AEIG)

- Providing evidence for safety cases, through independent technical evaluation of aircrew life support, and protective equipment.
- Supporting enhanced performance and improving protection for military aircrew with correct selection and use of personal protective equipment (PPE).

How do we rate – how does the mission statement relate to RAF aircrew ?

- RAF: Male aircrew make up around 95% – considering data from integrations, specialist measure and incident reporting, evidence suggests AEA appears suitable for male aircrew population.
- Females constitute around 5% of our aircrew population - low incident reporting, and yet higher proportions of specialist measure requirements than male aircrew (accounting for around 60% of appointments).
- This suggests that female aircrew are disproportionately affected by equipment and specialist measure requirements, but do not always report incidence of equipment concern.

Legislation as applies in UK

- Personal Protective Equipment at Work Regulations, 1992 (and amendments).
 - Equipment is to be safe to use, appropriate to the task, and reduce risk of hazard to as low as reasonably practicable.
 - Consideration of fit and physiological burden should be given when choosing PPE.
- Equality legislation, and diversity and inclusion policies require that our female aircrew are to be treated no less favourably. This is also relevant for equipment.

Female Aircrew Fora, October 2021

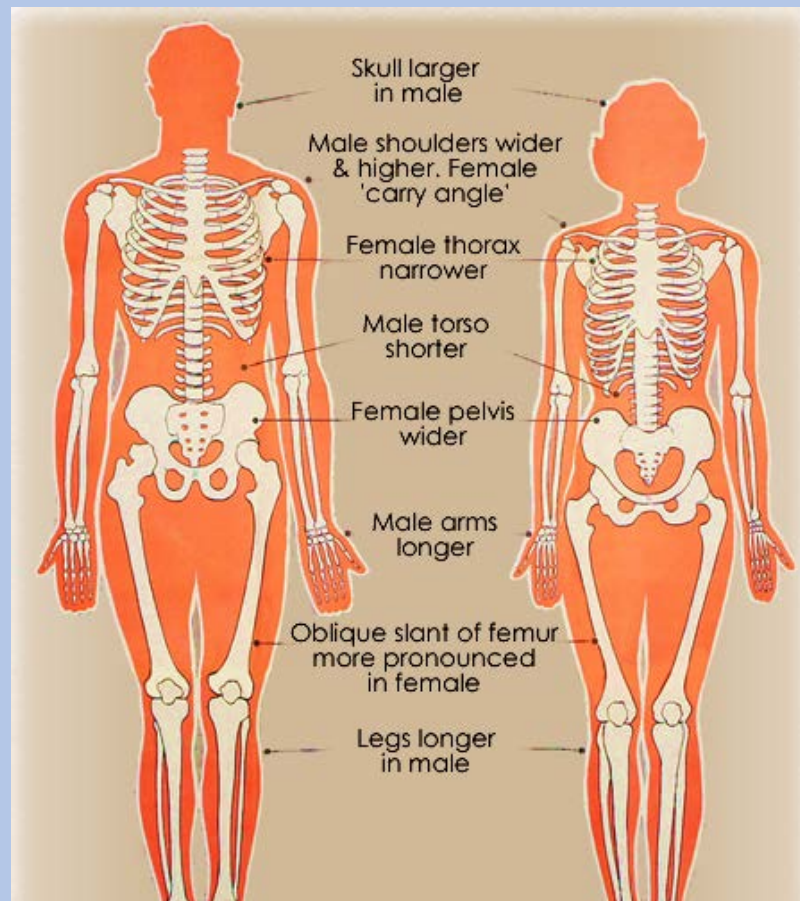
- RAF Centre of Aviation medicine wanted to ascertain the lived experience of our female aircrew:
 - Tri-service representation
 - 5 focus groups
 - 16 self selected female aircrew
 - Full range of platforms and level of experience represented
- Aircrew provided with broad topics including, equipment, clothing, female health, mitigations and reporting.

Female Aircrew Fora, October 2021

- Female aircrew emphasised a desire for parity with male colleagues.
- Equipment and clothing highlighted as a **significant** concern.
- Common perspective that design of **aircrew equipment assemblies** do not appear to consider sex differences and how this will affect function, comfort, utility and safety.
- **In-flight urination** and availability for dignified and sanitary toileting to mitigate against second order risk of dehydration was felt to be deficient.
- **Female health** and performance, was discussed. Greater emphasis at medicals was invited by aircrew.

So, does one size fit all?

- Men and women are different.
- Gender differences – sexual dimorphism



Does One-shape fits all?

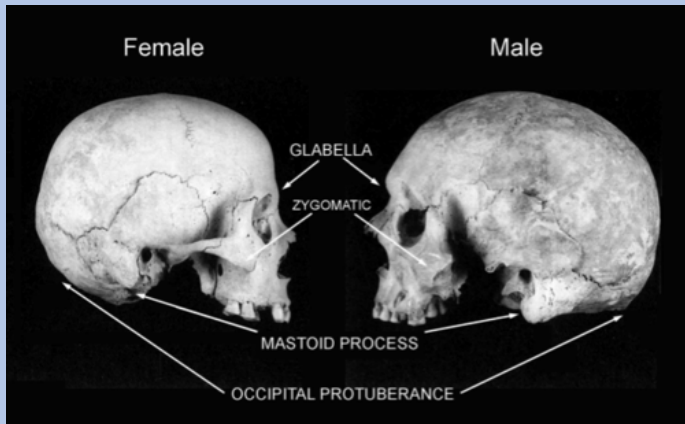
- Equipment has to fit well, to perform the desired safety function/protection.
- Equipment needs to be comfortable to encourage appropriate use.
- Anthropometrics, ergonomics and design are key....
 - Women are not 'small men' , and therefore we should not expect equipment designed for men, to necessarily be adequate for female aircrew.

Aircrew Equipment Assembly

- Aircrew forum highlighted the following specific concerns in relation to aircrew equipment:

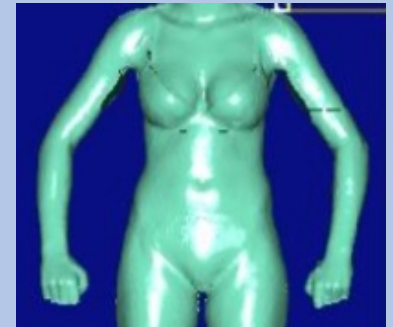
Helmet and mask Design

	Male	Female
Skull size	Larger (10% greater capacity)	smaller
Forehead Shape	sloping	vertical
Depth of jaw and facial bones	Greater	Smaller
Prominence for muscular insertions	Greater	Smaller/ smoother



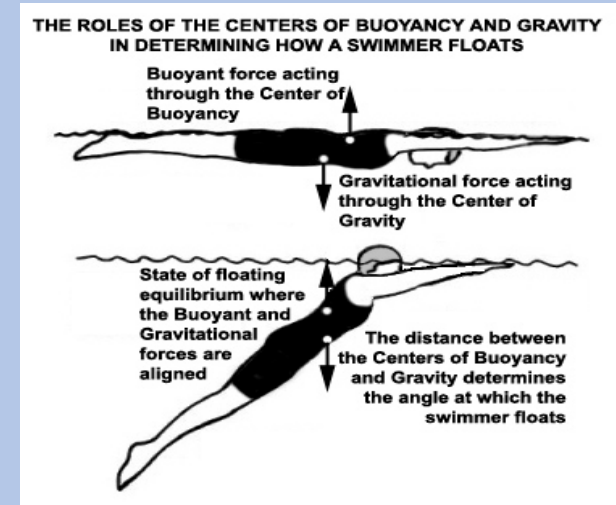
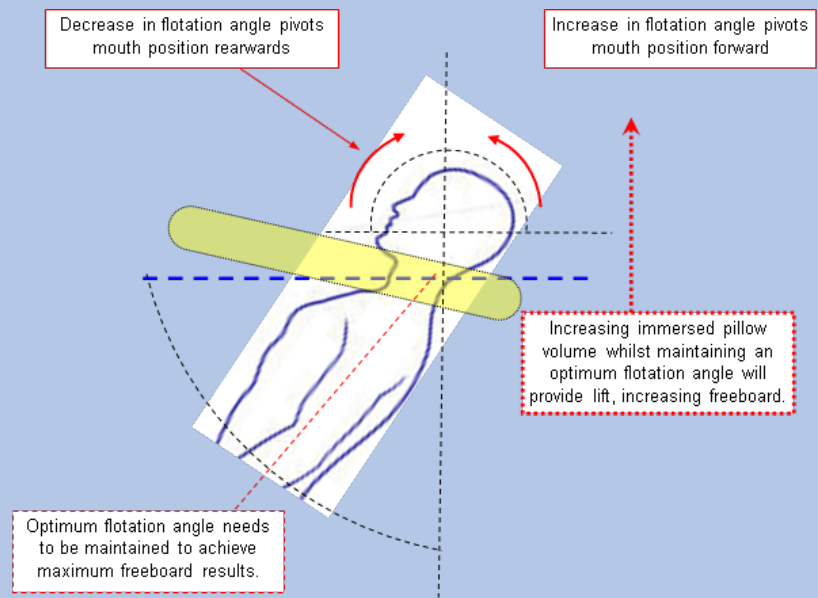
Body Armour design

- Consideration of chest contour and breast tissue
- Chest: waist ratio
- Load carrying capacity



Life preserver design and flotation characteristics

- Chest: waist ratio
- Centre of Gravity and Centre of Buoyancy
- Fat distribution, bone density



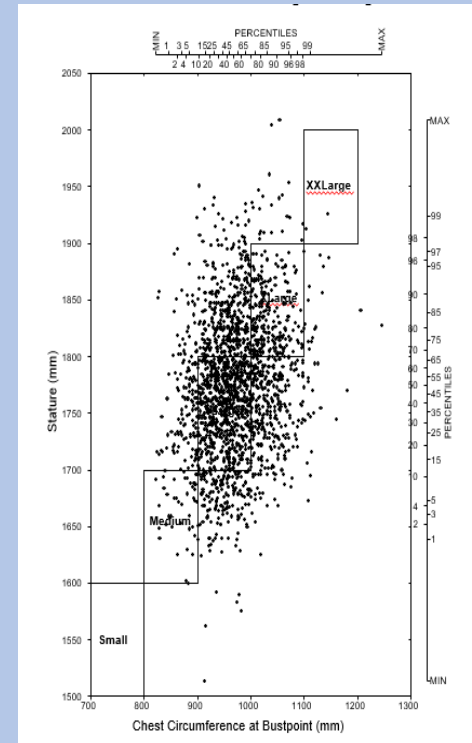


Relevance to Anti-G apparel

- Good fit required to acquire protection against sustained +Gz acceleration.
- Consideration of body form differences
 - Hip: waist ratios

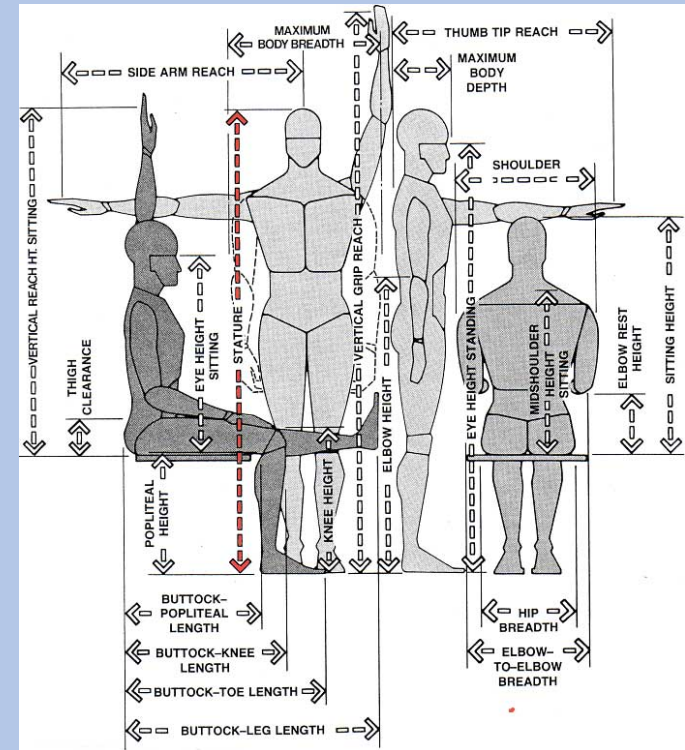
Other concerns?

- Flying clothing
 - One piece Vs two piece?
 - Liaising with manufacturers on:
 - Size range
 - Shape /pattern adjustment
- Pregnancy clothing



Anthropometrics

- Vehicle and workstation design
- Recruitment Standards
- Equipment design
- Role fit, size ranges





Anthropometrics and future research

- Whole body scanning
- Capture of 3D body shape, multiple cameras, data points
- Updating legacy anthropometry studies
- Supporting ergonomic design & procurement for all
- Evidence for other parameters and standards.

Conclusions

- Although numbers of female aircrew still remain low in UK military, appropriate PPE is a requirement for this cohort.
- Appropriate, means correct fit and function.
- It is essential to recognise and design for the differences between sexes in future, to enable parity and performance optimisation for all.

Menses to the Menopause Panel

Conclusions:

- Female specific considerations are relevant to aerospace medicine.
- No stigma or taboo topics can exist in our consulting rooms or centres for aerospace medicine.
- We must understand the interplay of sex-specific factors within our platform types.
- We must advocate for change where needed.

- **Failure to identify and remove gender data gap risks the health, safety and performance of female aircrew.**

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