



A Quaint and Archaic Practice: The Age-Based Exclusion of Perfectly Healthy Pilots

An antipodean philosophy at odds with '*tradition*'

Dr Dougal Watson
Principal Medical Officer
Civil Aviation Authority
Wellington, New Zealand

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A fine halo of antiquity

A theme herein

A fine halo of antiquity

THE LANCET, DECEMBER 14, 1918.

Observations

ON

THE MEDICAL EXAMINATION OF AVIATION CANDIDATES.

By G. A. SUTHERLAND, M.D. EDIN., F.R.C.P. LOND.,
LATE MEMBER OF THE SPECIAL MEDICAL BOARD, ROYAL FLYING CORPS.

INTRODUCTORY.

THE aim of the special medical examination is to select from amongst civilians, cadets, and officers those who are constitutionally fit, or who appear to be fit, for flying duties. In order to arrive at correct decisions fitness for his work is also necessary in the examiner. Unfitness on his part may lead to two undesirable results: first, candidates who are physically fit may be rejected; and, secondly, candidates who are physically unfit may be passed. There is no doubt that in the past the flying services suffered from both of these results.

It has been assumed too readily, and not by the lay public only, that it was an easy enough thing to decide as to a man's fitness for any duty. Experience in the flying service has shown that it is by no means easy to do so as regards flying work. It is impossible to estimate how many physically fit men have been rejected for the flying service. The decision depended on the examiner's skill and experience, and on the standards he had been taught or had laid down for him. Too often these were cast-iron standards, with a fine halo of antiquity about them, but quite unsuited for present-day purposes. The employment of the same standards led to the admission of men unfit for the flying service. These results are more serious in this service than in the case of the older services, because a flying man's training is a particularly expensive one, and when he fails or breaks down it usually means that his days are over for ever.

The Scope of the Examination.

There are certain things that the examiner must bear in mind. It is not the case that flying duties require qualifications other than those called for by the demands of sport and mountaineering and in many other sports. If, for instance, we take the case of a man who has been captain of his football team, and who is a first-class cricketer, in the class-room we require no special tests to estimate his physical fitness. At the other extreme we have the civilian man, who is born and town-bred, whose practical experience of flying has consisted in looking on at football matches, and whose working hours have been passed in an office, and his leisure hours in the streets or a music-hall. Merely by inspection one can decide at once that he is quite unfitted for flying work. Between these two extremes there is a large intermediate class requiring careful medical examination.

The examiner should also know that the diseases and disorders of flying men are not different from those met with in the civilian population. The contrast between the two lies in this, that the causes of flying disabilities are not present in ordinary life. The results are the same in both cases. Thus air-sickness bears a very close resemblance to sea-sickness. The man who gets sea-sick when the vessel leaves port on a calm day gets very much worse when the ship is storm-tossed. The pilot who gets sick at straight flying gets very much worse when the plane is buffeted about by pockets of wind or when stunting is indulged in.

While it is extremely desirable that the examiner should know how the causes of flying disorders will affect the candidate before him that knowledge is not yet forthcoming. It is asking too much of the examiner at the present stage of flying to expect him to recognize the proper flying temperament or any inherent tendency to develop disabilities in the air. What he should concentrate on is the selection of those only who are physically and mentally fit. The rest is guess-work.

Special Tests.

Attempts have been made both in this country and in America to standardise the examination by means of fixed tests. Some would allow the tests, or even a single test, to

dominate and decide the examination. So far, however, no tests have been found which can be accepted as reliable, and most of them require much more testing, especially by experience, before they can be accepted as definite standards.

One must remember how fallacious tests have proved in the past. A systolic murmur heard at the apex was for long considered an infallible test of heart disease and disability. Its presence has led to the rejection of countless fit men for army and navy service. It was only after long experience and bitter controversy that this test was recognised to be of no value in deciding as to the condition of a man's heart. It was useful in calling for a careful examination of the heart, of the significance of the murmur, and of the presence or absence of any associated cardiac lesion or functional disability. This is the value of all special tests, that they direct one's attention to certain organs or functions which require specially careful examination. For this purpose they are to be welcomed and used as finger-posts, but not to be regarded as impassable barriers.

Guiding Principles.

Instead of endeavouring to standardise the tests I think that an attempt might be made to standardise the examiners. If certain guiding principles were drawn up and accepted the carrying out of these principles would bring all the examiners into line. If the examiners viewed the medical problems involved from the same standpoint the results of the examination would tend to be uniform.

In the following pages certain broad principles are suggested, as the result of my experience, which may serve as a guide to the medical examiner who is beginning this work. The examiner does not start with an aptitude for assessing the fitness of a candidate for air duties. It has been my experience and that of most trained examiners I have talked to, that a somewhat long and arduous apprenticeship has been necessary before a decision can be given with confidence. That has been partly due to the fact that we had no guiding principles, and that the problems set were entirely new.

Too often these were cast-iron standards, with a fine halo of antiquity about them, but quite unsuited for present day purposes.

the new tests. His judgment to be over-ruled because of some test, with an authoritative name attached, or because of some scientific toy which is said to be an automatic pilot-finder. He is perfectly entitled to demand some definite proof of the validity of all such tests, and some more evidence of their value than that of the name behind them, or the fact that they are said to be amongst the latest scientific discoveries.

Essential Qualifications for Air Service.

The examiner must consider what are the special duties and dangers which will be experienced in a flying career. A pilot will have to carry out his duties in a new element, or at least in one which varies much in its composition from the stable atmosphere he has been accustomed to live and work in. He will have to acquire the complete control of a car moving through space in such a way that all his controlling movements become as automatic and unconscious as those of an expert bicycle-rider. He has, further, to be prepared for active fighting in the air, the attacking of enemy air-craft, and the protection of his own aeroplane and of his own life. No small requirements these.

From the medical standpoint I consider that there are certain necessary qualifications to meet these conditions successfully, or at least with the prospect of success. The first is a good physique; then comes a sound cardio-vascular system; and, lastly, a strong and stable nervous system. These are the essential qualifications required to meet the special conditions of the air service, on the principle that where the strain falls the resisting power must be strong.

AA

1918 Lancet, Dr G A Sutherland, on contemporary aviation medical standards:

Of course that was a century ago and such sentiments have no relevance to modern aviation medical standards. Of course!

"A persistent dilatation of the pupils with an excitable manner is regarded as suspicious of undue nervous excitability."



Dr Dougal Watson

- 30+ years of full-time aviation medical practice
- Principal Medical Officer with New Zealand CAA since 2001
 - Involved in the major revision of our civil aviation medical legislation
- Prior to that a military aviation medical practitioner with the Royal Australian Air Force
 - Operational Capabilities; RDT&E; Training; and ‘Regulatory’
- Pilot with a very diverse portfolio of aviation experience
 - Not so much recently
- Advocate for evidence-based and risk management approaches to aeromedical decision making: Show me the evidence
- Linguistically challenged & politically inept



Caveats & Disclaimers

- The views herein are the author's & not necessarily those of either the New Zealand government.
- In New Zealand it is against the law to discriminate based on age.
- The author:
 - is an aging pilot!
 - is an advocate ... for aviation safety and for fair and reasonable evidence-based aeromedical decision making
 - works for the government and so has no finances or financial interests to declare



The Quaint & Archaic Practice of Age-Based Exclusion

A VERY BRIEF HISTORY

One Night in Bangkok 2005

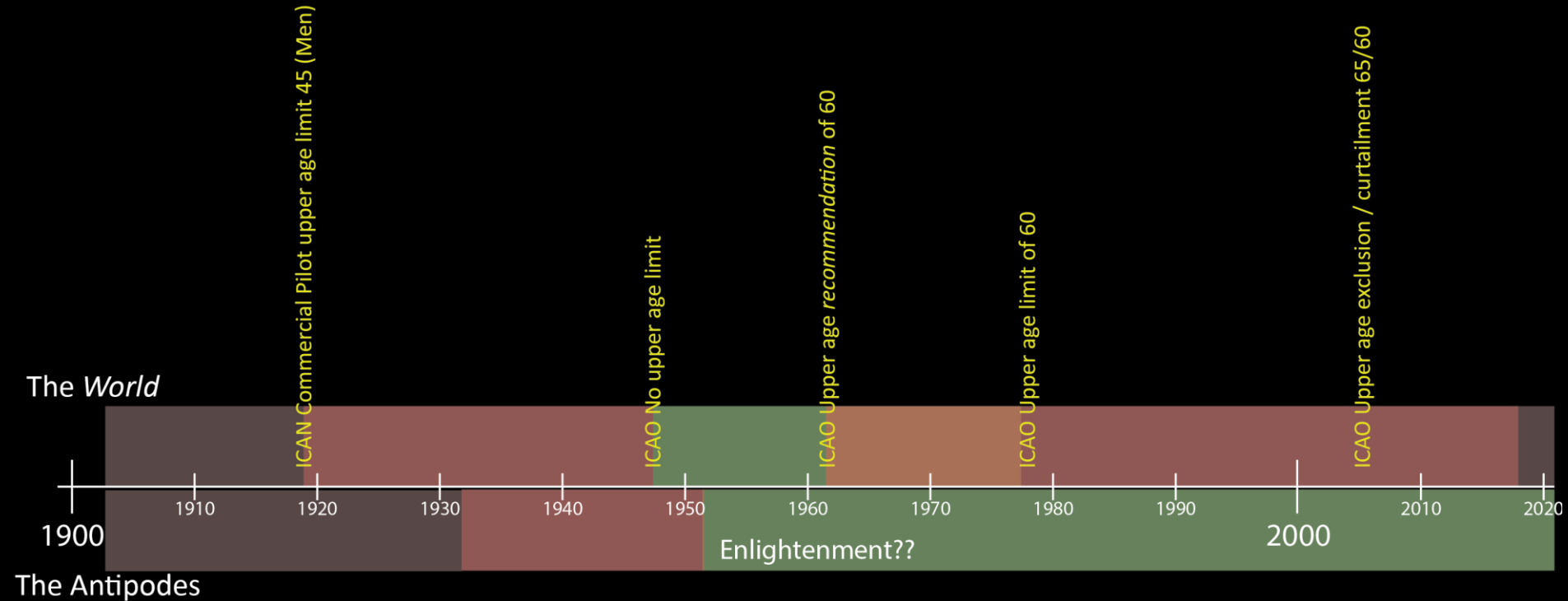
- “Is cardiovascular disease already over-regulated?”

Tony Evans, ICAO regional seminar.

- “No! It’s just not being regulated in an optimal, evidence-based, manner.”

Dougal Watson, then, and at every available opportunity since.

Timeline



Pre-JAR: “NZ is presently one of only seven ICAO signatory states that do not have an upper age limit for pilots. Those countries are Australia, Austria, Brazil, Canada, Costa Rica, Ukraine, and New Zealand.”

Enlightenment?



"I disapprove of what you say,
but I will defend to the death
your right to say it"

E B Hall 1906

A 'common sense' crusade against superstition and prejudice, in favour of toleration.

Je me battrai jusqu'à ma mort pour que vous puissiez citer erronément Voltaire.



The Quaint & Archaic Practice of Age-Based Exclusion

ANTIPODEAN APPROACH

Scope of Regulatory Medical Assessment

In general, the NZ medical assessment considers applicants in the context of:

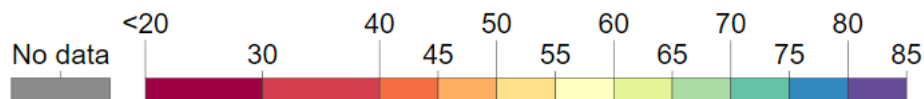
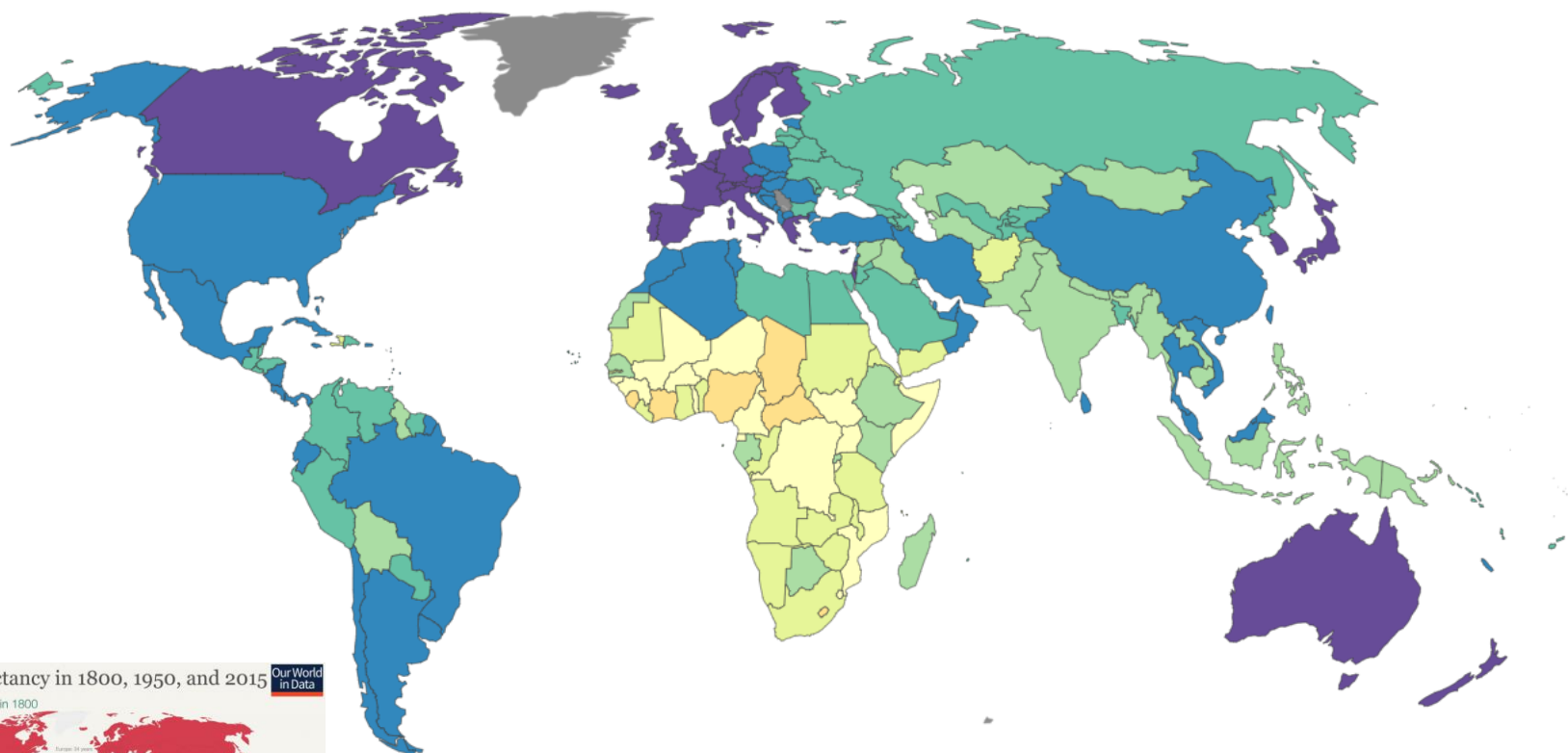
- Functional Capacity;
 - Incapacitation Risk; and
 - Unsafe Behaviour*.
- If we know that someone is fit for the task they should not be precluded from the task

* Often very difficult but, we believe, entirely legitimate and appropriate

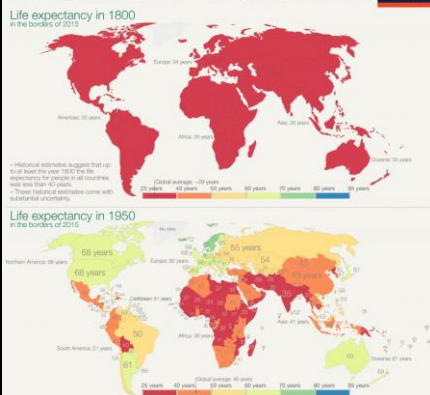
Life expectancy, 2015

Shown is period life expectancy at birth. This corresponds to an estimate of the average number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life

Our World
in Data

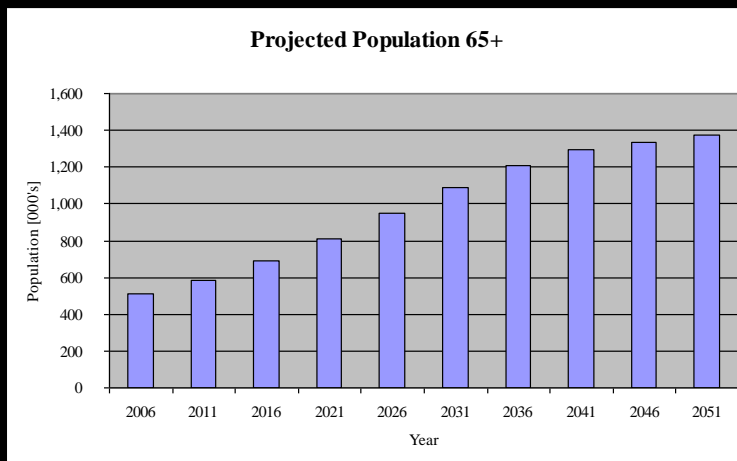
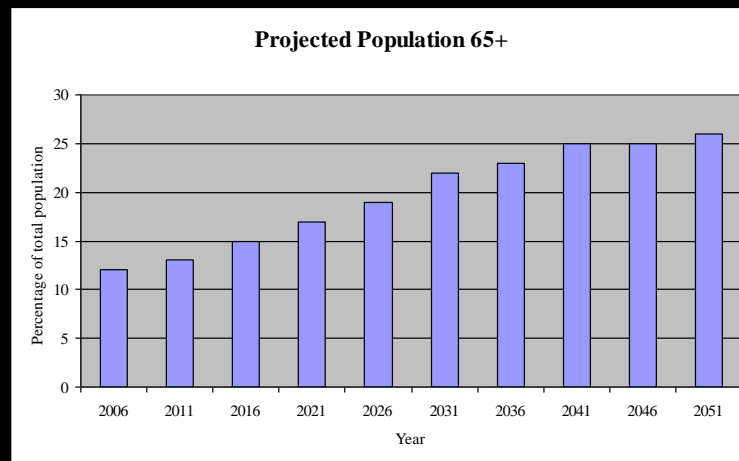
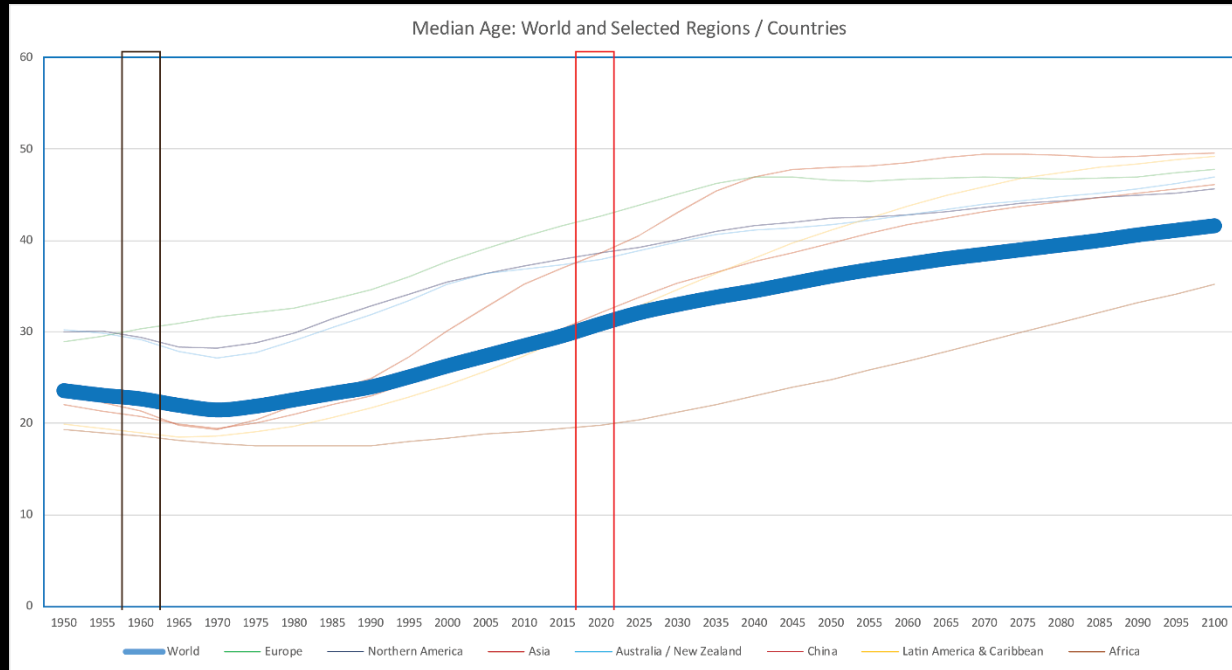


Life expectancy in 1800, 1950, and 2015



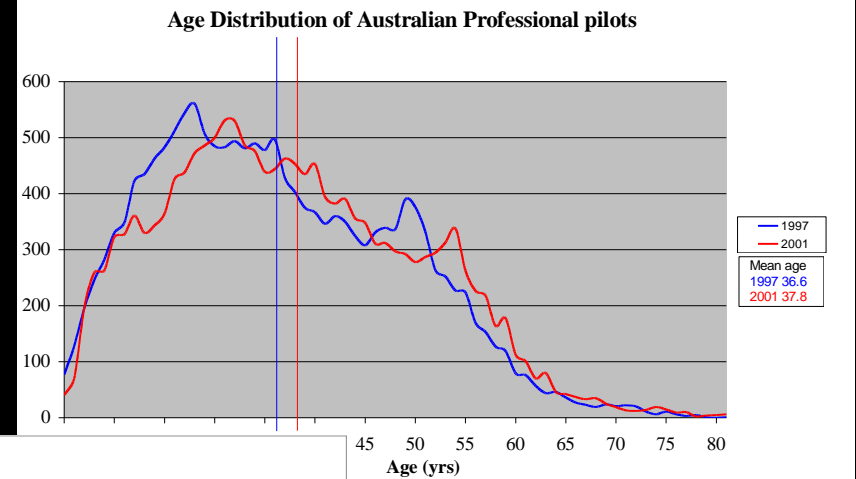
Global Averages: 29 in 1800, 46 in 1950, & 71 in 2015

Our population is aging

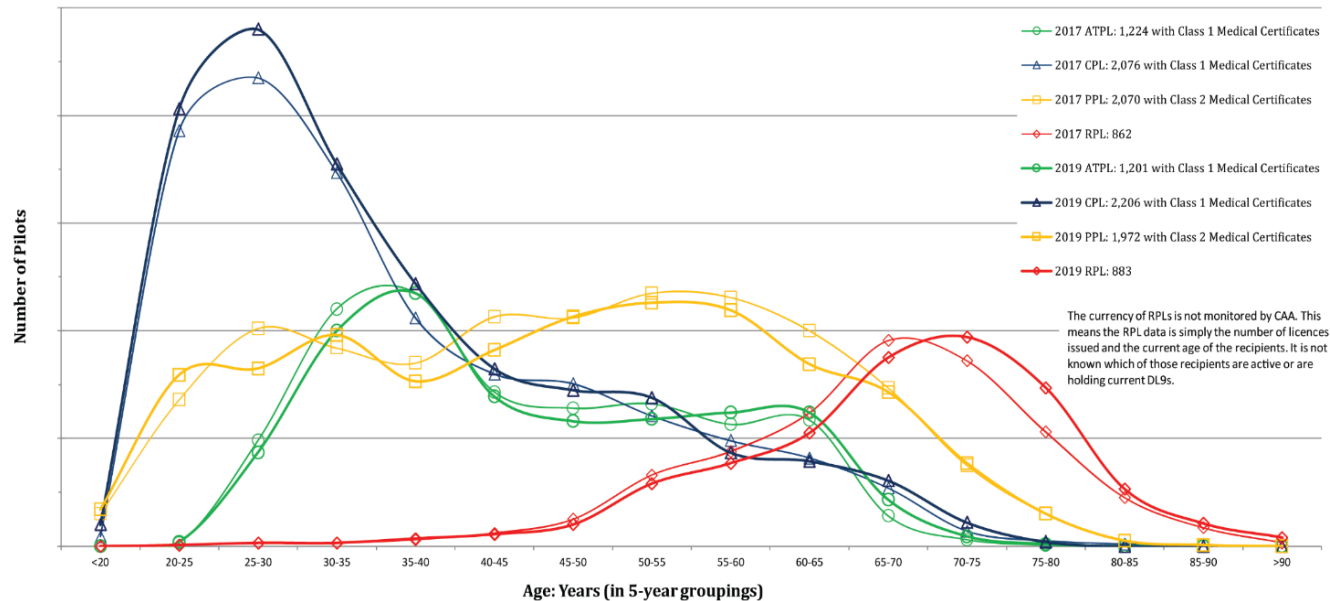


Older and healthier than ever before

Our pilots are aging

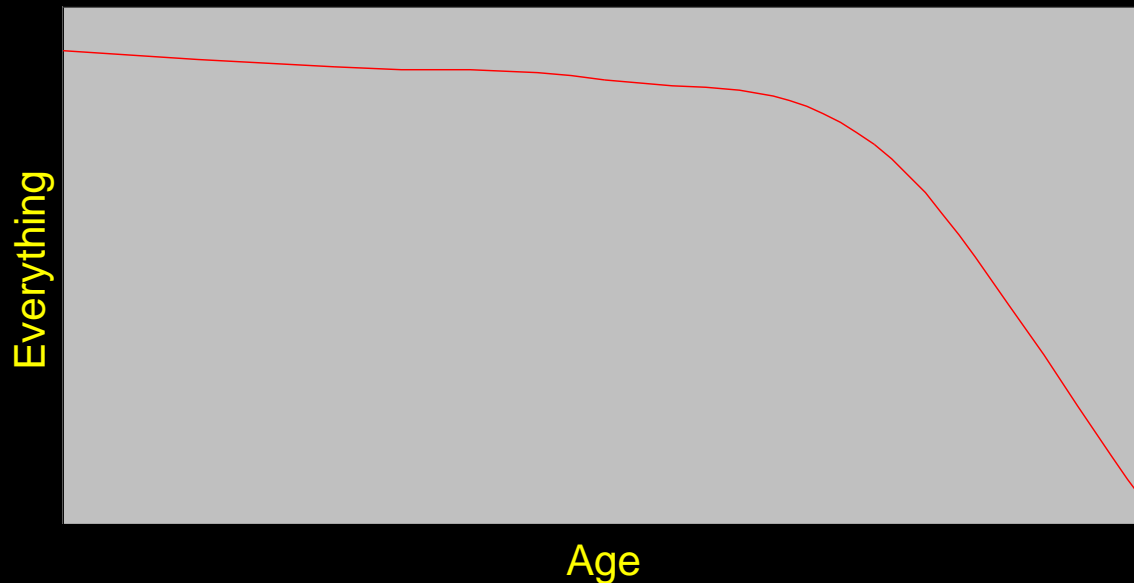


Age Distribution of NZ Pilots: 2017 and 2019



... individually and en masse

Is age a regulatory medical concern?



- Age-linked:
 - Increase in medical incapacitation risk: e.g. myocardial infarction, stroke, etc.
 - Reduction in physical performance
 - Reduction in neuro-cognitive performance



The ‘traditional’ approach

Most countries ... in some form or another*

- Establish an upper age limit, above which privileges are removed or curtailed ... an arbitrary statutory age limit
- Increase examination / assessment frequency with age
- Shift the arbitrary upper age limit and assessment frequency as driving forces dictate

* 7 ICAO states *currently* do not have an upper age limit (Australia, Austria, Brazil, Canada, Costa Rica, Ukraine, New Zealand).

An Enlightened Approach

- No legislated upper age limit*
- Recognise age as an independent risk factor for many *medical* conditions
- Risk assessment of *all* pilots ... using the best tools reasonably available
 - Establish risk criteria
 - Medical incapacitation risk
 - Cardiovascular and Cerebrovascular
 - Neurological – seizures, syncope, migraine etc
 - Mental Health – AOD, depression etc
 - Functional capacity: Neurocognitive and Physical function
 - Periodic clinical and operational evaluation
- Modify risk assessment tools and their application as evidence indicates

* Appropriate differences filed against Annex 1 of the Chicago Convention

Age-based Exclusion: Why?

- Then -
 - Post WW2 (mostly male) pilots, working in airlines, started having accidents due to cardiac causes.
 - Cardiovascular risk assessment in its infancy – age and male gender known.
 - Economics and politics.
 - USA implemented legislation to exclude pilots based on age, and the world followed. Male gender was not excluded.
- Now -
 - It's how we do things around here.
 - Cardiovascular risk.
 - Subtle cognitive decline.
 - Graceful retirement!!
 - Cannot justify, but it's hard to change.
 - Alternatives are not easy ... and not 100% reliable.

What we do

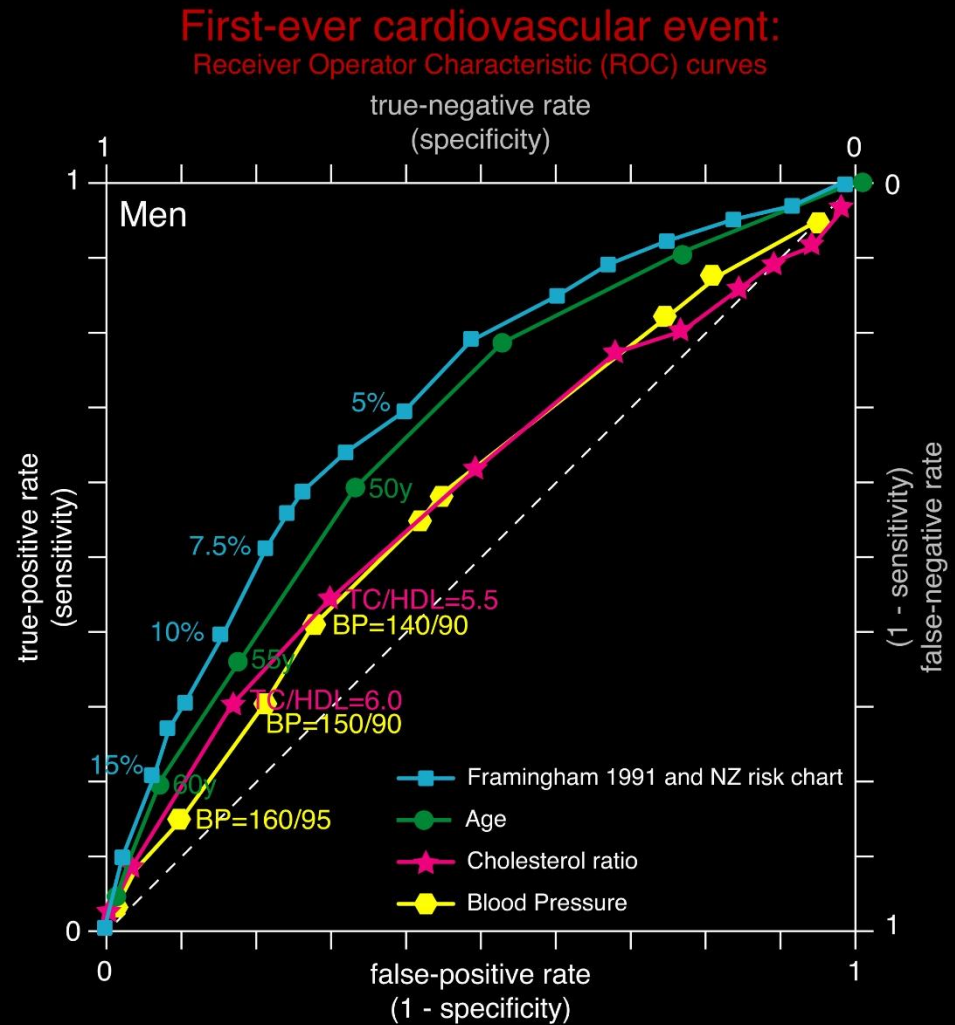
- No statutory upper age limit
- Strong statutory reporting obligations & protections
- Applicant history, history, history
 - The most powerful medical assessment tool is a correct and accurate medical history
- Low threshold for obtaining ‘GP notes’
- Structured cardiovascular risk assessment from 35yoa
 - Further investigation of *high-risk* applicants
 - Best available tool ... based on evidence
- Individual case-by-case assessment
- Follow-up on concerns raised by community or medical practitioners

What we do: CVS risk

- History, history, history.
- Structured screening of asymptomatic individuals
 - Sometimes controversial and a lot of effort is sometimes put into derailing this approach
 - Not relevant to our population
 - You cannot take action against an individual based on population data
 - Statistical mumbo-jumbo
 - A lot of experience
 - Screening is a method of identifying a high risk sub-group from within a wider population
 - We then focus other tools on individuals within that high-risk group to determine which individuals actually have a high risk and which do not
 - Medical standards (legislation) accommodate, actually require, this
- Examination and investigation by Medical Examiner
- Reports from the community

CVS risk assessment: NZ in 2003

- Framingham (USA) data was a better risk predictor than age-alone ... for the NZ population
- Much, much better risk assessment tools now
 - More accurately identifying high-risk applicant
 - Less follow-on investigation required
- Use the best tools available, do not ignore an issue because your tools are imperfect



What we do: Cerebrovascular

- History, history, history: ‘fainting’, especially new fainting
- Consider cerebrovascular risk to be roughly analogous to cardiovascular risk
- Examination and investigation by Medical Examiner
- Frequent reports from the community
- Future incapacitation risk is usually the primary concern ... not reduced functional capacity

What we do: Cognitive

- Frequent reports from the community
- History, history, history
 - We do not employ a structured screening tool to all applicants (e.g. Australia uses a mini-MOCA)
 - We do have a ‘Golden Oldie’ form, for >70 yoa pilots but it is of very limited utility
- Low threshold for obtaining ‘GP notes’
- Examination and investigation by Medical Examiner
- Individual case work-up: neuropsych assessment and operational assessment

What we do: Mental Health



- Frequent reports from the community
- History, history, history
 - MEs often raise red-flags from their history taking
- Examination and investigation by Medical Examiner
- Low threshold for obtaining ‘GP notes’
- Individual case work-up: Not all practitioners are equal

What we do: Mental Health



- Frequent reports from the community
- History, history, history
 - MEs often raise red-flags from their history taking
- Examination and investigation by Medical Examiner
- Low threshold for obtaining ‘GP notes’
- Individual case work-up: Not all practitioners are equal
- Great difficulty with behavioural and borderline mental health issues where a formal mental health diagnosis is unlikely to be made

What we do: Pros

- General approach and wording of our legislation
 - s27C for almost 20 years now
 - Risk assessment an integral element of medical standards
- Sits well with Human Rights commitments
 - Defensible, but occasionally challenged
- Sits well with evidence-based medical practice
- Sits well with pilot representative groups
- Provides a structured basis for further debate:
 - Risk thresholds allow for contextual discussion
 - Less eminence-based and more evidence-based
- Cardiovascular / cerebrovascular risk assessment is very good

What we do: Cons

- Administratively intensive compared with age-based exclusion:
 - Regulator: Careful medical history, ME knowledge, & follow-up on red-flags
 - Operators: Management and deployment of personnel (retraining)
- “I feel fine doc” No ‘graceful’ retirement.
- Requires flexibility to accommodate changes in medical knowledge ... and expertise to recognize true change from interest group advocacy. That costs.
- Single-pilot passenger operations
- Cognitive decline very difficult
 - Interplay between medical and operational assessment
 - Valid assessment endpoints and thresholds lacking
- Behavioural issues very, very difficult
 - We had a cockpit-door in-flight incident before *GermanWings*

Some general ‘Pros’ and ‘Cons’

‘Traditional’ approach

- Some arguments in favour:
 - Administrative simplicity & cost
 - It ain’t broke so don’t fix it
 - Psychological considerations ... clear endpoint
 - Socio-economical consideration ... retirement planning
 - Operational considerations ... recruiting and training new pilots
- Some arguments against:
 - *Unfair* on some of the older pilots
 - Not focussed on safety
 - No one age fits all

Enlightened approach

- Some arguments in favour:
 - Appropriately focuses attention on the safety issues (risk) and not age in isolation
 - Allows *well-maintained* older pilots to continue to operate
 - Helps maintain experience base within industry
- Some arguments against:
 - Administrative burden
 - Expense
 - Can be complicated and difficult to apply
 - Risk assessment tools imperfect ... and “do not apply to pilots”
 - Interferes with ‘graceful retirement’



The Quaint & Archaic Practice of Age-Based Exclusion

CONCLUSIONS

Conclusion

- The use of age-based exclusion criteria is administratively easier than most alternatives
- In many countries it is against the law to discriminate based on age (usually with some exempted special circumstances)
- Age is no longer a valid proxy for cardiovascular risk or cognitive function decline (etc)
 - Powerful CVS-risk screening and quantification tools exist
 - Powerful, if imperfect, operational and clinical functional capacity assessment tools exist
- It is difficult to envisage the continuation of age-based exclusion of pilots surviving a rigorous challenge
- ICAO follows, but we need to lead

Concluding Conclusion

- Age-based exclusion criteria:
 - Cast-iron standards (Annex 1)
 - Fine halo of antiquity (Since 1962)
 - Unsuitable for present-day purposes
 - A person of a certain-age is a very different demographic today when compared to the same age 60 years ago
 - Age discrimination is illegal in many countries
 - Increasing age is not a notable independent risk factor for aviation mishaps
 - Risk factor analysis for age-linked medical problems
 - Operational and other functional testing for age-linked cognitive / functional changes
 - We need those pilots



Aviation age-based exclusion paradigms
took their genesis early last century ...
and they should be left there

Thoughts and questions?

“Human beings, who are almost unique in having the ability to learn from the experience of others, are also remarkable for their apparent disinclination to do so.”

Douglas Adams

Did I forget something?



