

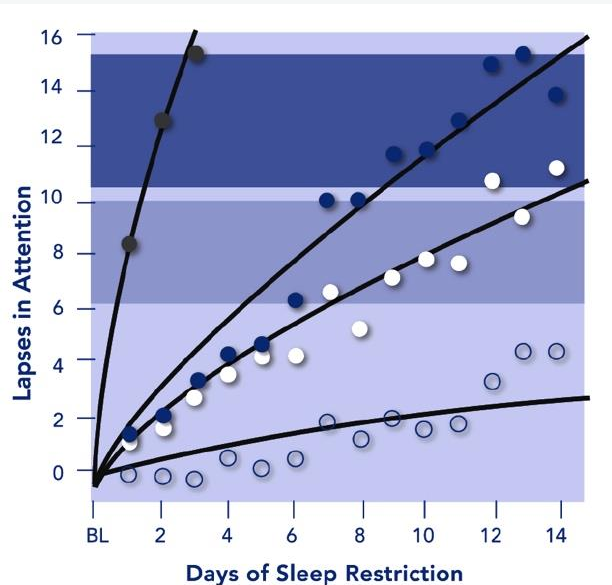
“We Need a Fatigue Risk Management Program. How Are We Going to Do That?”

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Alertness impairment accumulate with Sleep Debt



ABOVE FIGURE:

Lapses in attention across 14 days of chronic sleep restriction (8h ○, 6h ○, 4h ●, and 0h ●) sleep per day. The mean \pm s.e. of PVT lapses for 1 and 2 days of total sleep deprivation are shown as light and dark gray bands, respectively —see Van Dongen, et al. 2003 for more details.

Chronic sleep restriction

One week of chronic sleep restriction of 6 hours or less per night equates to 1 full night of total sleep loss.

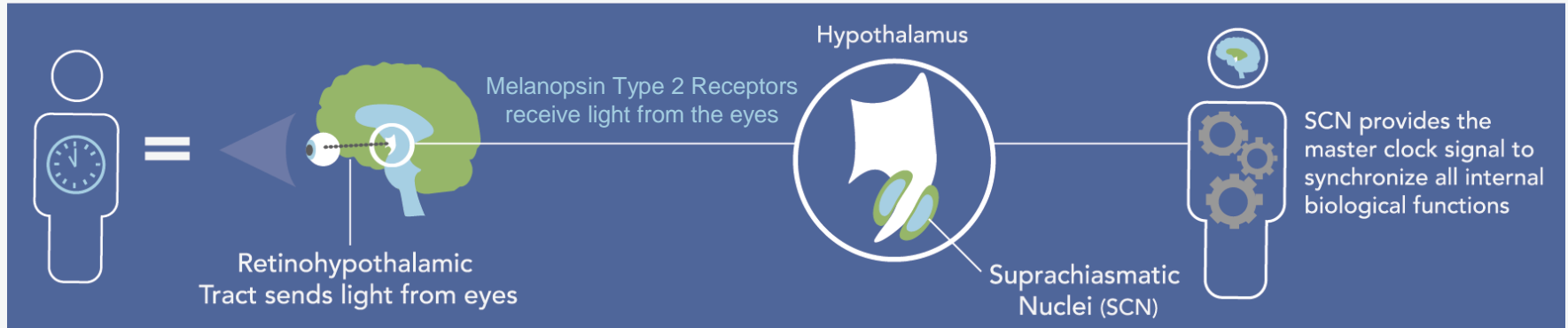
Two weeks of chronic sleep restriction of 6 hours or less per night equates to 2 full nights of total sleep loss.



This means that even relatively moderate sleep restriction seriously impairs function in healthy adults. Studies show that people are largely unaware of increased deficits and this may be why the impact of sleep restriction is often assumed to be benign.

Van Dongen, et al. The Cumulative Cost of Additional Wakefulness: Dose-Response Effects on Neurobehavioral Functions and Sleep Physiology From Chronic Sleep Restriction and Total Sleep Deprivation. *Sleep*, Vol. 26, No 2, pages 117-126. 2003.

Light exposure synchronizes circadian rhythm



- Special receptors in eye (not rods or cones) to sense light intensity patterns called melanopsin-expressing intrinsically photosensitive retinal ganglion cells (ipRGCs)
- Light impact largest around WOCL
- Internal clock does not shift (minimal) for short trips



The “How”

Fatigue Risk Mitigation System (FRMS) *Pre-Requisites*

- 70% of our flying is International, mostly to the Middle East, Africa, and the Indian sub-continent.
- Clients have a pattern of sleeping enroute, spending the day at meetings, then departing that same evening for the next destination.

The “How”

Fatigue Risk Mitigation System (FRMS) *Requirements*



The “How”

Fatigue Risk Mitigation System (FRMS) *Dependencies*



The “How”

Fatigue Risk Mitigation System (FRMS) *Dependencies*



- Assess initial fatigue risk
- Ensure adequate sleep opportunities
- Identify any impacts to sleep opportunities (hotel construction, longer drive times, calls/emails)
- Capture impacts and mitigate on future trips

The “How”

Fatigue Risk Mitigation System (FRMS) *Dependencies*



- Develop personal fatigue risk mitigation plan
- Maximum advantage of rest opportunities
- Liaise with scheduling to address any mid-trip impacts
- Evaluate personal plan during and post trip. Capture lessons learned. Adjust personal plan for next trip



The “How”

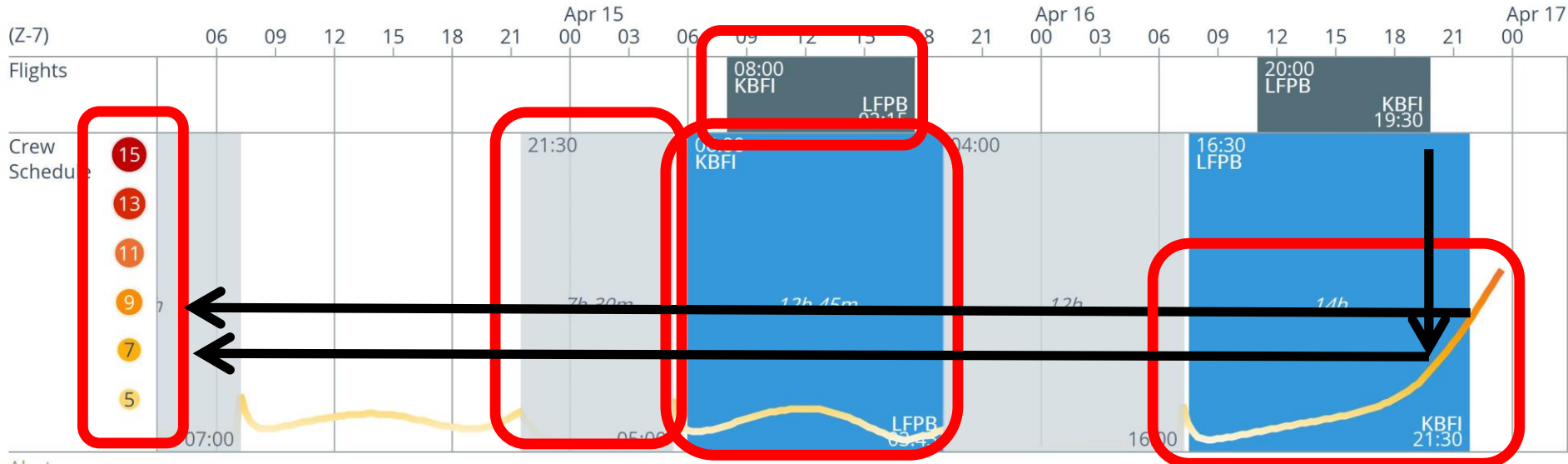
Fatigue Risk Mitigation System (FRMS) *Resources*



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Flight ↕ Duty ↕ Sleep ↕

Save Close ⚙️





Flight Duty Sleep

Save Close





The “How”

Psychomotor Vigilance Test (PVT)

- Assesses level of alertness
- Vigilant attention and reaction time? Relate to urgent reaction events:
 - Go-Around, Windshear, TCAS Resolution Advisory (RA)
- Effective! Not dependent on:
 - Language
 - Practice
 - Aptitude (I.Q.)

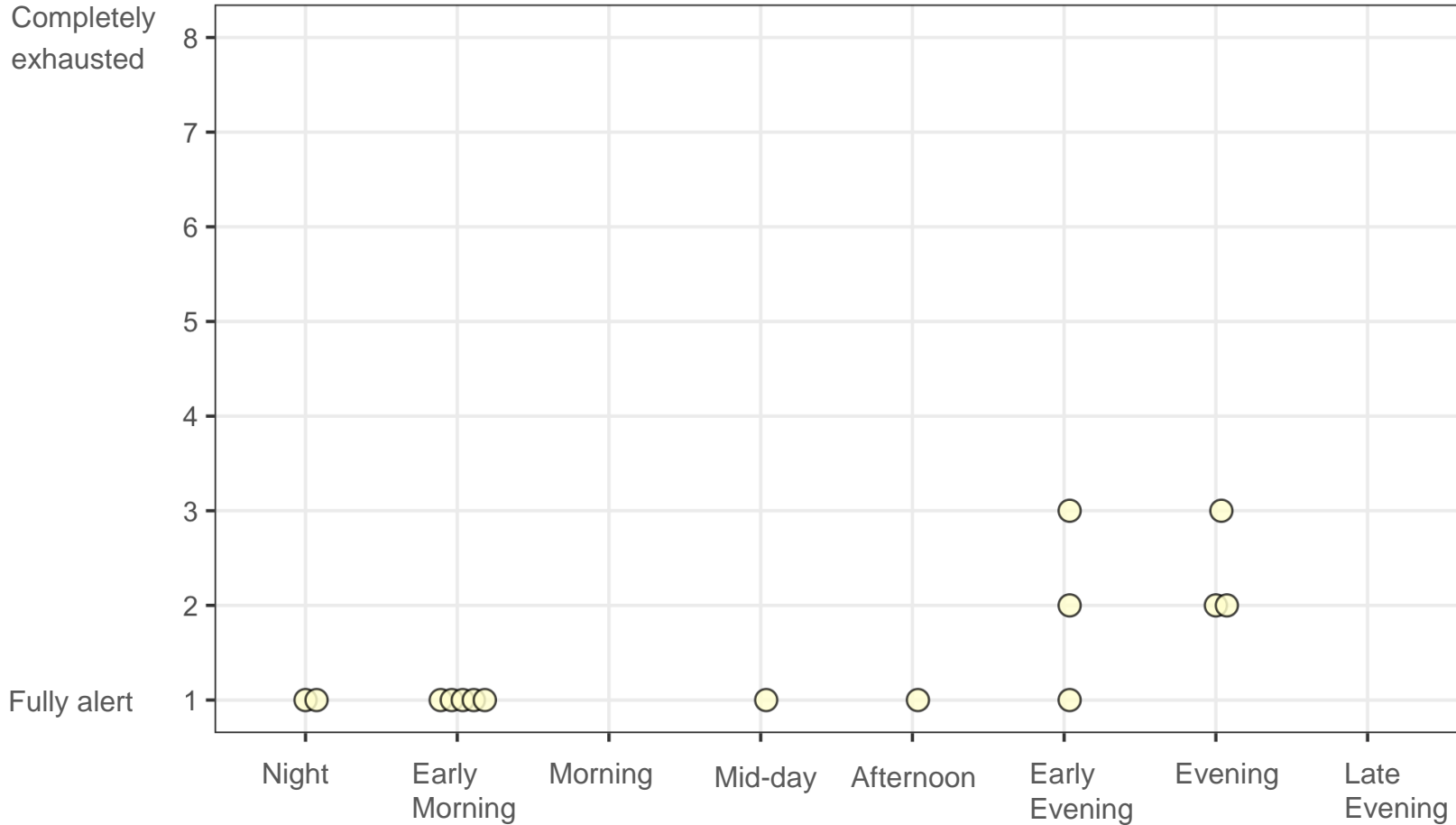
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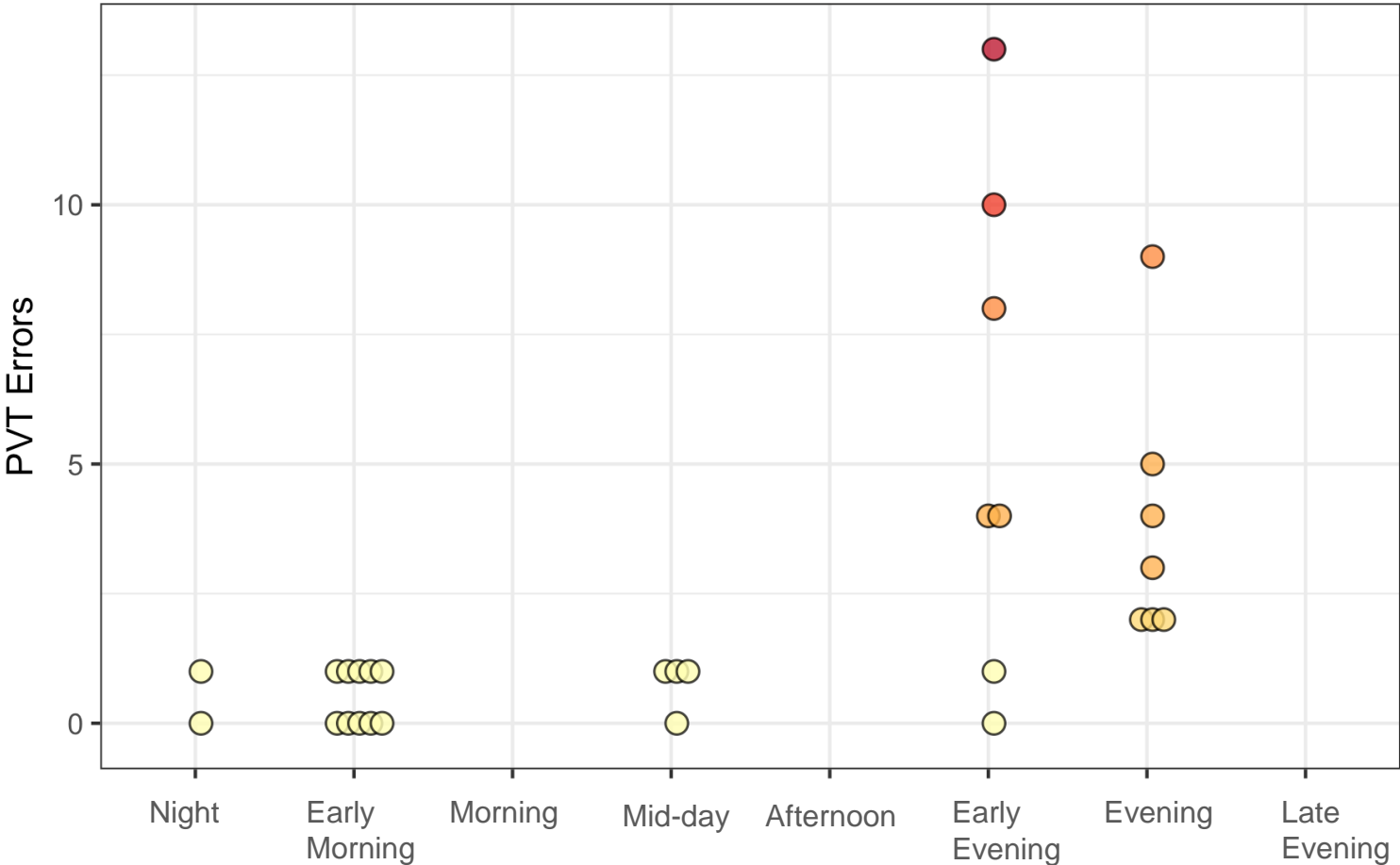
“Pilot Project”

- Fatigue Meter to ensure adequate rest opportunities
- Activity Monitor to assess Sleep Quality and Quantity
- Correlate Actual Rest with Planned Rest
- Sleep Diary
- PVT to compare Reported Alertness with Actual Alertness
 - Non-Flying Days with Flying Days
- Reported Pre-Flight, In-Flight, & Post-Flight Alertness with Actual

Samn Perelli Self-report score by Time of Day



PVT Errors by Time of Day





Take-Aways

Start Simply

- Likely require Cultural and Procedural change.

Refine

- As your comfort and success allow

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