航空器重大意外事件調查報告

ASC-AIR-00-12-002

中華民國89年5月8日
中華航空公司CI-681班機
AIRBUS A300-600R型機
國籍登記號碼B-18503
於中正機場飛胡志明市
經PARPA轉向KAPLI
機長於飛航中失能

中文

行政院飛航安全委員會
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摘要報告

中華航空公司CI681班機，編號B-18503，型機A300-600R，於八十九年五月八日台灣當地時間上午0746[註]自中正機場起飛，載運265位乘客飛往越南胡志明市。起飛後三十一分鐘，於平飛中副駕駛發現機長突然沒有反應，遂按失能程序處置並召喚座艙長入內及由另一位空服員協同將機長移至客艙（廚房）急救，並廣播請機上醫師協助施救。

副駕駛立即決定折返中正機場，並以自動駕駛操控安降中正機場五號左跑道，落地前曾於0816請求救護車及拖車待命。該機於0850落地，0852停妥於滑行道，該公司規定副駕駛不能滑行，需等待拖車拖往機坪。醫護人員待航機拖到機坪始登機急救，於0936將機長緊急送往桃園敏盛醫院，但急救無效，於1020時敏盛醫院宣告死亡。

該事件係飛航組員失能之重大意外事件，由行政院飛航安全委員會負責調查。飛安委員會當日接獲機長失能之通報後，即根據民航法第八十四條規定，立即派遣調查人員前往中正機場及中華航空公司進行調查，除訪談有關人員做成筆錄外，並取得機長航行包及該機之座艙語音記錄器，帶回飛安委員會進行後續工作。

飛安委員會對本次事故按『航空器失事及重大意外事件調查處理規則』成立專案調查小組，就組員失能之原因及事件突發應變等方向展開調查。經調查得出事故之可能肇因並提出改善建議如下：

調查結果

1. 該機長持有民航局核頒之合格體檢證及該機種之檢定證。且體檢證上無特殊限制，亦無缺點免記之紀錄。(1.5.1)
2. 按其體檢報告資料，以該員之體型、年齡、高血脂及吸煙習慣等紀錄，屬於潛在性冠心疾患者之高危險群。(1.13.3, 1.13.4)
3. 對體檢醫師建議事項，該機長無明顯改善之結果。（1.13.3）

註：本文所列時間均為台灣當地時間（台灣當地時間 = 國際時間 +8）

4. 缺乏該機長進入我國工作前之病歷。
5. 其履帶心電圖未顯示有心肌梗塞之徵候，按體檢作業辦法，航醫中心不繼續進行後續檢查。(1.13.5, 2.2.6)
6. 該機長之工作時間、飛行時間、休息時間均合乎民航法規之規定。前一、二日與此事故機長一起飛行之其他組員，未發現該機長在工作時有任何異狀。(1.5.2)
7. 該機長之隨身藥物不含任何毒物成分，也不含心臟治療藥物。(2.1.1)
8. 該機長之死因為心冠動脈狹窄阻塞死亡，自然死亡。(2.1.2)
9. 當次飛航任務是由副駕駛主飛並採用自動駕駛操控。當日天氣無特殊狀況。航機之適航情況正常。事故發生前，未有增加飛航組員工作量之情況，該機長之工作壓力應屬正常。(1.1, 1.6.2)
10. 副駕駛於機長失能後立即按公司失能作業程序處置，並以自動駕駛安降中正機場。惟事情突發時未使用標準緊急狀況術語通報。(1.1, 1.15.2, 1.15.6)
11. 機長失能後，空服員進入駕艙之組員合作良好，且持續給予該失能機長進行心肺復甦之急救。(1.15.3)
12. 機上醫師急救檢查機長已呈尿失禁、瞳孔放大及無心臟脈動情形。(1.15.3)
13. 中正國際航空站備有醫療救護人員及設備，與敏盛綜合醫院簽有醫療合作合約，且具急（重）病旅客通關作業程序，惟無醫療救護作業程序。(1.13)
14. 中正國際航空站「民用航空器失事處理作業實施要點」中規定應有之醫護組，係由與航站簽約之敏盛醫院機場門診部負責作業，惟未規範緊急事件時醫護組負責之職責及作業細節。(1.13, 2.3.10.1)
15. 台北區管中心航管人員未能瞭解該機副駕駛所報機長失能(Incapacitation)之訊息，而將乘客重病之錯誤消息傳給航站。該機副駕駛前後兩次向台北區管中心要求降落 05 左跑道，航管人員仍回以使用 06 跑道，顯示該員對航機駕駛員之訊息未能掌握並予確認，影響後續地面緊急應變作業。(1.15.6, 2.4.1, 2.4.5)
16. 航空站未即時調度較靠近使用跑道之停機坪，供緊急應變航機使用。(2.4.7)

17. 華航亞派中心人員未充分與該機副駕駛溝通及中正國際航空站有關人員密切聯繫，對副駕駛於空中請求拖車於跑道旁待命之訊息未善加應變爭取時效，致落地後航機於地面等待拖車有 9 分鐘(0852-0901)。 (1. 15. 6, 1. 15. 6. 1, 2. 4. 3, 2. 4. 4)
18. 現場指揮車與航機無直接聯絡對講之頻道，致無法迅速得知副駕駛不能滑行之情況，對機上病患狀況、航機意圖等緊急應變作業無法掌控。(1. 15. 6. 2, 2. 3. 8)
19. 中正國際航空站具有民用航空器失事處理作業實施要點、民用航空器失事或意外事件通報程序、中正國際機場急（重）病旅客通關作業程序及消防隊作業手冊，惟無類似國際民航組織所建議之緊急應變分類之「全面緊急事件」作業程序。(1. 18. 1, 2. 4. 3, 2. 4. 6)
20. 由 0852 航機停妥於滑行道至 0936 機長被送上救護車，全部急救應變耗時 44 分鐘。(2. 3. 4, 2. 3. 10. 1)

可能直接肇因

急性冠心動脈狹窄阻塞，引發惡性心律不整，自然死亡。

間接肇因

1. 未見追蹤列管以加強提醒冠心疾高危險群駕駛員之注意。
2. 未見駕駛員有具體改善健康之結果。

改善建議

致中華航空公司

一、要求駕駛員對體檢醫師所提之保健建議事項採取具體改善措施。（ASC-ASR-00-12-011）
二、參考例如法明漢心臟研究(FRAMINGHAM HEART STUDY)等系統，評估駕駛員中

具潛在冠心病之高危險群予以列管，並提出保健建議。（ASC-ASR-00-12-012）

三、新聘駕駛員時，應請出具近年病史供航醫參考及追蹤。（ASC-ASR-00-12-013）

四、發生緊急狀況時，駕駛員與航管員或有關人員間應採用標準緊急術語。（ASC-ASR-00-12-014）

五、地面有關人員應加強緊急應變訓練，並要求加強其與航空站有關部門在緊急應變時之聯繫。（ASC-ASR-00-12-015）

致交通部民用航空局

一、要求體檢機構擬定冠心疾高危險群駕駛員之追蹤列管相關規定。（ASC-ASR-00-12-016）

二、要求航空公司建立或委外航醫制度以追蹤列管體檢之建議事項。（ASC-ASR-00-12-017）

三、加強航管人員對緊急情況通信程序及訊息掌握訓練。（ASC-ASR-00-12-018）

四、參照國際標準及國際場站之緊急應變之方式及程序，徹底檢討我國各航空站之緊急應變計劃及程序，並訂定指導規範供各航空站配合修訂其緊急應變計劃及程序。（ASC-ASR-00-12-019）

五、加強緊急醫療救護之應變作業計劃、程序及場內外人員訓練。（ASC-ASR-00-12-020）

六、建置現場指揮官與航機駕駛艙間之有線及無線通訊裝備及作業程序。（ASC-ASR-00-12-021）

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英文縮寫對照表

ACARS	ARINC Communications Addressing and Reporting System	航機通報系統
ALT	Altitude	氣壓高度
CAA	Civil Aeronautics Administration	交通部民用航空局
CAS	Calibrated Air Speed	修正空速
CM1	Crew Member 1	第一正駕駛
CPR	Cardiopulmonary Resuscitation	心肺復甦術
CVR	Cockpit Voice Recorder	座艙語音記錄器
EMT	Emergency Medical Technicians	緊急醫療技術人員
FAA	Federal Aviation Administration	美國聯邦航空總署
FDR	Flight Data Recorder	飛航資料記錄器
FOM	Flight Operation Manual	航務手冊
GSPD	Ground Speed	地速
ICAO	International Civil Aviation Organization	國際民航組織
MHD	Magnetic Heading	磁航向
QAR	Quick Access Recorder	快速存取記錄器
VHF	Very High Frequency	特高頻

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第一章　事實資料

1.1　飛航經過

八十九年五月八日上午，中華航空公司航機編號B-18503機型A300 B4-600R之CI-681班機於0746起飛，原計畫由台北飛往胡志明市。該班次由副駕駛擔任主飛，在平飛於31000呎高空。機長做完廣播後不久，航機於0815由PARPA轉向KAPLI時，副駕駛發現機長有異，經喊叫兩次均無反應，遂按組員失能作業程序通知座艙長到駕駛艙，座艙長進來後呼叫機長及拍打機長臉部，見無任何反應後，立即請另一位空服員拿氧氣，並協助將機長移開座位至後方廚房地板上，空服員並於機上廣播，召請到一位醫師協助。副駕駛當即作回航台北之決定。機上空服員在醫師之協助下繼續給予該機長心肺復甦急救。

副駕駛於0816通知台北區域管制中心有關機長失能之情形，但未用＂緊急＂術語。副駕駛於0821通知華航聯合管制處亞派中心，申請拖車及救護車待命。

回航中於0831時，副駕駛向航管要求給予優先進場。進場時，由於該機停機位置608位於南機坪，因此航管給06號跑道，經副駕駛要求，改用05L跑道。0850副駕駛以自動駕駛於05L跑道落地，並停在N7滑行道上，等侯救護車及拖車拖行至608機坪。航機落地前航站救護車及機場特約醫院醫師、護士均在指定之608號機坪待命。

0901拖車到達，0904開始拖機，而後繼續拖往東面穿越滑行道，於0920拖抵608號機坪。特約醫師及急救人員登機後繼續施救，於0938將正駕駛轉上救護車並於0947送抵桃園敏盛醫院急救，但仍不治，敏盛醫院於1020宣告該機師死亡。

本事件自副駕駛於0816通知台北區域管制中心有關機長失能至安降05L於0852停妥於滑行道上，共經過36分鐘。

於0852自滑行道拖抵608機坪時為0920，拖機耗時28分鐘。

該機長被送上救護車之時間為 0936 ，距離停妥於滑行道上 0852 之時間共 44 分鐘。

1.2 人員傷害

傷亡情形	駕駛員	服務員	乘客	其他	總計
死亡	1	0	0	0	1
重傷	0	0	0	0	0
輕傷	0	0	0	0	0
無傷	1	12	265	0	278
總計	2	12	265	0	279

1.3 航空器損壞情況

航空器無損壞。

1.4 其他損壞情況

無其他損壞情況。

1.5 飛航組員資料

1.5.1　基本資料

項目	正駕駛	副駕駛
性別	男	男
年齡（歲）	45	27
進入中華航空公司日期	87 年 2 月 15 日	87 年 8 月 18 日
證照種類/有效期	外籍臨時執業證書 /2001 年 1 月 31 日	民用航空商用駕駛員證書
	A300-600R 正駕駛檢定證 /90 年 3 月 13 日	A300-600R 副駕駛檢定證 /90 年 6 月 18 日
	FAA 證 /92 年 4 月 30 日	FAA 證 /93 年 7 月 31 日
	甲類駕駛員體檢證 /89 年 5 月 31 日	甲類駕駛員體檢證 /89 年 8 月 31 日
總飛行時數	10559 小時	821 小時
90 日內飛行時數	172 小時	154 小時
60 日內飛行時數	143 小時	108 小時
30 日內飛行時數	95 小時	70 小時
該機型總飛行時數	1375 小時	412 小時
該次飛行距前次飛行時間	16 小時	44 小時

1.5.2　72 小時內飛航組員作息情形

1.5.2.1　正駕駛

該員 5 月 5 日未執勤；5 月 6 日自台北飛往香港，續自香港飛往吉隆坡；5 月 7 日自吉隆坡飛往香港，再自香港飛回台北。

1.5.2.2　副駕駛

該員曾於 5 月 5 日自高雄飛往香港，續自香港飛至高雄；5 月 6 日自高雄飛往台北；5 月 7 日未執勤。

1.6　航空器資料

1.6.1 航空器基本資料

機體資料					
1	飛機編號	B-18503	2	製造日期	Sep. 9, 1998
3	註冊證書編號	87-713	4	飛機使用時數	4560:14
5	適航證書編號	88-09-116	6	適航證書有效期限	Sep. 10, 1999 -Aug 31, 2000
7	上次工廠檢修日期	Dec 27, 1999	8	上次檢修後使用時數	1047:52
9	上次週檢日期	May 02, 2000	10	上次週檢種類	C Check

1.6.2 適航及維修

本機維修及適航情況合於民航法規之要求。

1.6.3 載重與平衡

該班機載重平衡表（Weight and Balance Manifest - load sheet）顯示，飛機原預計抵達目的地時之落地重量為298,684磅，重心在25.9 % MAC c.g.。

然因起飛後不久即返航，其實際降落在桃園國際機場時的重量為330,353磅，超過額定最大落地限重之308,648磅。落地後由機務人員按手冊規定執行「超重落地」檢查，並未發現異常，即予簽派後續飛航任務。

1.7 天氣資料

台灣受分裂高壓影響，當天各地為晴到多雲天氣。中正機場0800時之天氣資料為：風向080°，風速14浬，能見度大於10公里，稀雲1200呎、稀雲13000呎、疏雲20000呎，溫度25℃、露點19℃，高度表撥定值1011百帕。

1.8 助、導航設施

事故當日中正機場05L跑道助、導航設施正常。

1.9　　通信

事故當日該機與台北區域管制中心、中正近場台及塔台無線電通信情況正常。航機與航空公司地面通聯單位即亞派中心之通信情況正常。

座艙語音紀錄（CVR）詳如附錄一、中正塔台地面席／消防車／中正航務組指揮／救護車無線電（頻道459.2MHz）通訊紀錄抄本詳如附錄二、CI681航機／中正近場台／中正塔台／中正地面席無線電（頻道125.1/118.7/121.9MHz）通訊紀錄抄本詳如附錄三、塔台及航務組之電話紀錄抄本詳如附錄四、台北區域管制中心／中正近場台／中正塔台／航空站航務組內部通話紀錄抄本詳如附錄五及航管（ATC）通話紀錄中副駕駛通知台北區管中心聯繫中正航空站準備地面支援。有關中正航站與各相關部門聯絡情況，有連線者可用電話聯絡或具專用頻道聯絡。中正航站與各單位聯絡情況，詳如圖1.9-1。

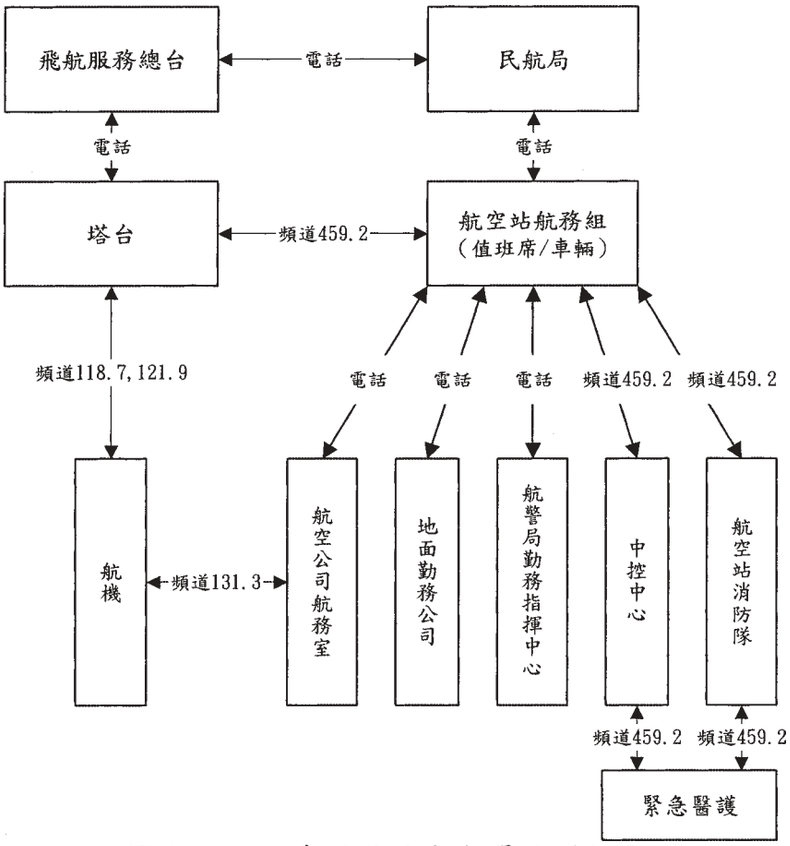

圖1.9-1　中正航站與各單位聯絡圖

1.10 場站資料

中正機場標高107呎，五號左跑道頭標高73呎。全長12008呎（3660公尺），跑道方向053度。道面為水泥，當時無下雨，道面情況乾燥。

中正機場唯一可採自動駕駛儀落地之五號左跑道。

場站有事件發生時，均先通知航務組。場內有傷患時，由航務組通知消防隊或有醫療合約之敏盛醫院。

1.11 飛航記錄器

1.11.1 座艙語音記錄器

記錄器為固態式飛航記錄器，廠商型號為FAIRCHILD A200S型。件號為S200-0012-00，序號為01566。語音資料共120分鐘，涵蓋自航機引擎啟動滑行至航機安全落地接上拖車。與本事故相關之抄件內容如附錄一。抄件涵蓋範圍:自航管區管中心指示該班機飛向西港（08:00:18），至航機落地後由拖車拖往608停機坪止（09:05:40 記錄器結束）。

1.11.2 飛航資料記錄器

記錄器為固態式飛航記錄器，廠商型號為FAIRCHILD F1000型。件號為S800-2000-00，序號為02008。飛航資料共有61小時5分48秒。重要參數均解讀完成，其中九個參數（ALT、CAS、GSPD、HEADING、LAT POSITION、LONG. POSITION、NOSE WHELL POSITION、PITCH、ROLL）並與QAR資料比較。比較結果均相同，如圖1.11.2-1。

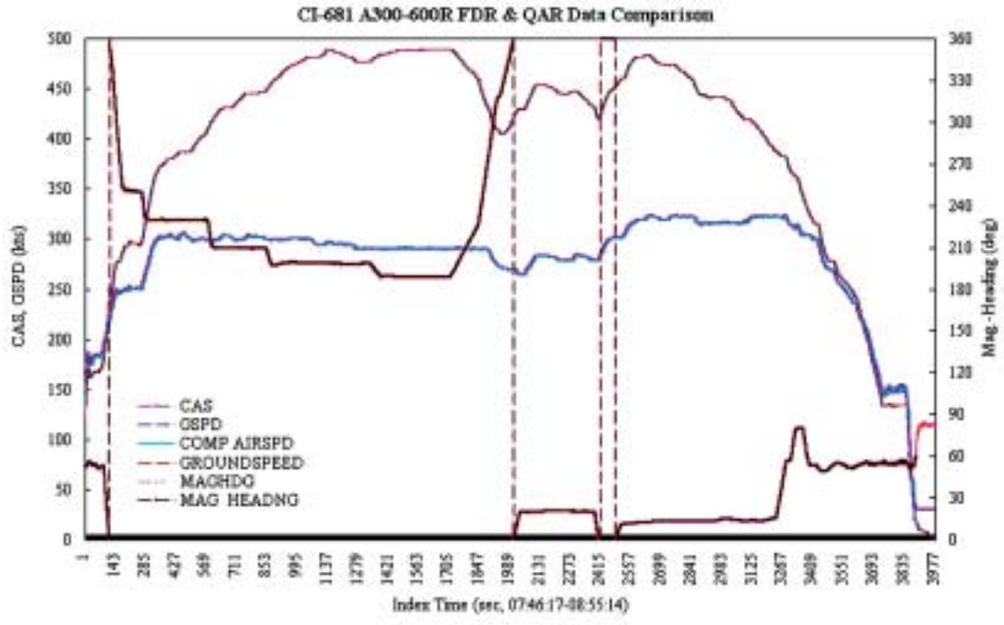

圖 1.11.2-1　FDR 與 QAR 之航速、地速與航向角圖

1.11.3　快速存取記錄器

磁帶式 QAR，記錄 258 個飛航參數。由華航飛安室之協助，已完成解讀。QAR 記錄器解讀發現如下：

□ **航機起飛時間：**07:46:17 （CAS=171 KTS; MHD= 52 DEG; CG%=26.2%），以中正機場 5 號跑道起飛。

□ **航機落地時間：**08:50:14 （CAS=145 KTS; MHD= 55 DEG; CG%=26.2%，Vertical g:1.12），以中正機場 5L 跑道降落。

□ **航機停止時間：**08:52:06 （CAS=30 KTS; GSPD= 0 KTS）。

□ **航機折返位置與時間：**航機通過台南西港後沿 A577 航道往南飛行。於高雄市西南方 37.5 公里處開始迴轉，並且穿越 G581 航道。最後沿原來飛行航道折回中正機場。該機於 08:17:40 到達高雄市西南方最遠處（74 公里），高度為 31000 呎。

1.12 航空器殘骸與撞擊資料

本項不適用

1.13 醫療與病理

1.13.1 醫療

根據航醫中心所保存事故機長之病歷資料，除體檢資料外並無醫療看病之記錄。體檢資料包含白血球過高之複檢紀錄及心電圖、X 光等記錄。

1.13.2 白血球數

白血球數過高之情形在屢次體檢均被檢出，複檢後降至 10,000 以下而通過體檢。

1.13.3 總膽固醇

該機長歷次體檢總膽固醇皆超 122-200 mg/dl 標準值，雖未被航醫列為複檢項目，但因其高密度膽固醇低，體檢醫師曾建議要求多運動及注意飲食。

86.11.27 至 88.11.25 期間，該機長總膽固醇及白血球檢驗數目及醫師建議如下說明：

體檢日期	白血球	總膽固醇	高密度膽固醇	比值	檢查發現		醫師建議
					白血球	血脂	
86.11.27	14,400	233	34	6.8	過高	——	複查白血球
複檢 86.12.04	9200						
87.5.8	13,500	240	33	7.3	過高	——	複查白血球
複檢 87.05.21	10000						
87.11.6	14,500	233	30	7.7	過高	——	血球計數異常肝功能ALT略高12月下旬複檢發證一月
複檢 87.12.22	12400						白血球複查仍稍高血液專科門診複查追蹤戒菸
複檢 88.02.12	14400						白血球高未能發現明顯原因請複查血液專科門診以便釐清
複檢 88.04.14	9800						
88.5.18	10,000	218	33	6.6	——	高密度膽固醇過度低	適當運動、戒煙
88.11.8	12,400	239	43	5.5	過高	——	自述牙周病高膽固醇肝功能異常請牙醫檢查並檢查血液及肝功能.食用低脂低糖及油炸食物
複檢 88.11.25	10000						牙周病檢查血液正常,肝功能正常,無B型肝炎及愛滋,可發證,需追蹤
送專科牙醫會診 88.11.25							無急性牙週發炎續追蹤

1.13.4　生理狀況

失能之機長其生前屬肥壯型、男性、年齡40-50、總膽固醇數高、吸煙，屬潛伏心臟疾病高危險群(附錄十八)。其航行包中雖有多項隨身藥物，但不含與心

臟治療或保健之藥物在內。

1.13.5 心電圖資料

該機長三次動態心電圖資料均未有任何心臟異常之表現。三次之檢查結果如附錄六。

1.13.6 中正航空站醫療救護作業

中正國際航空站具備醫療人員及設備，惟尚無醫療急救之作業程序。

依據交通部民用航空站所屬航空站組織規程中正機場應編制醫生二人，護士3人，中正航務組現有護士3人。交通部民用航空局所屬航空站辦事細則第十三條＂醫師受航務組組長之指揮監督處理傷患救護工作其職責：一、受傷人員及緊急病患之急救或轉送。二、醫護器材及藥物之規劃請購及保管使用＂。

航空站與桃園敏盛醫院簽有合約，在機場門診部配置醫生1人與護士1人，負責失事及重大意外事件傷患初步檢傷、包紮及急救處理。

當日參與緊急醫療人員由航空站護士1人，配合敏盛醫院醫生1人及護士1人組成緊急醫療小組。

當日之醫療緊急應變作業請參閱1.15生還因素。

1.14 火災

本項不適用

1.15 生還因素

1.15.1 機長失能情形

該機於0746時由中正機場起飛，係由副駕駛主飛（Pilot Flying, PF），起飛後狀況正常，該機平飛後副駕駛致中文歡迎詞，0808時機長致英文歡迎詞，0813時機長仍與副駕駛交談。0815時該機接近PARPA INTX準備右轉定向KAPLI，副駕駛發現機長未專注於飛航操作，而且呼吸沉重、右臉頰輕微抖動，身體左傾，臉微上仰，墨鏡下眼睛微張，對副駕駛之詢問無反應。

1.15.2　飛航組員失能作業

副駕駛按航務手冊（Flight Operation Manual, FOM）中組員失能程序要求座艙長進入駕駛艙協助，座艙長檢視機長狀況並拍打機長臉頰兩下無反應，隨後轉請客艙空服員協助取出氧氣瓶施以急救，經五至十秒後機長並無呼吸反應，期間座艙長曾請空服員向乘客詢問是否有醫護人員在座，並指派Z1空服員坐於原機長位置，擬協助副駕駛操作部分工作。同時副駕駛因確定機長失能決定返航台北中正機場。

1.15.3　機上急救

機上一名醫師由空服員帶入駕駛艙檢視機長狀況，初步檢視機長已經無心臟脈動，停止呼吸，小便失禁，同時已經散瞳。

約0820時座艙長及空服員經醫師指示將機長由駕駛座位移至該機廚房區(G1)（詳圖1.15.3-1客艙及空服員配置圖），進行心肺復甦術（CPR）。期間醫師要求提供心臟電擊器、喉頭鏡、氧氣插管、抽痰器，希望將機長喉部與氣管會咽撐開便於人工呼吸時將空氣導入肺部，並由抽痰器抽出嘔吐物，心臟電擊器刺激心臟之重新律動，空服員表示無喉頭鏡、氧氣插管、抽痰器等設備。

座艙長繼續進行心肺復甦術（CPR）之心臟按摩，機上醫師指導進行人工呼吸並觀察脈博、呼吸及瞳孔狀況，並由一具護士資格之空服員（4L）從旁協助。心肺復甦術進行20分鐘後，機長曾噴出灰黑色嘔吐物。

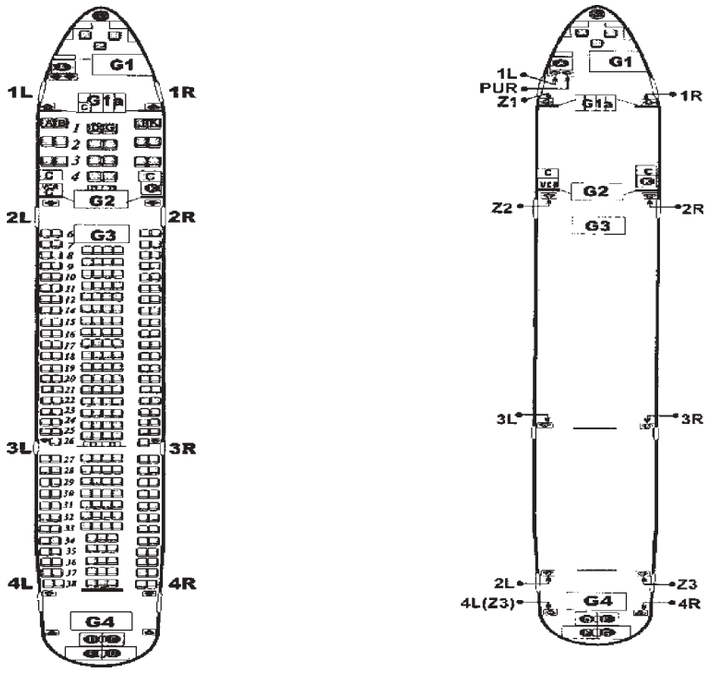

圖 1. 15. 3-1　客艙及空服員配置圖

機上急救約自 0825 開始施行心肺復甦術至約 0925 由中正機場醫療人員登機接替期間並未曾間斷。

當該機停妥後機上醫師將急救工作交予敏盛醫院繼續急救，醫師時曾敘述機長已呈休克狀態。

1. 15. 4　　降落後急救

該機 0850 降落中正國際機場航空站 05L 跑道， 0920 拖抵 608 機坪。敏盛醫院醫師及護理人員登機後，發現機長無任何反應，瞳孔放大、無頸部脈搏。立刻使用喉頭鏡並插入氧氣內管及注射點滴，並繼續進行心肺復甦術，醫師表示機上空間狹小且急救過程中機長均無反應，因此決定將機長運送至敏盛醫院大園分院繼續救治。

1. 15. 5　　送醫情形

約 0936 機長送上救護車，敏盛醫師及航空站護士持續急救，約於 0947 抵達敏盛醫院大園分院，約 1020 該院急救無效，宣佈死亡，根據敏盛醫院診斷書說明機長到院前已死亡。

1.15.6　機場緊急應變配合

緊急應變摘要時間表如下，表中每一列為同一時間發生之事件，惟各單位紀錄時間可能不同。

機場緊急應變時間表

引用資料:
飛航資料記錄器紀錄、座艙語音紀錄器紀錄、桃勤作業管制中心 CAL681 作業流程、華航亞派中心班機異常報告、中正國際站航務組 CAL681 回航事件經過報告、中正國際航空站消防隊出勤紀錄、桃勤地勤部機坪組 CAL681 作業流程、航機/中正近場台/中正塔台/中正地面席無線電(頻道 125.1/118.7/121.9MHz)通訊紀錄、中正塔台地面席/消防車/中正航務組指揮/救護車無線電(頻道 459.2MHz)通訊紀錄抄本、塔台及航務組之電話紀錄抄本、台北區域管制中心/中正近場台/中正塔台/航空站航務組內部通話紀錄抄本。

時間	狀況
FDR074617	CAL681 由中正機場 05L 跑道起飛機載駕駛 2 名，乘客 265 名，空服員 12 名，起飛狀況正常。
CVR081519	副駕駛發現正駕駛有異(FO: Are you all right?)
CVR081630	副駕駛決定回航(FO to Area control:…back to Taipei….also request ambulance stand by in Taipei)。
CVR081644	副駕駛向區管要求因機長失能救護車待命(FO to Area control: the captain incapacity, we need ambulance stand by in Taipei…)
CVR081721	向區管重複要求救護車一輛台北待命 3 次(FO to Area control: one ambulance stand by, please)
航管紀錄時間 081748	台北區管中心通知塔台 CAL681 一名乘客生病要求救護車待命。
航務組紀錄時間 081823	塔台通知航務組值班資料席 681 要回航，有一個乘客生病，並要求指定機坪。 航務組值班資料席轉告華航亞派中心申請救護車。
CVR081943	區管中心指定 TIA 儀降進場
CVR082136	副駕駛向華航OD說 '681 returning to Taipei 那個機長已經

華航亞派中心紀錄時間 0805	昏迷了，我現在要回台北落地，落地之後請求拖車在跑道旁邊standby好了，我不想滑行飛機，現在狀況比較忙沒時間準備。’ 華航亞派中心報告中說明華航 CAL681 副駕駛向亞派中心報告機長昏迷請求回航
CVR082200 華航亞派中心紀錄時間 0810	副駕駛向華航亞派中心人員說‘不是病人是機長昏迷了我們現在要回去了我沒有空跟你多講，麻煩準備一架救護車拖車就這樣謝謝 華航亞派中心D1席通知督導、航務組、聯管處 督導通知航務處長、聯管處長、飛安室
CVR082324	副駕駛要求航機於05L跑道落地
ATC082339 桃勤紀錄時間 0825	航務組值班資料席詢問桃勤空坪後提示塔台給定608 BAY接駁機坪。
CVR082404	副駕駛再次要求於05L跑道落地
航管紀錄時間 082510	由航站航務組通知塔台確認該機長昏迷，塔台再轉述近場台。
航務組紀錄時間 0825 華航亞派中心紀錄時間 0820	華航亞派中心簽派通知航務組機長昏迷。
航務組紀錄時間 0825	航務組由華航亞派中心確認機長昏迷後通知民航局高勤官、民航局標準組、航站辦公室、機場中控中心、通知消防救護車至06待命點。
消防隊紀錄時間 0825	機場中控中心通知消防隊派救護車至608坪待命。
消防隊紀錄時間 0827	航站消防隊救護車含護士一名駕駛一名EMT1合格救護士兩名於抵達608bay
消防隊紀錄時間 0828	塔台隨後通知消防隊機長昏迷航機由06進場
消防隊紀錄時間 0830	南北站消防車抵達S8、S5待命區，消防車1號通知於608機坪之救護車改調至S5會合
CVR083117	駕駛員向台北區管中心要求Priority
CVR083234	坐於正駕駛位置之空服員通知華航亞派中心機長已被置於Galley位置
桃勤紀錄時間 0835	華航簽派通知桃勤需要一部輪椅，桃勤建議華航旅客昏迷應用擔架(擔架附升降平台)
敏盛醫院紀錄時間 0830-0840	華航於約0830、0840分別通知敏盛醫院出診說乘客昏倒未敘明病情，0840攜帶一般的急救東西插管、打點滴、氧氣等藥物由華航工作車接至608BAY。
CVR083646	ATC對副駕駛稱使用06進場

	'CAL681 affirmative and depart B DME fix turn right intercept ILS runway 06 final approach course by yourself'
CVR083656	副駕駛詢問並再次要求05L落地 'CAL681 confirm can we request 05l'
CVR083716	ATC修正為05L落地 'CAL681 depart Xerox correction, depart DMX fix intercept runway 5L localizer over'
CVR083852 華航亞派紀錄時間 0835	華航亞派簽派督導傳達副駕駛實施 Autoland Mode 華航航務處長電告亞派由督導轉告副駕駛須實施 Autoland Mode
桃勤紀錄時間 0840	擔架(擔架附升降平台)被通知至608待命
消防隊紀錄時間 0842	塔台於消防隊時間0842通知消防隊航機改降05L
消防隊紀錄時間 0845	消防車及救護車轉進北場N6N10完成部署
華航亞派紀錄時間 0846	華航AB6總機師要求簽派督導轉達請CAL677提出協助
FDR085014 CVR085037 消防隊紀錄時間 0850 華航亞派中心紀錄時間 0852 桃勤紀錄時間 0850	航機落地
FDR085206	航機停止於N7&23L間
CVR085208 CVR085211 CVR085221 CVR085226	副駕駛向地面席宣稱航機停止於N7 地面席詢問是否需要拖車 地面席再次詢問是否需要拖車並說明須將航機拖到608Bay 地面席要求航機停止於N7
CVR085311 華航亞派中心紀錄時間0855 華航亞派中心紀錄時間 0900	副駕駛詢問亞派拖車要多久抵達 簽派D1席向華航機務TPEMM要求拖車 簽派OD#再向TPEMM要求拖車未到
CVR085329	地面席要求航機往前滑至N7&N9間 FO未動作前滑
消防隊紀錄時間 0853	塔台通知消防隊收隊，惟指揮車108及救護車繼續尾隨
CVR085403	地面席要求航機停止移動(消防車在移動回站)

航管紀錄時間 085440-085500	航務組透過塔台詢問是否由拖車來拖，若是，要求航機原地熄火
CVR085507	地面席要求航機關車
CVR085543	FO不滿詢問亞派拖車在哪
桃勤紀錄時間0856 華航亞派中心紀錄時間0902	華航亞派OD通知桃勤CAL拖車服務由N7至608BAY 簽派OD向桃勤要求拖車
桃勤紀錄時間0857	桃勤聯管通知機坪組 機坪組派於BAY A6之拖車就近由北機坪至機下
CVR085758	簽派請副駕駛詢問塔台要求航機滑行回機坪
航管紀錄 085827-090050	標準組要求塔台不應讓航機滑行，但期間未下令前拖車已到
CVR085833	副駕駛向塔台要求重新啟動引擎
CVR085839	塔台核准副駕駛開車滑回機坪
CVR090040 華航亞派中心紀錄時間0905	副駕駛說拖車來了，航機再次關車
CVR090439 桃勤紀錄時間0904 華航亞派中心紀錄時間0906	拖車拖動航機
華航亞派中心紀錄時間0910	簽派D1向地服處TPETT確定救護車已在608BAY
桃勤紀錄時間0920 副駕駛報告0921	拖車將航機拖至608BAY升降平台R1扶梯車L1接靠完成
消防隊紀錄時間0936	正駕駛經由敏盛醫院醫生護士及航站護士於機上急救無效經升降平台送至航站救護車 機長病發至敏盛醫院醫生護士及航站護士來到之前一直由機上醫生及座艙長施行持續之心肺復甦術。
消防隊紀錄時間0938	將正駕駛送往敏盛大園分院途中以電話通知醫院病患狀況已備提供必要器材。
消防隊紀錄時間0947	正駕駛抵達醫院

1.15.6.1　航空公司

華航聯合管制處亞洲派遣中心(亞派中心)負責與該公司飛航人員及其他地面支援聯繫之任務。

根據訪談資料亞派中心於收到CAL681副駕駛報告機長昏迷決定回航並要求救護車待命時，亞派中心人員未聽見副駕駛要求拖車於跑道頭待命之敘述，且亦不知副駕駛不允許滑行之規定（航務手冊第四章第二節載客飛機滑行時需由本公司正駕駛員（CM1）操控）。

當亞派中心與CAL681副駕駛通話並確定機長昏迷後，立即通知華航聯管處、航務處、飛安室、中正航務組，並取得該機被安排停於608號機坪之資訊。

敏盛醫院於8:30接到華航請求醫療支援後，約0845醫師及護士由華航小客車載運至608號機坪，航站中控室也由華航收到CAL681回航訊息，並要求救護車提供支援；

約0830桃勤公司由中正航務組通知CAL681回航將停於608機坪；約0835華航要求桃勤提供輪椅，但由桃勤建議擔架及病患車較適宜昏迷病患，約0840病患車及擔架至608機坪待命完成。

0852 CAL681降落後，副駕駛向亞派中心詢問拖車準備狀況，亞派中心向華航機務處二度要求拖車未果；約0856亞派中心通知桃勤拖車服務，0904拖車拖動航機，0920機該機拖至608機坪，扶梯車接靠1 L門，病患車（載運敏盛醫院醫師及護士）接靠1 R門。

1.15.6.2　中正航空站

約0818中正航務組資料席接獲塔台通知CAL681乘客身體不適，要求返航及提供救護車，航務組隨後轉告華航亞派中心申請救護車、了解病患病情，並向塔台回覆請該機回航後可停靠608機坪。

約0825中正站中控室通知救護車至608機坪待命，救護車含護士一名及具緊

急醫療技術人員第一級（EMT1）合格消防士三名出動。

約 0825 亞派中心回覆航務組稱機長昏迷，航務組即通知民航局、航站主任、航站中控中心。

約 0827 救護車抵達 608 機坪；約 0828 塔台通知消防隊因機長昏迷回航，將由 06 跑道降落，消防車出動，救護車被通知至南區待命點與消防車會合。

約 0835 消防救護車分別於 S5 滑行道(1 、3 、5 、16 號消防車、救護車、108 消防指揮車)及 S8 滑行道待命(4 、6 、7 、8 號消防車)，航務組 103 號車於 S1 滑行道待命點完成佈署，中正航空站消防搶救方格圖，如圖 1.15.6-1 至圖 1.15.6-2 。

0838 塔台通知航務組該機改降 05L 跑道。

0845 消防救護車分別改於 N6 滑行道（1 、3 、5 、16 號消防車、救護車、108 消防指揮車）及 N10 滑行道待命（4 、6 、7 、8 號消防車），航務組 101 車停於 05R 上，航務組 103 車停於 N6 滑行道待命點， 105 車停於國內線機坪完成佈署。

約 0850 該機降落 05L 跑道，並由 N7 脫離跑道，停機於 05R 跑道上；約 0852 南北站消防車陸續撤離，僅留 101 及 108 指揮車及救護車尾隨該機；

現場指揮官為中正國際航空站航務組組長， 0852 航務組現場指揮詢問塔台該機為何停止，塔台答覆該機正找拖車拖行；0855 航務組指揮詢問桃勤公司拖車位置，桃勤答覆正準備中；0858 塔台通知航務組現場指揮，華航亞派中心轉達該機副駕駛要求自行前往 608 機坪之意向，請航務組現場指揮車負責引導，拖車於 0901 抵達， 0904 拖動該機，沿 05R 跑道進入 East Cross 滑行道，右轉 SP；

約於 0920 該機進入 608 機坪，此時醫療人員及急救裝備均在機坪待命，扶梯車及病患升降車分別靠上該機 1L 及 1R 門。機內 1R 門較遲開啟，地面人員也並未強制開門。根據訪談資料 1R 及 1L 門由該機同一名空服員開啟。

機門開啟後華航及中正站航務組人員、航站護士藉扶梯車由 1L 門先行進入，敏盛醫院醫師護士藉升降車由 1R 門進入搶救。

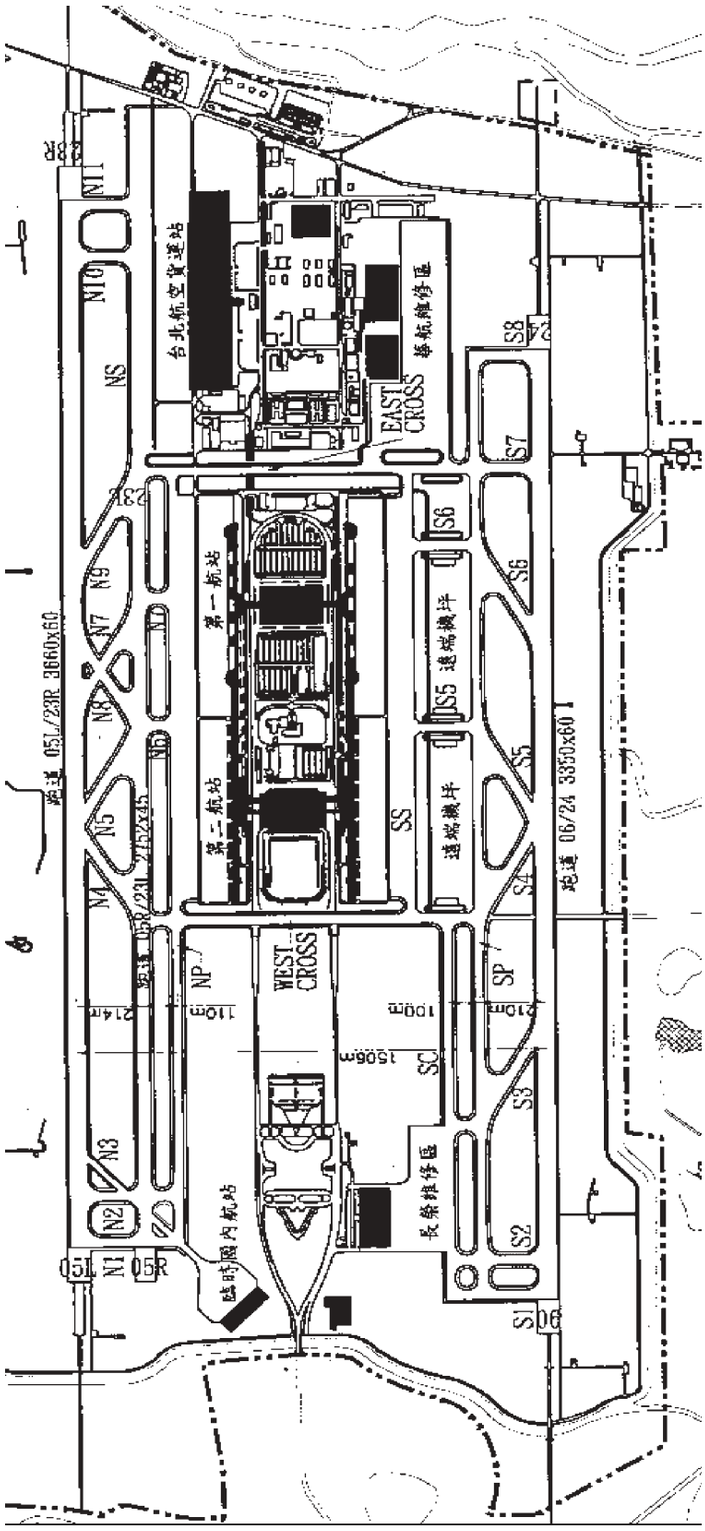

圖 1.15.6-1　中正國際航空站消防車出勤路線及緊急待命點

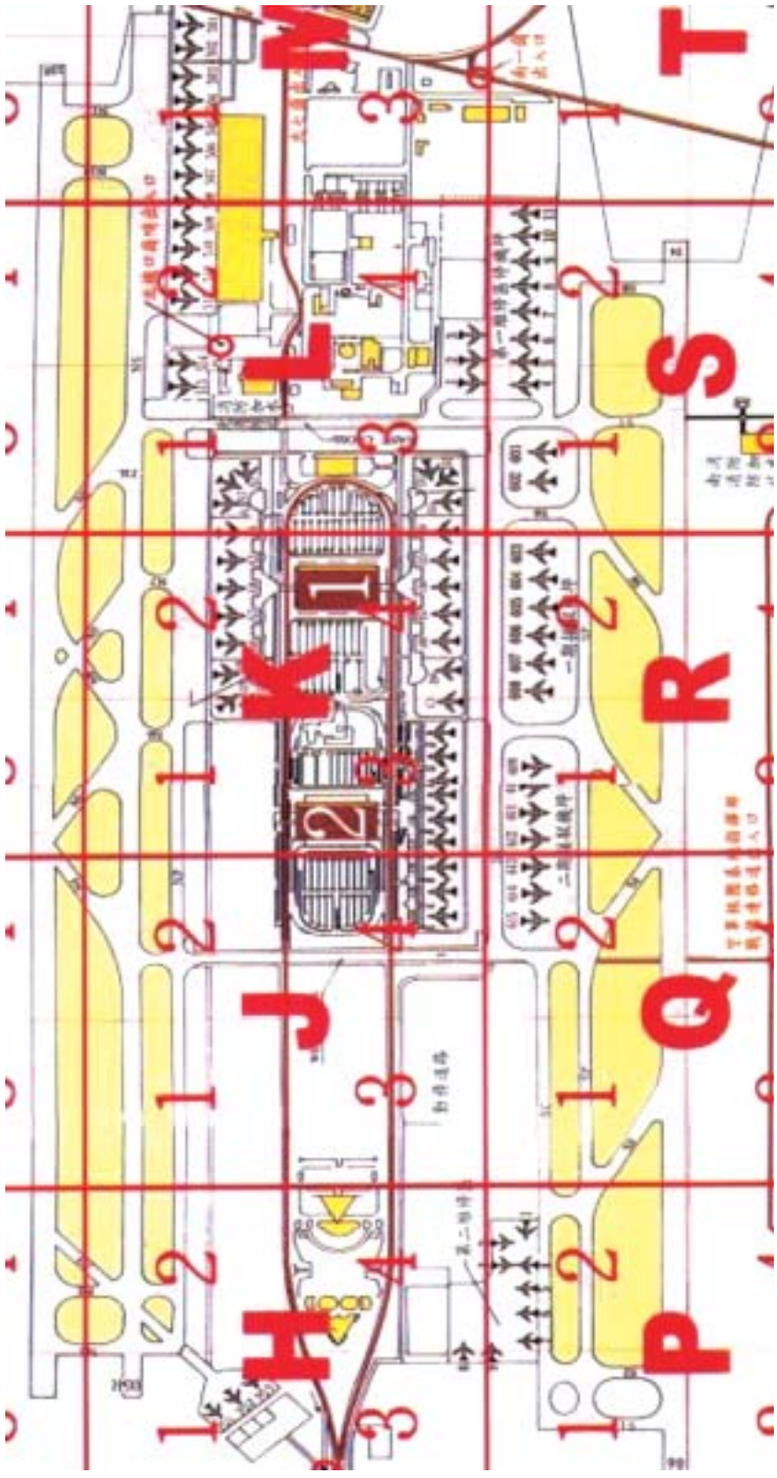

圖 1.15.6-2　中正航空站消防搶救方格圖

1.16　測試與研究

不適用

1.17　組織與管理

1.17.1　民航局航空醫務中心(以下簡稱航醫中心)

1.17.1.1　航醫中心之組織

民航局航醫中心除由航空醫務管理委員會監督，另設有醫事審議委員會，專司體檢有疑問情況之審查。其組織圖詳如圖 1.17.1-1 。

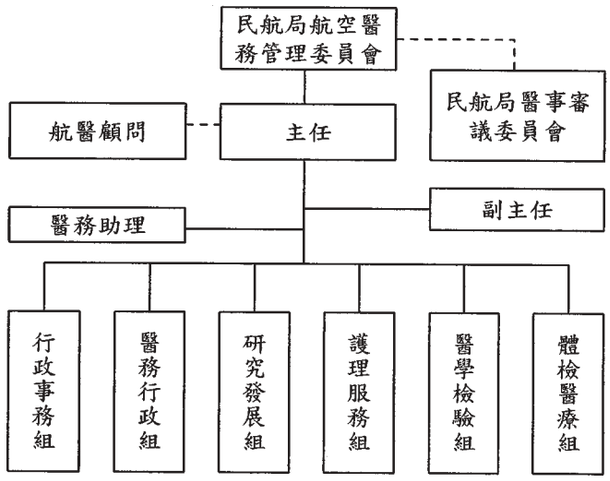

圖 1.17.1-1　航醫中心組織圖

1.17.1.2　民航局醫務管理委員會

航醫中心成立於民國五十九年十一月。

航醫中心為一受民航局醫務管理委員會監管而負責執行全國國籍航空人員及外籍在台航空人員體檢工作之唯一機關。

民航局醫務管理委員會負責航醫中心之監管。管理委員成員為民航局長、兩位副局長、企劃組長、航管組長及人事會計、政風室主任等人，另有航醫顧問數人，視情況負責提供專科意見。

1.17.1.3 醫務人員

航醫中心之醫護專業及行政人員皆由航醫中心主任報請民航局同意後聘用。各人待遇視年資核定。所聘人員不經公務人員銓敘。

目前航醫中心有醫師六人，其中全職四人，兼職兩人，護理人員有八人，其中一位為營養師，檢驗人員有三人，心理諮商兩人。

航醫中心編制上有一位主任及一位副主任，除擔任醫師工作並兼行政管理，所聘人員待遇由體檢費收入項下支出，每年不須由民航局另編預算支付所聘用人員薪津。

1.17.1.4 航醫中心之任務職掌

按航醫中心提供之簡介資料所述，其任務及職掌如下：

任務

1. 航空人員之體格檢查與鑑定。
2. 航空生理教育與急救訓練。
3. 航空事故醫學調查研判與建議。

職掌

1. 航空人員之體格檢查及預防保健作業。
2. 心理篩檢諮商與輔導。
3. 醫療資料之統計分析。
4. 組員逃生教育與急救訓練。

5. 機場急救設施與膳勤衛生之督導與建議。

6. 航空體檢標準修訂之建議。

7. 民用航空醫學之研究。

8. 國際航空醫學界之交流。

1.17.1.5　體檢作業

平日上午為航醫中心體檢時段，全體醫護檢人員在上午均以體檢工作為主。平均每日有30-40人進行甲、乙、丙各類體檢，每位醫師每日約負責5-8人之最後醫師檢查。

表1.17.1-1　民用航空醫務中心88年1～12月體檢人數月統計表

	元月	二月	三月	四月	五月	六月	七月	八月	九月	十月	十一月	十二月	合計
駕駛員	360	370	413	306	370	340	386	361	398	309	390	330	4333
飛航機械員	5	1	1	9	16	6	8	5	10	9	1	1	72
空測照相員	1	0	0	0	0	5	0	0	0	0	0	0	6
空服員	115	136	179	148	96	143	120	246	193	258	132	131	1897
管制員	23	4	8	10	15	21	10	69	64	47	18	16	305
地面機械員	114	159	120	153	146	151	156	140	119	124	181	183	1746
簽派員	32	17	22	27	23	20	21	18	22	18	22	27	269
行政主管	0	0	31	3	0	1	4	34	10	19	13	2	117
委託體檢	2	1	0	3	0	2	3	4	1	1	3	0	20
機場消防士	0	0	0	0	0	0	0	0	0	0	0	0	0
其他（游泳）	1	1	0	0	1	1	7	2	0	0	0	0	13
合計	653	689	774	659	667	690	715	879	817	785	760	690	8778

1.17.1.6　體檢工作與標準之依據

航醫中心遵照民航法0五-0三A內容，即交通部民用航空局於六十二年十一月十七日頒布，並歷經七次修訂，最後於八十九年二月二日修訂之企法發字第0002號令之「航空人員體格檢查標準」(如附錄七)執行各項工作。並沿用航醫中心於民國八十三年制訂、民國八十五年修訂之「民用航空人員體格檢查手冊」(如

附錄八）進行體檢工作。此一手冊所寫為一原則性之指導，實際作業時，航空體檢醫師依「航空人員體格檢查標準」逐項檢查，並依受檢者之執照種類進行不同項目之查驗。

航醫中心對受檢者有疑問必須作進一步之判斷時，按「航空人員體格檢查標準」內容，委由指定醫療機構、專科醫師檢查，其檢查結果及意見，經航醫中心體檢醫師彙整，並經審議委員會開會討論做成決議，由航醫主管簽請意見或核定。

1.17.1.7 缺點免記

受檢者如按「航空人員體格檢查標準」第五章內容缺點免計之程序提出申請，經體檢醫師或經特殊醫學鑑定後，認為該航空人員之豐富經驗可彌補該項缺點，而無礙飛航安全，始可做成專案，准予按缺點免計規定，報請民用航空局核定之。本次事件機長之體檢證上，並無缺點免計項目。

1.17.1.8 體檢證之核發

航空人員體檢檢查通過後送民航局由民航局局長簽字發照。

1.17.2 中正航空站航務組

航務組位於第一航站大樓近A9停機坪。

航務組人員編制有組長1人、輪班航務員15人，正常班4人，合計20人；每班原有四個席位，為配合第二航廈啟用，增為五個席位。

航務組人員訓練有平日自辦訓練、年度民航局訓練所複訓、聯合演習集訓。場內各主要單位間對航空器失事緊急通報以專線電話聯絡，遇緊急狀況由塔台按警鈴通知。

場內航空器失事救難任務編組，指揮中心指揮官為航站主任，二位副指揮官為航站副主任及航警局副局長，現場指揮官為航務組組長。場外航空器失事並無明訂救難任務編組表，僅有下列文字敘述：「由各該作業區地方政府首長或其指定代理人負責，航空站全力配合。」

1.17.3　中華航空公司聯合管理處亞洲簽派中心

華航亞洲簽派中心負責航機簽派工作，並兼監管航機動態與聯絡航機。在距機場二百浬附近與航機聯絡時，通常以向民航局所租用之 131.5 VHF 以話語或以機上 ACARS 直接傳在紙上溝連。

此次 CI-681 事件，該機種副駕駛不能在落地後滑行之情況，亞洲簽派中心之值班人員並不了解。副駕駛在聯絡時只要求拖車，並未說明自己落地後不能滑行且在通連中未曾採用緊急情況之字眼。亞派中心傳達有關消息時，亦未以緊急事件通報。

1.18　其他資料

1.18.1　ICAO 緊急事件作業分類及內容

國際民航組織機場為處理機場緊急事件而訂定緊急應變手冊，該手冊 2.2.2 敘述緊急事件之定義為(a)牽涉航機事故(b)不涉航機事故(c)緊急醫療事故及(d)混合型事故：

(a)牽涉航機的緊急事件：

(1)失事－航站內航機失事

(2)失事－航站外航機失事

(I)陸地

(II)水面

(3) 事件 - 航機飛航中事件

(I) 嚴重亂流

(II) 失壓

(III) 結構失效

(4) 事件 - 在地面之航機事件

(5) 事件 - 破壞事件包含炸彈威脅

(6) 事件 - 劫機事件

(b) 不包含航機的緊急事件：

(1) 失火 - 航站內結構物失火

(2) 破壞 - 包含炸彈威脅

(3) 自然災害

(4) 危險物品

(5) 緊急醫療

(c) 混合性事件

(1) 航機 / 結構物

(2) 航機 / 燃油設施

(3) 航機 / 航機

該手冊 2.2.3 將各機場緊急應變區分為三類來處理，分別為：

(a) 航站內外航機失事(Accident)；

(b) 全面緊急事件(Full emergency)：航機接近機場有潛在失事危險。

(c) 部份待命(Local standby)：航機接近機場雖有事件但無影響落地安全的可能。

同時該手冊第四章將緊急事件處理擴增為 10 類，詳述不同緊急事件發生時各參予單位(航管服務、消救人員、警備服務、航站管理者、醫護服務、醫院、航空公司、政府單位、公關部門等)應負之職責及作業程序，該 10 類緊急事件處理分別為：

(1) 航站內失事

(2) 航站外失事

(3)全面緊急事件(Full Emergency)

(4)區域待命(Local Stand by)

(5)非航機失事之機場緊急應變

(6)非法干擾飛航行動

(8)危險物品事件

(9)天災

(10)航機入水事件

此頁空白

第二章　分析

本班次之機長及副機師都是擁有合格體檢證書的飛航組員，機長在這個班次突生意外而失能，終至死亡。

飛航組員體檢之把關工作由是航醫中心負責，航醫中心之體格檢查與飛安關係密切。

副機師在航管配合下順利落地，但地面救援工作未能及時。所安排之機坪未考量有病患需急救，又無適當聯絡請急救相關車輛就機門位置，卻要航機將就機坪位置，延長了急救人員登機時間。落地後到就醫各階段未能在最短時間內讓病患送醫以獲得應有之醫藥救護。

2.1　死因分析

本班次機長之遺體由桃園地檢署委請法務部法醫進行解剖內臟，並作血、尿、胃內容物之分析。死因鑑定報告書詳如附錄九。

2.1.1　鑑定情況

肉眼觀察：死者整體檢查無外傷，眼結膜正常，頭皮無出血，無骨折。心臟部份冠狀動脈在左前支起始部百分之五十狹窄，瓣膜無異常，心肌無變化，主動脈呈粥腫樣變化，在腹主動脈有鈣化及潰瘍出現。

顯微鏡觀察：除心冠動脈狹窄外，無其他特殊異常。

病理檢查：急性心冠動脈狹窄阻塞，並有梅子干殘渣異物見於喉頭，猝死，自然死。隨身藥物經刑警局檢驗無特殊毒物成份。血液、尿液、胃內容物含酒精0.00487%（W/V），小於0.002%（W/V）及0.102%（W/V），無其他毒藥成份，詳如附錄十。

解剖中發現嚴重心臟冠狀動脈阻塞及腹部主動脈有明顯血管硬化、鈣化及潰瘍。胃有半固體梅子干渣。喉頭聲間上緣亦有異物梅干渣。

2.1.2 鑑定結果

按法務部法醫之鑑定結果為心冠動脈狹窄阻塞死亡，自然死亡，詳附錄九。飛安委員會在調查中曾邀有關航醫及心臟科專家學者對機長猝死之原因作深入探討。心臟專科醫師指稱急性心冠動脈狹窄阻塞為主因，亦即為造成失能之原因，而喉頭所發現之異物梅干渣可能是急救時或移動病體時流入，非猝死之主因。

2.2 體檢分析

2.2.1 檢查裝備

該事件機長在「航醫中心」做過五次體格檢查。其中有三次履帶心電圖檢查，均以可調坡度履帶跑步機檢驗之。該跑步機有定期功能檢查紀錄，包括以模擬器檢測心電圖與跑步機之同步有無誤差，並檢測速度與升坡有無誤差。

2.2.2 心電圖資料

航醫中心採用「民用航空人員體格檢查手冊」為處理之依據。其內所載第二章第十八、十九、廿條說明心臟雜音、運動心電圖異常、心律不整之處理程序與原則。

本事件機長在各心電圖之檢查並無異常之發現，即心電圖無陽性反應。故未繼續探討有無冠狀動脈疾病之危險因子，也未指定做核子掃瞄之檢查。據醫學統計，心電圖對冠心病的準確度僅百分之廿，運動心電圖為百分之五十至六十，心臟超音波為百分之七十，核醫掃瞄為百分之九十五。

2.2.3　白血球數高對死因之影響

「航醫中心」歷次檢查出該機長需複檢之項目均為白血球數過高。「航醫中心」曾有兩次接受事件機長在國外檢查機構之白血球複檢證明。唯一指定讓受檢人接受專科專家之檢查者為88年11月25日送請該中心附設牙醫專科檢查白血球數高之情況。其結果為無急性發炎之症及建議需進一步檢查原因，「航醫中心」並未要求續檢或追蹤。

美國牙周病醫學會(American Academy of Periodontology)與中華民國牙周病學會均已於其正式文件中確認牙周感染與心臟血管疾病及中風有統計上之正相關連性，更指出患有牙周感染之人較未患有牙周感染者，其發生心臟血管疾病及中風之危險機率達兩倍以上(參閱Position paper: Periodontal disease as a potential factor for systemic diseases, 載於Journal of Periodontology 1998;69:841-850)。另依牙周疾病之分類而言，傳統分類法共為五類：1. 牙齦疾病、2. 早期牙周炎、3. 中度牙周炎、4. 嚴重牙周炎、5. 頑固型牙周炎。若依世界牙周病專家會議於公元一九八九年將其中牙周炎分為五類：1. 成人型、2. 早發型、3. 潰瘍壞死型、4. 頑固型、5. 與全身疾病相關之牙周炎。該會議並於公元一九九九年通過分類法為八類：1. 牙齦疾病、2. 慢性牙周炎、3. 侵犯型牙周炎、4. 全身疾病有關之牙周炎、5. 壞死型牙周炎、6. 牙周組織膿腫、7. 牙周合併根管病變、8. 先天或後天牙周相關之變異。(參閱牙周病學現況：牙周病的分類與篩檢，載於中華民國牙周病醫學會雜誌，第五卷第三期第168頁，民國八十九年九月出版)。則上述牙周感染應非僅以急性牙周感染為限，因而本案死亡駕駛員於八十八年五月十八日於航醫中心檢出牙周病時，航醫中心未有相關建議；復於八十八年十一月八日該員至該中心體檢時自述牙周病史，該中心會診結果謂「無急性牙週發炎續追蹤」，則僅係症狀判斷、而非疾病篩檢或診斷，亦未提醒該員心臟血管疾病及中風危險機率已較常人倍增。

然據心臟專科醫師最後判斷，白血球數高與此次心臟病發並無直接關聯。

2.2.4 血脂高對死因之影響

按航醫中心之「民用航空人員體檢檢查手冊」第二章第廿二條，有關檢查出高血脂症之處理，以膽固醇危險度比值超過 6 者，依情況建議戒煙、減重、運動、低脂飲食。總膽固醇高於 240 時，建議飲食治療、營養師諮商。

「航醫中心」醫師在建議欄有建請駕駛員注意飲食及多運動之紀錄，但未見實效即未有明顯減低血脂情況。「航醫中心」之營養師對該機長諮商無紀錄可查。

高血脂情況如與年齡、男性、吸煙等因素之組合，為心疾高危險群。本次事件機長即具有以上各種高危險群因素。解剖報告證明該機長確為冠心病患。

2.2.5 「航醫中心」體檢制度與國際民航組織 ICAO 建議、美聯邦航空總署 FAA 體檢制度之比較

ICAO 建議體檢之特性：

國際民航組織提出飛航安全之最低需求，以便世界各國易於執行。故 ICAO 只對體檢標準作原則性限制，完全授權各國航醫依其醫學能力自行決定，以維護飛航安全為最高準則，以目前我國訂定之民航體檢標準而言，自較 ICAO 為嚴謹。

FAA 體檢制度之特性：

美國 FAA 是委託指定體檢醫師執行航空人員之體檢。美國因幅源遼闊，航空人員眾多，FAA 每年體檢人數達五十餘萬人次，因此無法集中體檢，而必須委託指定體檢醫師辦理。而受委託指定醫師多達五千人，有些委託指定醫師只憑數天講習即擔任體檢醫師，因此體檢品質不一。又其項目簡單，設備不一，體檢時靠受檢人誠實自述，但如自述或檢查有所隱瞞，可處罰 25 萬美元罰金，五年以下刑期，兩項亦可併罰（請參閱附錄十一 FAA 體檢表首頁）。做過本國及 FAA 體檢者會發現我民航體檢項目或標準比 FAA 多又嚴謹。例如 FAA 在甲類體檢可不做履帶心電圖。FAA 可接受裸眼視力 0.0 之限制（矯正後為正常），但 CAA 只接受裸眼視力 0.2 之限制。以往許多航空公司曾有欲聘用獲 FAA 體檢合格之外籍機師，但

在民航局因體檢無法通過而作罷之例。

目前我民航法對體檢人隱藏病史並無像 FAA 定有處罰條例，航醫進行航空人員體檢要求自訴之部分，就較難掌控。尤其目前航空人員來自世界各地，或國人轉自非民航業界，隱藏病史會造成體檢之盲點。

2.2.6　航醫中心對心臟疾病之檢查

據航醫中心統計資料，航醫中心在 1987 年至 1995 年的九年間，共停飛 48 位民航駕駛員，含 4 位外籍機師，千人年停飛率為 6.8 。停飛年齡分佈在 40-49 歲間為 25% ， 50~59 歲間為 65% ，其餘年齡為 10% 。

體停原因中通常心臟疾病超過半數，而心臟病發作之不可預期性，對飛安影響尤大。因此體檢醫師皆希藉定期體檢看出心臟疾病，以防範心臟病發作之不可預期性。航醫中心要求每年一次之履帶運動心電圖檢查，對冠心病之早期診斷助益極大，並視狀況作心導管檢查或核子醫學鉈 201 掃瞄。另心臟超音波或 24 小時心電圖檢查亦視需要而定。

本次事件機長在履帶運動心電圖並未發覺異常，故未進一步檢查是否有冠狀動脈狹窄之病情。航醫中心履帶心電圖之檢查程序詳如圖 2.2.6-1 。

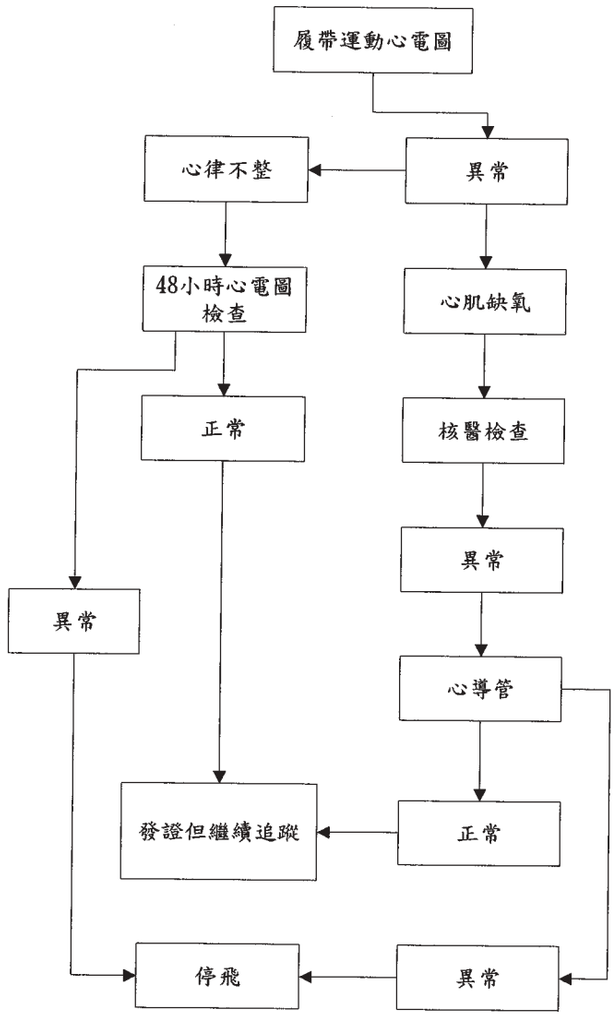

圖 2.2.6-1　航醫中心履帶心電圖檢查程序

人體心臟血管系統之評估，除我國現行制度採取之病史問診、臨床檢查、履帶式運動心電圖、心導管檢查等外，應可考慮納入 24 小時心電圖、心臟超音波檢查與核子醫學掃瞄等方式。另對於心臟血管疾病危險因子之具體管理辦法，得參考美國心臟科醫學會(American College of Cardiology)與美國心臟協會(American Heart Association)所聯名提出科學論述推薦之法明漢評估系統(Framingham Scoring System)(參閱 Scientific statement: Assessment of cardiovascular

risk by use of multiple-risk-factor assessment equations,載於Journal of American College of Cardiology 1999;34:1348-59)，或採歐洲方面之評量系統（參閱Prevention of coronary heart disease in clinical practice: recommendations of the second joint task force of European and other societies on coronary prevention,載於European Heart Journal 1998;19: 1434-503之研究）…等。

2.2.7　航醫中心體檢報告

目前航醫中心體檢報告及體檢證送出後，如為及格不需複檢但有建議事項，會送交航空公司有關單位或其航醫轉交持證人。航醫中心未做任何建議事項之追蹤分析工作。

綜觀國內航空企業自設之航醫部門收到航員體檢報告後，對該體檢人報告中之建議事項大多未加列管，也無追蹤該受檢人之保健改善情形。

受檢航空人員獲體檢證後，遇有建議事項但若無公司航醫之告誡或常限於保健方法之認知，也容易忽略自我改善之要求。

本事件機長屬冠心病之高危險群，過去三年間白血球數及血脂未減少，證明缺少追蹤及實質改善。航空公司有關單位或航醫及航醫中心均對建議事項未明確要求改善，受檢航員對建議事項也有漠視之嫌。

2.3　航站緊急應變程序

本段根據國際民航組織(ICAO)建議之機場緊急應變手冊(Airport Service Manual, Airport Emergency Planning DOC-9137 Part 7，以下簡稱ICAO機場緊急應變手冊)，檢視中正機場訂定之處理緊急應變相關程序。

2.3.1　中正機場緊急事件作業分類及內容

根據1.18.1節ICAO緊急事件作業分類及內容，檢視中正機場緊急應變相關規定，發現緊急事件分類標準不一及應變程序散見各規範中，造成各依單位作業程序處理或無作業程序依循，各單位將無法進行有效整合行動，如該機場訂有"中正國際航空站民用航空器失事處理作業實施要點"，該要點內第九章包含航站內失事及航站外失事之處理程序，將航站內失事區分為"航空器著陸後部分損壞，無燃爆現象，人員無傷亡"；"航空器著陸後發生燃爆，人員有傷亡"，航站外失事區分為"航空器陸地失事"；"航空器海上失事"。中正國際航空站民用航空器失事處理作業實施要點中並未考慮全面緊急事件及區域待命應如何處理，惟於中正航空站航務組消防隊作業手冊中將消防作業程序區分為航空器起飛或降落時失事、航空器因故要求緊急降落、停留地面航空器告警、建築物室內火災及建築物室外或災等項目，該作業手冊僅敘述消防隊之處理程序，並無其他支援單位完整之配合程序。另有關天災之緊急應變程序敘述於"中正國際航空站防颱措施"；非法干擾飛航行動之緊急應變程序敘述於"中正國際航空站民用航空器被劫機以外之場面應變措施"。

2.3.2 場外失事作業

ICAO機場緊急應變手冊4.2敘述場外失事各單位之職責(參考附錄十二)。且ICAO機場緊急應變手冊3.12敘述搜救協調中心對場外失事扮演重要角色，尤其當失事現場未知或須額外的搶救設備參予場內或場站附近行動，搜救協調中心需快速通聯所有單位，包括提供飛機、直昇機及特殊搜救設備及團體的能力。計畫中應有特別章節描述搜救協調中心之運作。中正國際航空站民用航空器失事處理作業實施要點未見描述搜救協調中心之運作。

中正國際航空站民用航空器失事處理作業實施要點未見場外失事時航站各單位職權及作業程序之敘述，將造成場外失事時航站較難支援專業技巧協助搶救，如告知地方縣市消救單位航機易燃區、機載危險物品位置及航機消防技巧等。

2.3.3　航管服務

ICAO 機場緊急應變手冊 3.2 、4.1.2 敘述之航管服務包括機場塔台須連絡消救單位，並視資訊之了解與否提供緊急事件型態及其他基本資料，如航機型式、燃油殘量，失事地點，甚者，緊急應變計畫應規範塔台或航管應依程序告知地方消防單位及其他適當組織。初報時須提供方格圖、等待點（Rendezvous Point）、航站開放的入口、這些連絡的功能可不由航管人員處理，但需指定某一單位處理。清楚區分電話初報單位之職責區分，避免重覆。隨後電話可補充相關資料，包含乘客數量，機載危險物品及駕駛姓名等。機場可以因處理緊急事件關閉，航管須提供必需的判斷及反應，須登記所通知單位之時間並簽名。

中正國際航空站民用航空器失事處理作業實施要點規範上述功能由連絡通報組提供，惟未敘述連絡通報組應提供支援單位上述基本資料、應繼續蒐集資料提供再次通知、登記所通知單位之時間並簽名之程序。

2.3.4　消救服務

ICAO 機場緊急應變手冊 3.3 、4.1.3 敘述消救人員應以救人為主要職責，為了達成該職責應壓制火勢、防止復燃，應提供機載成員快速逃生的可能協助。機場消救人員或其他人員應具有緊急醫療訓練較佳，因為這些人員為第一時間進入失事現場人員，若機場內立即反應人員具有醫療救護資格能減小人員之傷亡。僅有消救人員穿著防火衣及裝備才許可接近失事航機，且必須在航機任何一點或燃油外洩點起算 100 公尺外著裝。消救人員及車輛須：

a）由航管人員指引最快路徑到達現場

b）應通知建議相互支援的消救單位

1）等待點

2）運作區

3）人力裝備支援需求

4）其他資料

c）快速建立暫時易識別指揮站，直到航站管理之行動指揮所已完成運作。

類似之作業細節及職責規範均未見諸於中正國際航空站民用航空器失事處理作業實施要點及通報表中。

2.3.5 警備服務

ICAO 機場緊急應變手冊 3.4 敘述警備人員應於第一時間到達現場、封鎖現場，直到當地具司法管轄權之警察到達現場接管，計畫中也應規劃如地方警察、軍隊或其他政府人員快速有效的協助。同時應快速建立通暢出入口及道路便於緊急應變車輛進入。限制圍觀民眾，避免破壞現場，保存失事調查所需證據。相互支援計畫應考慮所有可能涉及警備的單位如縣市警力、憲兵、海關…。警備人員應在各檢查點審核搶救人員進入失事現場，識別卡應由航站管理事先已頒發給個人。許多個案顯示相互支援消救車因場地等問題無法直接進入現場，因此需設置等待點，直至現場指揮有相對需要，此點設置可減少交通阻塞，干擾失事現場運作，警備人員需控制等待點之車輛進出。

中正國際航空站民用航空器失事處理作業實施要點規範之程序未包含上述場內及周邊出入口及道路交通之暢通、識別卡之預頒及審核、檢查點及等待點之設立及預劃警力。

2.3.6 航空公司

ICAO 機場緊急應變手冊 3.8 、4.1.8.2 敘述計劃中須由公司即時提供出事航機如機載人員、燃油殘量、危險物品(危險品包含易爆物、壓縮、液態氣體、易燃液固體、氧氣瓶、有毒物質、傳染、放射物質)等基本資料，予以現場指揮官及消防指揮及醫療協調者。同時須安排未受傷乘客繼續行程及其他援助，安排聯絡死亡乘客親屬。計劃中應指定一家航空公司負責處理過境、私人、軍方、其他非機

場用戶航空公司之應變。

中正國際航空站民用航空器失事處理作業實施要點規範之程序未包含上述即時提供出事航機如機載人員、燃油殘量、危險物品等基本資料，予以現場指揮官及應了解之單位、預劃航空公司處理過境、私人、軍方、其他非機場用戶航空公司緊急事件之應變事項。

2.3.7　運輸載具支援

ICAO 機場緊急應變手冊 3.8 敘述載具於失事搶救中可執行搜救任務、人員運送、殘骸及補給運送。公車、租車公司、卡車、餐車之使用應預先規劃納入計劃中。引導車應易受辨識，並須設置雙向無線電，引導車輛由等待點至失事現場，不受其他航機操作干擾。預劃可使用於水面及沼澤地帶特殊運輸工具的調用。

中正國際航空站民用航空器失事處理作業實施要點規範之程序由地勤支援組提供運輸載具之支援，未包含上述引導車及等待點之規劃、機場運輸載具能量調查及調用程序之詳細規劃。

2.3.8　通訊聯繫

ICAO 機場緊急應變手冊 12.3.3 敘述行動指揮所之無線電頻道必須可直通航機及地面管制員並裝設耳機減少干擾，ICAO 消救手冊 4.3 敘述特定事件，特別是機輪支架發生狀況或啟動機上逃生程序，須提供消防、指揮與航機座艙之通訊。(國際民航組織機場服務手冊緊急應變計畫第十二章通訊規劃，參閱附錄十三)

中正國際航空站民用航空器失事處理作業實施要點中僅敘述失事時由連絡通報組提供無線電手機與各作業單位，便於整體指揮。惟航機失事時所有單位、載具、主要人員之通訊聯繫至為複雜，須詳加考量整體作業架構並將通訊聯繫設備及頻道規劃納入緊急事件應變程序。該站尚未規劃行動指揮所與航機間之緊急無線電頻道通聯。

2.3.9 通報電話表

ICAO 機場緊急應變手冊 8.1 敘述各場站應發展不同緊急狀況的電話表。中正航空站並未訂定不同狀況之通報電話表，執行上易造成通報規模無法標準判斷。

2.3.10 航站醫療救護程序

2.3.10.1 航站醫療救護程序訂定

ICAO 機場緊急應變手冊 1.1.9 敘述應考量失事後傷亡者搶救及穩定病情的考量，因此訂定醫療救護速度及技巧至為重要，須預先規範及定期演練。且 ICAO 機場緊急應變手冊 3.6.1 敘述醫療服務的目的是提供檢傷分類、急救、醫護：

(a) 減低重病立即死亡人員之危險

(b) 緩解痛苦

(c) 運送傷亡病患至適當醫療機構

中正航空站並未於中正國際航空站民用航空器失事處理作業實施要點或獨立之緊急事件醫療救護程序訂定航站醫療救護程序，僅訂定中正機場旅客急(重)病通關作業程序，無法規範不同狀況之醫療救護應變方式及技巧。

ICAO 機場緊急應變手冊 4.1.6 敘述場內失事時醫護服務之行動應包括：

(1) 確認已通知支援及救護車單位應抵達之等待區或運作區。

(2) 組織檢傷分類、處理傷亡者及安排車輛運送。

(3) 和運送人員配合控制確定傷亡人員的流向，簽派傷亡人員運送到合適的醫院。

(4) 列出傷亡名單，包括姓名及最後運送位置。

(5) 協調航空公司運送未受傷乘客到指定地點。

(6) 提供須急救及未受傷乘客之醫療評估。

(7) 若需要時安排補充醫療裝備。

(8)和警備單位處理死亡人員之事宜。

中正國際航空站民用航空器失事處理作業實施要點僅指定由敏盛醫院成立醫護組至失事現場、協調指揮支援醫護單位及檢傷分類後之傷患後送，並未規範緊急事件時醫護組應負之職責及作業細節。

2.3.10.2　醫療救護能量運送及作業程序

ICAO 機場緊急應變手冊 3.6.4 敘述，訂定緊急應變計畫須包含由陸、海、空之方式將醫療服務、裝備、醫療補給及人員運送至失事現場，中正國際航空站於程序中並未預劃上述醫療支援能量之運送。

ICAO 機場緊急應變手冊 3.6.5 敘述應變計劃中應指定醫護運輸人員，職責應包含：

向醫院及醫療人員告警現場狀況。

特別病患送至適當醫院進行特殊處理。

紀錄運送人員姓名、人數、運送路線、送達醫院、傷者狀態。

傷患在途中時，建議醫院準備。

持續和醫院、救護車、資深救護人員、現場指揮及指揮所連繫。

中正航站未見任何程序規範醫護運輸人員之職責，未規劃醫療協調者與現場指揮官及各式載具之相互通聯方式。

2.3.10.3　心理衛生組織預劃

ICAO 機場緊急應變手冊 3.19 敘述應變計劃須包含地方心理組織，提供生還者、目擊証人及搶救人員心理衛生諮詢服務。中正航站未將地方心理組織之支援及作業納入緊急應變程序中。

2.3.10.4　規範消救人員具醫療訓練程序

ICAO 機場緊急應變手冊 3.3.2 敘述嚴重受傷乘客若不能快速穩定病情，將演變成死亡，機場消救人員或其他人員應具有緊急醫療訓練較佳，因為這些人員應為第一時間進入失事現場人員，若航站內立即反應人員具有醫療救護資格能減小人員之傷亡。中正航空站雖已進行第一線消救人員 EMT1 之訓練，惟未見於此項功能於緊急應變程序加以敘述。

2.3.10.5 醫院分佈規劃

ICAO 機場緊急應變手冊 3.7 敘述醫院應有意外事故緊急計劃，因應最短時間提供醫療小組至現場，且醫院需具資格人員及適當設備處理航機事件的能力，緊急應變計畫需有列出週遭分佈醫院表，並依特殊傷患如燒傷病患處理能力加以分類，非應用盡越近醫院的資源。

ICAO 機場緊急應變手冊 4.1.7 敘述指定醫院完成下列作業：

a）收到通知後快速運送醫生及外傷醫療團隊至失事現場。

b）當傷患到達處理區時提供醫療服務

c）確定緊急事件發生時，適當醫生、護士、手術室、心理治療單位、外科、血袋已備妥。

檢視中正國際航空站民用航空器失事處理作業實施要點之中正國際機場醫療救護支援單位及能量表未列出醫院之特殊專科能量，提供醫療協調者簽派傷患分送醫院之參考，與醫院簽訂之相互支援協議未明列醫院於緊急事件發生時支援之能量及作業程序。

2.3.10.6 檢傷分類及照料

ICAO 機場緊急應變手冊第九章敘述檢傷分類法則、標準化之傷患識別卡及使用、同分類之照料原則、傷患流動控制之詳細作業細則，中正國際航空站民用航空器失事處理作業實施要點僅標示航空器失事醫療救護示意圖、傷票(檢傷單)並

未包含規範詳細作業細則(參考附錄十四)。

2.3.11　　機場及郊區方格圖

ICAO 機場緊急應變手冊 7.1 敘述緊急應變中心須提供機場及郊區的方格圖予塔台、消防站、消救車及所有支援單位之車輛，副本須送知所有單位；提供二種方格圖 2.3.11-1 為描述機場道路或聯外道路、水源供給位置、等待點、運作區(staging areas)；圖 2.3.11-2 為機場範圍至少 8km 包含周遭地形、聯外道路及醫院位置、資料、等待點等資料。；方格圖中顯示之醫院機構應包含，可利用病床數、醫療專門項目、人員等資料。

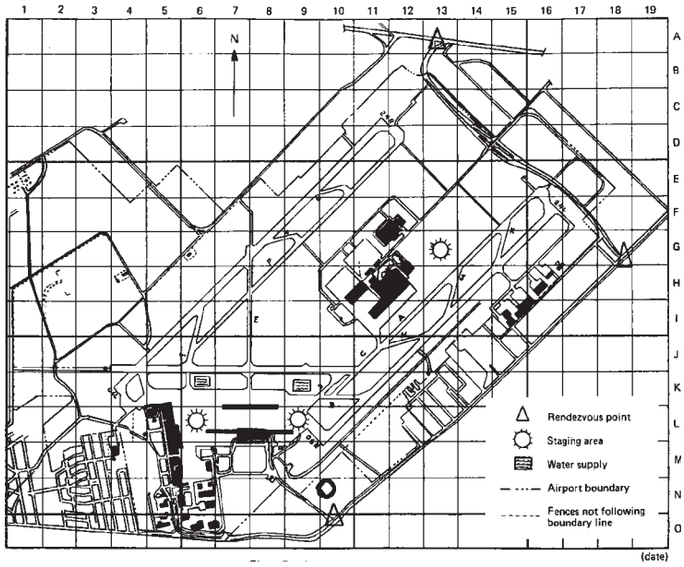

圖 2.3.11-1　ICAO 機場及郊區方格圖一

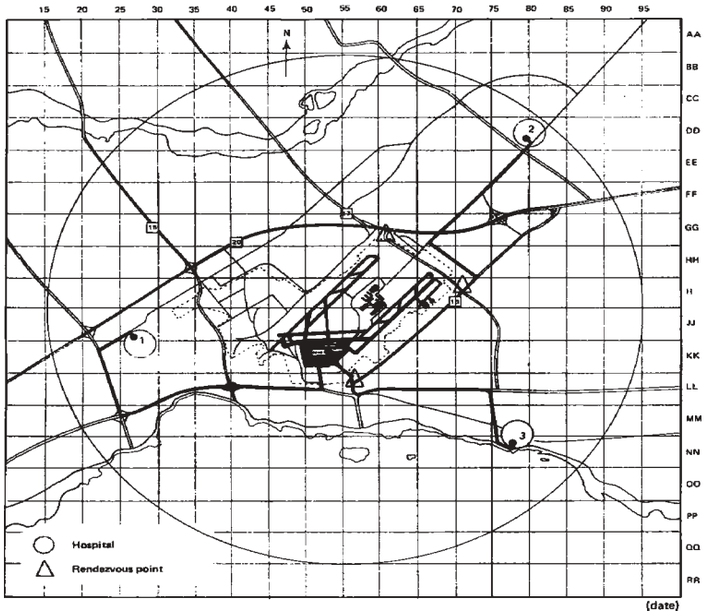

圖 2.3.11-2　ICAO 機場及郊區方格圖二

檢視中正國際航空站民用航空器失事處理作業實施要點之中正國際機場消防救護方格圖並無標示上述水源、預劃之等待點、運作區、機場範圍至少 8km 包含周遭地形、聯外道路及醫院位置、可利用病床數、醫療專門項目、人員等資料。

2.4　航站緊急應變執行作業

2.4.1　正駕駛失能訊息傳遞

根據座艙語音紀錄，0815 副駕駛發現正駕駛右臉頰抖動，身體左傾，臉微上仰，墨鏡下眼睛微張，呼吸聲沉重。0816-0817 副駕駛聯繫台北區域管制中心要求返航台北，並說明機長失能，請求一輛救護車待命。根據區管中心 / 中正近場台 / 中正塔台 / 中正機場航務組平面通信錄音（以下簡稱航管平面通信錄音，如附錄五），0817 台北區管中心告知塔台 CAL681 機上乘客生病，航機回航，要求救護車一輛，0818 塔台通知航務組相同訊息，由台北區管中心傳遞錯誤訊息至中正塔台及中正站航務組，OK 區管中心誤解該機副駕駛之請求。

直至約 0825 由華航機航（亞洲派遣中心）通知中正航務組確定為機長昏迷，中正航務組及航站中央控制中心通報航站消防救護準備作業。機長失能航機回航具極大之潛在危險，有別於乘客生病，錯誤訊息之傳遞及修訂，減低應變及準備時間。

2.4.2　緊急情況宣告

0816 副駕駛發現機長失能以 "Incapacity" 告知航管人員，0831 因有其他航機在附近故向航管要求 "Priority"，惟直至航機落地均未表明該機遭遇緊急狀況，根據飛航管制程序第九章 9-1-1 緊急情況之決定：

a. 緊急情況可能為危難或急迫之情況，定義於附錄駕駛員／管制員詞彙中。（緊急情況指危難或急迫情況）

b. 駕駛員遇危難情況時，應以無線電通信於最初連絡時以「MAYDAY」之用語宣布緊急情況，最好重複三次。急迫情況時，使用「Pan-Pan」之用語，以同樣方式表達。

c. 如果「MAYDAY」或「PAN-PAN」未被使用，而管制員懷疑會構成緊急或潛在

緊急情況時，則視同緊急情況處理。

參考飛安基金會於 March-April 2000 出版之機場運作刊物 Vol. 26, No. 3 建議飛航組員於任何緊急情況時應以標準術語宣告(附錄十九)。

華航航務手冊第十四章緊急程序之危難及緊急時無線電通話程序中敘述危難時應宣告 "MAYDAY"，緊急時應宣告 "PANPAN"。

惟華航航務手冊第三章醫療緊急狀況中組員失能之處置程序及第十四章緊急程序之危難及緊急時無線電通話程序中均未敘述緊急情況（危難及緊急）之宣告條件為何，若依飛航管制程序該機機長失能為緊急情況，而副駕駛未提示航管人員或亞派中心人員該事件為緊急情況，影響整體應變作業。

2.4.3 全面緊急事件作業

因機長失能，該機由副駕駛降落時預期具極大危險性，國際民航組織之緊急應變計劃中之緊急事件分類，該事件應屬於全面緊急事件（Full Emergency），預期航機降落可能造成失事之危險，等級僅次於失事時之應變作業，惟中正航空站因未規範類似事件之緊急應變程序，事件之分類也不同，故包括通報程序、各單位之應變作業皆未全面作業。

2.4.4 要求地面拖車之訊息傳遞及覆頌程序

根據座艙語音紀錄副駕駛才向台北區域管制中心請求回航後，0821 副駕駛首次向華航亞派中心說明機長昏迷，要求地面支援之拖車至跑道旁待命（0821:36 副駕駛向亞派中心說: "681 return to Taipei 那個機長已經昏迷了我現在要回台北落地落地後請求拖車在跑道旁 standby 好了，我不想滑行飛機…"），為確保滑行安全該公司規定副駕駛不可獨自滑行航機，副駕駛表示須拖車至跑道旁待命，將航機拖回機坪。

依據訪談華航亞派中心值班人員表示未聽見副駕駛請求拖車於跑道旁待命之

請求，因此當航機於0850安全落地時並未有拖車前往支援，直至0852塔台詢問副駕駛是否需要拖車協助，提醒副駕駛再向亞派中心詢問拖車支援之進度，亞派中心才向華航機務及桃園勤務中心要求拖車，桃園勤務中心要求拖車之拖車於0901抵達航機下方，0904拖動航機。

Readback（覆頌）程序在陸空通訊程序中唯一週知遵循之法則，以雙向確定資料傳送無誤。檢視華航航務手冊有關陸空通訊（第十三章）、飛行安全及安管之醫療緊急情況（第三章）及航機簽派（第五章）等相關緊急應變章節均未見類似覆頌規定以確保航機於緊急情況下訊息能正確傳達，同時因副駕駛及亞派中心值班人員傳遞拖車支援之誤解，造成航機副駕駛於0821空中要求拖車待命，0852航機停止後9分鐘拖車抵達航機之延誤狀況。

2.4.5　指定跑道訊息傳遞

根據座艙通話紀錄0823副駕駛首次向台北區域管制中心東部席要求降落05L跑道，0824副駕駛向台北區域管制中心西部席要求降落05L跑道，經西部席確認，0832副駕駛稱病人危急請求Priority Landing，0836台北區域管制中心西部席要求航機於06跑道落地，副駕駛立即再次申請05L跑道落地獲准。指定跑道之請求與獲准重複進行3次，副駕駛與航管人員間之訊息傳遞產生差異，消防隊紀錄之時間0825航站中控室請求航站救護車至608機坪待命，消防隊紀錄之時間0830消防隊指示消防車及救護車更改至南跑道（06跑道）等待點待命，0835完成佈署，消防隊紀錄之時間0842塔台通知消防隊改降北跑道（05L跑道），消防隊紀錄之時間0845消防救護車完成佈署，訊息認知及傳遞錯誤造成地面應變工作反應時間壓縮，影響危急應變能力之成效。

2.4.6　醫療協調者訓練

ICAO機場緊急應變手冊3.6.3醫療協調者應控制現場醫療狀況的運作，此協

調者應為機場醫療人員，可指定第一時間抵達之航站搶救人員之一為暫時協調者。

中正國際航空站未訂定緊急事件之醫療作業程序，但於中正國際航空站民用航空器失事處理作業實施要點指定醫療協調者為敏盛醫院機場門診部人員，該協調者應派遣醫生、護士、救護車至失事現場成立急救檢傷中心、協調指揮支援單位（桃園區緊急醫療救護網所屬醫療院所）、檢傷分類、傷患後送協調工作。

事件後本會訪談指定之醫療協調者宣稱未曾閱覽中正國際航空站民用航空器失事處理作業實施要點，且並未受成立急救檢傷中心、協調指揮支援單位、傷患後送協調工作等醫療協調者之訓練。

檢視中正國際航空站民用航空器失事處理作業實施要點，並未指定第一時間抵達之航站搶救人員之一為醫療暫時協調者，無論機場指定何者為醫療協調者，任何一位參與醫療人員均應熟習航站之緊急醫療作業內容。

2.4.7 機坪指定

081748 台北區管中心通知塔台 CAL681 一名乘客生病要求救護車待命。081823 塔台通知航務組值班資料席 681 要回航，有一個乘客生病，並要求指定機坪。082339 航務組值班資料席詢問桃勤空坪後提示塔台給定 608 BAY 接駁機坪，根據訪談航務組人員，此一階段因地面應變人員認為乘客緊急醫療航機回航於客機坪客滿情況下指定接駁機坪 608 ，該坪較接近 06 跑道屬南面機坪。檢視＂中正國際航空站客、貨、接駁國內線各機坪停泊航機及過夜航機調度位置注意事項＂及＂中正國際機場接駁機坪作業管理規定＂中並未顯示航機回航應限制停靠於接駁機坪。082510 航務組確認機長昏迷，惟仍缺乏航機落地後該公司不允許副駕駛滑行航機之規定，0826 塔台通知航務組該機於 06 跑道落地，距離 608 機坪較近，航站航務組人員因此未更改該機停靠之機坪位置。塔台於消防隊時間 0842 通知消防隊航機改降 05L 跑道，但航機進行緊急醫療降落時，航站航務組人員未因應跑道變更調度較近之停機坪，以縮短病患送醫時間。

2.4.8　航站搶救作業及現場指揮

現場指揮官為中正國際航空站航務組組長。

航管平面通訊紀錄顯示 0818 中正航務組接獲塔台通知，該機回航一名乘客生病，0823:39 中正航務組通知塔台航機預定停放於接駁機坪 608 ，消防隊紀錄之時間 0825 航站中央控制中心通知航站救護車至 608 機坪待命，直至 0830 確定該機為機長失能改調航站救護車至跑道待命點，0842 更改待命點，0920 航機拖回 608 機坪，航站救護車皆跟隨該機，航站指定之醫療協調者(敏盛醫院機場門診部)之醫護人員於 0830 由華航通知出勤，0840 並由華航接送至 608 機坪待命，直至該機抵達不曾移動，航站指定之醫療協調者依據中正國際航空站民用航空器失事處理作業實施要點實應由航站中控中心通知出勤，且由現場指揮官指揮，惟該航站現場指揮無直通之通信聯繫醫療協調者。

0822 華航亞派中心獲通知機長昏迷，0835 通知桃勤華航乘客昏迷須擔架附病患升降車支援，0840 擔架附病患升降車已至 608 機坪待命，直至 0920 航機拖回 608 機坪，該裝備皆於此等待病患，現場指揮官未要求該擔架及病患升降車至跑道邊待命，協助航站救護車人員立即運送病患下機。

航機約於 0852 停止於跑道上，現場指揮官並無與航機座艙直通之無線電，而另一能與座艙聯繫之座艙地面線(Cockpit and Ground Lines)由地勤人員攜帶並同拖車於 0901 抵達航機旁下，現場指揮需透過塔台間接與座艙聯繫，而座艙副駕駛不明航站可提供之緊急應變支援為何，該現場指揮訊息無法明確且即時之傳遞。

現場指揮於 0845 航機降落前完成消防、救護車之待命，而航機停止後現場指揮因通訊不及於座艙，無法直接得知該機不滑行至機坪之原因，未調度病患升降車及醫療協調者(敏盛醫院機場門診部醫護人員)至跑道邊與救護車同步配合運作，使用擔架運送病患下機由救護車迅速運送至醫院，無法發揮緊急醫療應變時航機落地後由現場指揮官接管航機於第一時間救人之任務精神，而類似醫療緊急事件之處理作業程序未見諸機場緊急應變相關程序。

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第三章　結論

3.1　調查結果

1. 該機長持有民航局核頒之合格體檢證及該機種之檢定證。且體檢證上無特殊限制，亦無缺點免記之紀錄。(1.5.1)
2. 按其體檢報告資料，以該員之體型、年齡、高血脂及吸煙習慣等紀錄，屬於潛在性冠心疾患者之高危險群。(1.13.3, 1.13.4)
3. 對體檢醫師建議事項，該機長無明顯改善之結果。（1.13.3）
4. 缺乏該機長進入我國工作前之病歷。
5. 其履帶心電圖未顯示有心肌梗塞之徵候，按體檢作業辦法，航醫中心不繼續進行後續檢查。(1.13.5, 2.2.6)
6. 該機長之工作時間、飛行時間、休息時間均合乎民航法規之規定。前一、二日與此事故機長一起飛行之其他組員，未發現該機長在工作時有任何異狀。(1.5.2)
7. 該機長之隨身藥物不含任何毒物成分，也不含心臟治療藥物。(2.1.1)
8. 該機長之死因為心冠動脈狹窄阻塞死亡，自然死亡。(2.1.2)
9. 當次飛航任務是由副駕駛主飛並採用自動駕駛操控。當日天氣無特殊狀況。航機之適航情況正常。事故發生前，未有增加飛航組員工作量之情況，該機長之工作壓力應屬正常。(1.1, 1.6.2)
10. 副駕駛於機長失能後立即按公司失能作業程序處置，並以自動駕駛安降中正機場。惟事情突發時未使用標準緊急狀況術語通報。(1.1, 1.15.2, 1.15.6)
11. 機長失能後，空服員進入駕艙之組員合作良好，且持續給予該失能機長進行心肺復甦之急救。(1.15.3)
12. 機上醫師急救檢查機長已呈尿失禁、瞳孔放大及無心臟脈動情形。(1.15.3)
13. 中正國際航空站備有醫療救護人員及設備，與敏盛綜合醫院簽有醫療合作合

約，且具急（重）病旅客通關作業程序，惟無醫療救護作業程序。(1. 13)

14. 中正國際航空站「民用航空器失事處理作業實施要點」中規定應有之醫護組，係由與航站簽約之敏盛醫院機場門診部負責作業，惟未規範緊急事件時醫護組負責之職責及作業細節。(1. 13, 2. 3. 10. 1)
15. 台北區管中心航管人員未能瞭解該機副駕駛所報機長失能(Incapacitation)之訊息，而將乘客重病之錯誤消息傳給航站。該機副駕駛前後兩次向台北區管中心要求降落 05 左跑道，航管人員仍回以使用 06 跑道，顯示該員對航機駕駛員之訊息未能掌握並予確認，影響後續地面緊急應變作業。(1. 15. 6, 2. 4. 1, 2. 4. 5)
16. 航空站未即時調度較靠近使用跑道之停機坪，供緊急應變航機使用。(2. 4. 7)
17. 華航亞派中心人員未充分與該機副駕駛溝通及中正國際航空站有關人員密切聯繫，對副駕駛於空中請求拖車於跑道旁待命之訊息未善加應變爭取時效，致落地後航機於地面等待拖車有 9 分鐘(0852-0901)。(1. 15. 6, 1. 15. 6. 1, 2. 4. 3, 2. 4. 4)
18. 現場指揮車與航機無直接聯絡對講之頻道，致無法迅速得知副駕駛不能滑行之情況，對機上病患狀況、航機意圖等緊急應變作業無法掌控。(1. 15. 6. 2, 2. 3. 8)
19. 中正國際航空站具有民用航空器失事處理作業實施要點、民用航空器失事或意外事件通報程序、中正國際機場急（重）病旅客通關作業程序及消防隊作業手冊，惟無類似國際民航組織所建議之緊急應變分類之「全面緊急事件」作業程序。(1. 18. 1, 2. 4. 3, 2. 4. 6)
20. 由 0852 航機停妥於滑行道至 0936 機長被送上救護車，全部急救應變耗時 44 分鐘。(2. 3. 4, 2. 3. 10. 1)

可能直接肇因

急性冠心動脈狹窄阻塞，引發惡性心律不整，自然死亡。

間接肇因

1. 未見追蹤列管以加強提醒冠心疾高危險群駕駛員之注意。
2. 未見駕駛員有具體改善健康之結果。

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第四章　飛安改善建議

4.1　失事調查期中飛安通告

本會已於八十九年五月十九日以 ASC-IFSB-89-05-1 文號發出失事調查期中飛安通告，詳如附錄十五。

4.2　改善建議

致中華航空公司

一、要求駕駛員對體檢醫師所提之保健建議事項採取具體改善措施。（ASC-ASR-00-12-011）

二、參考例如法明漢心臟研究(FRAMINGHAM HEART STUDY)等系統，評估駕駛員中具潛在冠心病之高危險群予以列管，並提出保健建議。（ASC-ASR-00-12-012）

三、新聘駕駛員時，應請出具近年病史供航醫參考及追蹤。（ASC-ASR-00-12-013）

四、發生緊急狀況時，駕駛員與航管員或有關人員間應採用標準緊急術語。（ASC-ASR-00-12-014）

五、地面有關人員應加強緊急應變訓練，並要求加強其與航空站有關部門在緊急應變時之聯繫。（ASC-ASR-00-12-015）

致交通部民用航空局

一、要求體檢機構擬定冠心疾高危險群駕駛員之追蹤列管相關規定。（ASC-ASR-00-12-016）

二、要求航空公司建立或委外航醫制度以追蹤列管體檢之建議事項。（ASC-ASR-00-12-017）

三、加強航管人員對緊急情況通信程序及訊息掌握訓練。（ASC-ASR-00-12-018）

四、參照國際標準及國際場站之緊急應變之方式及程序，徹底檢討我國各航空站之緊急應變計劃及程序，並訂定指導規範供各航空站配合修訂其緊急應變計劃程序。（ASC-ASR-00-12-019）

五、加強緊急醫療救護之應變作業計劃、程序及場內外人員訓練。（ASC-ASR-00-12-020）

六、建置現場指揮官與航機駕駛艙間之有線及無線通訊裝備及作業程序。（ASC-ASR-00-12-021）

附錄一　CVR 抄本

台灣時間：座艙通話記錄器相對時間同步於台北區域管制中心時間

ATC 時間：由空中交通管制單位提供抄本的時間

發話：聲音來源代號如下，

CAPT：正駕駛，FO：副駕駛，FA：空服員，WR：區管中心西區席，ER：區管中心東區席，AREA：座艙內區域麥克風，C1：台北近場台，C2：台北塔台，C3：台北地面控制台，GND：拖車地面人員，677：中華航空 CI677 ，OP：中華航空亞派中心

台北時間	發話	內容
8:00:18	WR	CAL681, proceed direct to TNN, resume own navigation。
8:00:22	CAPT	681 direct to TNN, thank you。
8:07:40	WR	CAL681, contact Taipei Control 130.6。
8:07:44	CAPT	130.6, Thanks good day, CAL681。
8:07:48	WR	Good day。
8:07:54	CAPT	Taipei, morning, CAL681 with you FL310。
8:07:59	ER	CAL681, Taipei Control, 10 miles north of TNN, maintain FL310, and cleared from Parpa direct Kapli, flight plan route。
8:08:08	CAPT	Parpa to Kapli, CAL681。
8:08:32	CAPT	Good morning ladies and gentleman. This is your captain speaking. On behalf of entire our crew, welcome aboard China Airline Airbus Flight 681 from TPE to Hu Chi Min city. Now we are maintaining our cruise altitude of 31thousand feet, average ground speed 570 miles per hour. Estimate time arrival Hu Chi Min at morning 0950. There is a one hour time different between Taipei and Hu Chi Min Local time is 8 minutes past 7 in the morning. Weather forecast at Hu Chi Min airport is 28 degree Centigrade about 82 degree F. Please enjoy your flight. Thank you.
8:09:30	FO	No change
8:09:37	FO	Is 30 and 45 for departure?
8:09:41	CAPT	Yeah.
8:12:56	CAPT	Do you have……something

8:12:59	FO	Yes
8:13:01	FO	You want to fly by yourself?
8:13:03	CAPT	Oh no.
8:13:09	CAPT	This is what we need.
8:13:11	FO	Ah？
8:15:19	FO	Are you all right?
8:15:22	FO	Captain!
8:15:32	FO	座艙長進來一下
8:15:39	FO	Are you all right?
8:15:48	FO	Check 一下他怎麼了
8:15:54	PR	他幹嘛？
8:15:58	PR	Are you ok? Captain
8:16:07	PR	Captain
8:16:13	FO	那我要回航，叫人進來幫忙
8:16:19	PR	你可以落地嗎？
8:16:20	FO	可以可以可以
8:16:21	FA	Captain 不舒服啊?
8:16:22	PR	對….
8:16:24	FO	Taipei Control, CAL681。
8:16:28	ER	CAL681, go ahead。
8:16:30	FO	CAL681, got some problem, we need turning back to Taipei, and also request ambulance stand by at Taipei。
8:16:39	ER	CAL681, say again your reason return to Taipei?
8:16:44	FO	The captain incur incapacity, we need ambulance stand by in Taipei, and currently just passing Parpa 310, we need radar vector back to Taipei。
8:16:53	ER	CAL681, roger, and cleared from present position right turn, turn right direct to TNN, focus one arrival to TIA, stand by for descent, over。
8:17:08	FO	Roger, right turn direct to TNN, focus one arrival。
8:17:14	ER	CAL681, and request ambulance, request how many ambulance?
8:17:21	FO	One ambulance the captain is incapacity, and we need turning back ambulance one, one ambulance stand by, please。
8:17:28	ER	CAL681, roger。
8:17:54	PR	還要多久
8:17:56	FO	大概……要 30 分鐘
8:17:58	PR	要放油是吧　二三十分鐘
8:17:59	FO	這飛機沒有放油 我們要做 Over weight landing
8:18:07	PR	要三十分鐘是吧
8:18:08	FO	三十分鐘我們盡量準備好了，因為我們沒有時間預測他的

		動靜
8:18:12	PR	Ok 好
8:18:16	FO	麻煩你廣播我現在沒有空廣播
8:18:18	PR	Ok 好，全部用你的名字，你不要管
8:18:31	PR	怎麼會這樣子啊
8:18:32	FO	起飛之後改平突然...講講話就.....
8:18:47	ER	CAL681, do you prefer to descend now?
8:18:51	FO	CAL681, Stand by。
8:19:04	PR	需要我幫忙什麼東西嗎？
8:19:06	FO	不用了 就這樣子好了 謝謝，如果不方便移開他的話 麻煩幫他 Shoulder harness 扣上鎖住避免他往前倒 會妨礙到我
8:19:17	PR	要把他移開嗎？
8:19:19	FO	你如果能夠移開的話 不行的話…..
8:19:21	PR	我可以
8:19:31	FO	門關起來，不要給客人知道
8:19:36	PR	我們把他抬出來 那個誰幫我抬他
8:19:43	ER	CAL681, cleared from present position direct to TIA, direct TIA, over。
8:19:50	FO	CAL681, roger。
8:20:04	FA	把那個 Cart 鬆開我們把他....把那個帘子拉起來，把那個帘子拉起來然後我們把他.....
8:20:22	FO	盡量不要碰到我的操控
8:20:52	FO	CAL681 roger.Frequency change for only five minutes to report the company。
8:21:00	ER	CAL681, roger what?
8:21:03	FO	Request change frequency for 2 minutes to contact company。
8:21:08	ER	CAL681, roger, approved, and cleared descend and maintain FL290, over。
8:21:13	FO	290, roger, leaving now。
8:21:15	ER	Roger。
8:21:19	FO	Operation, CAL681
8:21:27	FO	Operation, CAL681
8:21:34	OP	681 Go ahead, Sir
8:21:36	FO	681 Returning to Taipei 那個機長已經昏迷了，我現在要回台北落地， 落地之後請求拖車在跑道旁邊 Standby 好了，我不想滑行飛機，現在狀況比較忙沒時間準備
8:21:47	OP	教官你預計到場幾點
8:21:49	FO	我們現在離在西港附近大概到場大概 20 分鐘左右
8:21:55	OP	教官麻煩你把病人座位號碼假如有空的話告訴我們 我們通知運務組好嗎？

8:22:00	FO	不是病人是機長昏迷了我們現在要回去了我沒有空跟你多講 麻煩準備一架救護車拖車就這樣謝謝
8:22:07	OP	Copy
8:22:09	FO	Taipei Control, CAL681 back on frequency。
8:22:14	ER	CAL681, roger, remain this frequency, and proceed direct to TIA, over。
8:22:20	FO	Present position direct to TIA, and descend passing FL300 to FL290。
8:22:25	ER	CAL681, Roger。
8:23:24	FO	Taipei Control, CAL681 reach and maintain FL290.And possible request longe final for runway 05L
8:23:32	ER	.7 for further, over。
8:23:39	ER	CAL681, contact Taipei Control 126.7 for further, over。
8:23:44	FO	126.7, CAL681, thank you!
8:23:47	ER	You are welcome。
8:23:49	FO	Taipei Control, CAL681 maintaining FL290。
8:23:53	WR	CAL681, Taipei Control, Roger, 30 miles south of Shikang, descend and maintain FL270。
8:24:00	FO	Descend and maintain FL270, CAL681。
8:24:04	FO	Taipei Control if possible, 681 request long final for runway 5L。
8:24:09	WR	CAL681, copy, and do you need fuel dumping?
8:24:13	FO	Negative, Airbus unable dumping fuel。
8:24:17	WR	Thank you.
8:25:52	WR	CAL681, Fly heading 360 for vector to final approach course, maintain FL270
8:25:59	FO	Heading 360,and maintain FL270 CAL681
8:27:15	FO	Taipei Control, CAL681, any chance direct to Karan ?
8:27:20	WR	CAL681,say again your request ?
8:27:22	FO	Request direct to Karan.
8:27:27	WR	You mean the Karan ?
8:27:28	FO	Yes, affirm.
8:27:30	WR	CAL681, can you accept direct to "Bravo".
8:27:34	FO	Affirmative thank you, direct to "Bravo"
8:27:36	WR	Affirmative, direct to "Bravo"
8:29:06	WR	CAL681, descend and maintain FL250
8:29:14	WR	CAL681, descend and maintain FL250
8:29:19	FO	Descend and maintain FL250, CAL681, thank you
8:29:23	FA	教官還要多久時間？
8:29:25	FO	大概再 20 分鐘
8:29:26	FA	還要那麼久啊

8:29:27	FO	我盡快 再快結構會有危險
8:29:29	FA	你會危險哦 當然安全第一 Captain 他現在是還有救
8:29:35	FO	他現在狀況是怎麼樣
8:29:37	FA	狀況很不好 如果快到的話還有救，到晚的話他的命沒救
8:29:42	FO	哦 Ok 這樣子
8:29:44	FA	地面已經有救護車
8:29:46	FO	有有有
8:29:47	FO	找一個....小哥你英文好不好
8:29:51	FA	我不是很好啦
8:29:52	FO	這樣子啊， 麻煩你坐在旁邊。你現在 你拿那個麥克風麻煩你，你熟悉戴耳機跟 Operation 聯絡
8:30:01	FA	等一下我馬上過來
8:30:09	FO	Taipei Control, CAL681
8:30:39	FO	不曉得，他起飛之後還飛好好的，我看他邊改平之後...我以為他在吹什麼....我問他....， 我看他好像打呼一樣 ..
8:30:49	FA	他睡著了是啊？ 他昏倒了
8:30:51	FO	眼睛是開的， 我以為他在跟我開玩笑， 後來...
8:30:55	FA	把你嚇到了
8:30:56	FO	因為感覺，我以為他開玩笑，平常飛都在跟我開玩笑...
8:31:00	WR	CAL681, traffic 2 O'clock 10 miles south bound, flight level 240.
8:31:05	FO	Say again flight level?
8:31:17	FO	CAL681 got the traffic on TCAS, and also approaching FL250, request priority for landing, and the patient in critical condition.
8:31:26	WR	CAL681, roger.
8:31:28	FA	Ok 教官要怎樣
8:31:30	FO	現在你幫我調一下
8:31:32	WR	CAL681, no ATC restriction on speed.
8:31:36	FO	681, roger, and maintain FL250
8:31:40	FO	是你在 Operation 的 Frequency,公司的亞派中心，因為我可以聽到你們後面講什麼，你跟 Operation 講一下
8:31:48	FA	你現在是接亞派中心是啊？
8:31:52	FO	對，你跟他講 我們 20 分鐘後到
8:31:53	WR	CAL681, descend and maintain FL 230.
8:31:57	FO	Descend and maintain FL230, CAL681.
8:32:01	FO	你跟公司聯絡就好了
8:32:02	FA	好好好，你要跟他講是吧
8:32:04	FO	對
8:32:05	FA	要不要按什麼東西?都不用是吧
8:32:07	FO	你要壓一下

8:32:08	FA	前面壓那一個
8:32:09	FO	其他都不要紅色鈕都不要動，這個往後壓
8:32:12	FA	往後拉
8:32:14	FO	往裡面壓
8:32:15	FA	往裡面壓這樣講話好 Ok，好現在跟亞派中心發一次
8:32:18	FO	這樣往前面壓好了，這比較保險
8:32:20	FA	喔這個
8:32:21	FO	往前面壓講話然後放開
8:32:23	FA	這個可以接亞派中心嗎
8:32:25	FO	壓的時候講話
8:32:26	FA	亞派中心
8:32:29	OP	請講
8:32:31	FA	他講話我們放掉是不是,要不要放掉
8:32:32	FO	要
8:32:34	FA	亞派中心這是 681 的組員我們的 Captain 剛剛起飛以後身體不太舒服目前已經昏倒了我們把他擺在 G1 請了一個內科醫生在幫他救治 我們大概 20 分鐘會到達到達這個台北機場
8:32:50	OP	681 您的 Message 我們都已經抄收了我們都已經知道了我們已經通知相關單位已經準備一切的設施 您要按照您的工作程序來做操作好了
8:33:02	FA	目前 Captain 情況很不好 醫生講很不好 我們必須在短時間內落地 而且急救設施要幫他準備好 才可以...他的... 他的性命才有一點希望
8:33:12	OP	Ok 我們已經全部通知安排好了 我們能不能再請教一下 現在是不是由 FO 林欣在操作飛機
8:33:19	FA	對 FO 在操作飛機,我不是 FO 我是 Flight attendant
8:33:24	OP	Copy 謝
8:33:28	FO	是這樣的,你那邊幫我就好,因為你必須監視我的狀況,因為下面有備用,如果有....
8:33:35	FA	如果我聽到他,然後我看你操作,對不對
8:33:37	FO	如果有狀況不正常,我告訴你只做兩件事情,第一個壓這個按鈕,就壓這個按鈕而已
8:33:43	FA	這是什麼樣子的一個按鈕
8:33:44	FO	這個是保持高度
8:33:45	FA	保持高度
8:33:46	FO	對,第二個按鈕把這個轉到 250
8:33:49	FA	250，就轉這個是吧往下轉目前不要轉
8:33:53	FO	現在 315 轉到 250，確定這 2 個燈要亮著
8:33:57	FA	喔確定這 2 個燈亮,壓只壓一個不是壓兩個，是只壓一個
8:34:01	FO	壓一下就這樣子

8:34:02	FA	壓一下就好
8:34:03	FO	這 2 個燈亮就對了
8:34:04	FA	喔這 2 個燈亮,如果要保持高度就這個開的是吧
8:34:08	FO	然後剩下的按照剛剛的方法跟航務聯絡，跟 OD 聯絡,如果我怎麼樣你請他協助
8:34:14	FA	好好好
8:34:16	FA'	到還要多久？
8:34:18	FA	大概 15 到 20 分鐘左右
8:34:19	FO	15 分鐘左右
8:34:22	FO	後面廣播了沒
8:34:24	FA	不敢廣播，客人知道還得了
8:34:27	FO	要告訴他們要回航,是這樣的
8:34:28	WR	CAL681 descend and maintain FL170
8:34:30	FA	好,那我告訴他們回航,好不好
8:34:33	FO	Descend and maintain FL170 CAL681
8:34:35	FA	那個 Interphone 在那裡,我用 Intercom 告訴他們回航,
8:34:40	FO	還是我廣播好了
8:34:41	FA	你廣播是吧,Ok Ok,
8:34:50	FO	各位女士，各位先生,這是副機長代表機長廣播,很抱歉告訴各位由於飛航操作的因素我們必須回航台北落地,我們預計在 15 分鐘之後就到達台北中正國際機場,對各位造成不便在此表示歉意。Ladies and gentleman due to aircraft maintenance problem, we have to return back to Taipei International Airport. About landing at CKS Airport about 15 minutes from now. Sorry for the inconvenience to you.
8:35:20	FA	關好了
8:35:23	FO	這樣就好了
8:35:24	FA	這個燈不亮沒關係
8:35:28	FO	沒關係,我現在在下降
8:35:31	WR	CAL681 descend and maintain FL150
8:35:35	FO	Descend and maintain FL150 CAL681
8:35:47	FO	你就監視我情況就好,飛機操作不會有問題，我落地之後，你幫我看幾樣東西就好大約看，避免我因為我落地後有一些要對答.這邊要有兩個綠燈，大概在 4,5 秒之後.這裡這裡會有兩個綠燈.如果沒有兩個綠燈的話，就叫.就這樣就好.
8:36:12	FA	如果沒有兩個綠燈,我就要通知你
8:36:13	FO	對
8:36:14	FA	這兩邊兩個綠燈,是嗎?在差不多幾仟呎以下的時侯.
8:36:17	FO	沒有沒有，若 Touch down 之後,你看大約 3 到 4 秒,沒有綠燈，你就喊一下.
8:36:24	FA	一 Touch down 就應該要有綠燈,
8:36:25	FO	你一叫我名字,我就知道了.

8:36:29	FA	你就要有另外的操作
8:36:30	FO	那就是 Reverse 要拉,
8:36:33	FA	Reverse 沒拉它不會亮,
8:36:35	FO	我們飛機重量重，不想用太多跑道，儘量趕快把 Captain 送回去
8:36:40	WR	CAL681 descend and maintain FL150
8:36:44	FO	Descend and maintain FL150 CAL681
8:36:46	WR	CAL681 affirmative and depart B DME fix turn right intercept ILS runway 06 final approach course by yourself
8:36:56	FO	CAL681 confirm can we request 05L
8:36:59	WR	Stand by
8:37:11	FO	你幫我看那邊牌子是 Cat II?
8:37:15	FA	是 Cat II
8:37:16	WR	CAL681 depart xerox correction, depart B Dmx fix intercept runway 5L localizer over
8:37:25	FO	Depart B intercept 5L localizer CAL681 thank you
8:37:29	WR	不客氣
8:37:38	FO	你現在把那兩簾子拉起來，謝謝
8:37:41	FA	這兩個
8:37:41	WR	Break, CAL681 contact Taipei Approach 125. 1 see you
8:37:44	FO	不好意思麻煩你了
8:37:45	FA	沒有沒有，大家都是同機一命
8:37:51	FO	中華 681 簽派中心呼叫
8:37:54	FA	簽派中心在呼叫
8:37:57	FO	簽派中心在叫 681 嗎?那你跟他通話就好
8:38:00	WR	CAL681 Taipei
8:38:02	FA	CAL681 請講(OP),
8:38:03	FO	CAL681go ahead
8:38:03	FO	681 go ahead
8:38:04	WR	CAL681 contact Taipei Approach 119 ,correction 125.1 over
8:38:10	FA	聽不太清楚請麻煩再講一次
8:38:10	FO	125.1,CAL681 good day
8:38:13	WR	Good morning
8:38:15	C1	CAL681, Taipei
8:38:16	OP	副駕駛用 Auto landing
8:38:17	FO	681, CAL681 with you, passing FL178 for 150.
8:38:23	FA	FO 教官正在對話,請麻煩再講一次,
8:38:23	C1	CAL681 Taipei Approach, ident, descend and maintain 11 thousand, Taipei QNH 1013 runway 05L.
8:38:26	OP	麻煩你通知 FO 用 Auto landing
8:38:31	FO	1013 ,11 thousand, descend 11 thousand, CAL681 thank you,

		say again wind.
8:38:37	FA	請現在再講一次好嗎?剛剛正在對話聽不見
8:38:38	C1	CAL681 now the wind is 070 at 14.
8:38:43	FO	Thank you.
8:38:44	FA	他現在要跟你對話是不是
8:38:46	FO	OPS, CI681 go ahead
8:38:52	OP	上面要求 Autoland
8:38:53	FO	Autoland roger,先告訴你哦,按照 Procedure 的話 Auto land is not recommend,不過你要求的話,基本上我會 Monitor 應該沒有問題
8:39:09	OP	這是我們處長及總機師是希望他用 Auto land 下來
8:39:11	C1	CAL681 descend and maintain 4000.
8:39:15	FO	Roger 你告訴他,我現在是 Over weight,我會執行 Auto land,如果不正常,我再解掉
8:39:19	OP	Roger 謝謝
8:39:19		CAL681 descend and maintain 4000.
8:39:24	FO	Confirm 681 descend to 4000.
8:39:26	C1	CAL681 affirmative, descend and maintain 4000.
8:39:30	FO	Descend And Maintain 4000, CAL681, and request high speed below one zero thousand.
8:39:34	C1	CAL681 approved as requested.
8:39:37	FO	CAL681 thank you.
8:39:44	FA	自動降落哦，但是我們的重量太重
8:39:47	FO	這些人都…..
8:39:48	C1	CAL681 depart BRAVO turn right heading 080 intercept localizer runway 05L.
8:39:54	FO	080 depart from BRAVO intercept localizer runway 5L, CAL681.
8:40:06	FA	教官，你這樣都要聽他們嗎?如果這個 SOP 不合的話,
8:40:11	FO	沒有啦，不會有問題,不過這個飛機結構要 Ground 下來檢查，是沒關係
8:40:19	FA	是沒有關係， 如果有危險…
8:40:21	FO	不會有危險，我落也不會有危險
8:40:24	FA	對，如果你有把握，若他剛剛指示有違我們的安全的話，還是要照標準程序啊!
8:40:31	FO	不會危險
8:40:32	FA	因為總機師跟處長都不是 AB6 的駕駛員,對不對
8:40:47	FO	Auto Land 可以,因為我會 Monitor,如果有問題我會解掉,這個 Auto land 有一些 Monitor 的程序,如果太,可能會重一點,請小姐儘量坐好,Captain 要把他 Secure 好,
8:40:55	FA	他會 Warning 是啊

8:41:00	FA	哦，這樣子，我先去跟他講一下，請他們都坐好，還有多久?他說肆仟呎現在還在一萬一，對不對很快就到?
8:41:17	FO	對對,我們很快就到了,大概還有六、七分鐘左右。
8:42:35	FO	681 establish on localizer runway 5L.
8:42:38	C1	CAL681 roger, 25 miles from outer marker, cleared ILS runway 05L approach.
8:42:44	FO	Cleared ILS runway 5L approach, CAL681.
8:43:17	FO	五分鐘落地
8:43:21	FA	我們還五分鐘落地
8:44:16	FA	不要緊張，教官,哈哈哈,慢慢來，把它從頭再想一遍,不會有問題啊!這一架又是最新的飛機嘛
8:44:29	FO	我現在比較擔心的是 Captain，比較不擔心飛機
8:44:53	677	OPS, 677
8:44:55	OP	張教官,葉嘉偉葉教官來有請您稍為注意一下 681 的情況
8:45:04	677	Ok，他什麼情況
8:45:05	OP	681 Captain 在 In Flight 時候昏倒了，現在是 FO 現在準備要回來落地
8:45:11	677	現在叫我幹什麼
8:45:14	OP	葉教官請你 Monintor681 的情況
8:45:18	677	我在 Gate 啦!在 Gate 怎麼 Monitor 它
8:45:20	OP	是啦!剛剛電話來是這樣子，有勞您這個聽一下如果需要時給予協助
8:45:25	677	Ok，我就在 Approach 波道
8:45:54	C1	CAL681 contact Taipei Tower 118.7, Good day.
8:45:58	FO	118.7 Good day CAL681.
8:46:10	FO	Taipei Tower CAL681 ILS runway 05L twelve miles.
8:46:17	C2	CAL681 Taipei Tower, runway 05L, wind 080 at 17, QNH 1013 cleared to land.
8:46:25	FO	Cleared to land CAL681, runway 5L roger, please say again the wind.
8:46:29	C2	CAL681 surface wind 080 at 17.
8:46:34	FO	080 at 17 CAL681
8:46:36	AREA	Gears down
8:46:37	FO	待會叫一個警報，不要管它
8:46:38	677	Ok，林欣,我是張建和，有沒問題,沒問題吧!
8:46:42	FO	沒問題，我現在十浬進場 ILS。
8:46:46	677	Ok, Auto land over weight 情況之下
8:46:50	FO	Roger，現在 APU 什麼都 Start,按照 Procedure
8:46:52	677	Flare 不夠，如果認為 Flare,如果不夠，就 Release 幫它 Flare 一下
8:46:57	FO	Yes,roger
8:46:58	677	Ok.

8:47:00	FO	還是要看著辦
8:47:06	FA	那你待會是怎麼樣，你 Release 後,就踩煞車
8:47:09	FO	對,我用自動煞車
8:47:12	FA	你用自動煞車，那你如果感覺不對就趕快用自己煞車
8:47:18	FO	好小哥抱歉現在我不能跟你講話
8:47:43	677	OPS 677
8:47:45	OP	教官請講教官
8:47:46	677	請問 681 的那個 Captain 是那那個 Medical emergency 的設備準備好了沒？
8:47:53	OP	全部準備好了準備好了教官那個董先生希望你能夠 Monitor 協助他
8:47:59	677	是的 我們的 IP 已經跟林欣連絡上了現在他在七八哩的 Final 馬上就要落地我們等他落地平安落地再 Push Back
8:48:08	OP	Roger Roger
8:48:10	677	目前看起來沒有什麼問題
8:48:14	FO	(唸 Final check list)
8:48:36	AREA	通過 OM
8:48:42	FO	OM, 1400 Check
8:48:59	677	林欣,你現在幾哩
8:49:02	FO	3.5
8:49:03	677	Ok 注意 FMA 上的 Flare,最重要的是 Flare 還有 Thrust retard，如果沒有 Flare ，馬上 Release，然後 Manual Flight
8:49:04	FO	Check
8:49:25	FO	Wind check please,
8:49:30	C2	中華 681 這是台北塔台。
8:49:32	FO	請講。
8:49:33	C2	剛才跟你通話的是不是你們的 OD。
8:49:37	FO	IP.
8:49:39	C2	請問他怎麼發射這個波道的。
8:49:43	FO	我不曉得。
8:49:44	FO	現在我沒空講話
8:49:46	C2	能不能跟我們通知一下，還有其他飛機在管制當中。
8:49:49	FO	Roger I am landing now.
8:50:08	AREA	Three hundred
8:50:15	AREA	Two hundred (Sound of IM)
8:50:23	AREA	One hundred
8:50:28	AREA	Fifty
8:50:30	AREA	Thirty, fifteen, ten, frive
8:50:37	AREA	落地聲
8:50:41	FO	Reverse check, manual brake"80"
8:50:49	FO	Eighty

8:50:57	FO	Fans on ,Sixty ,Idle thrust
8:51:15	AREA	Sound of auto pilot disengagement
8:51:18	C2	CAL681 high speed N7 turn off, and cross runway 05R, contact ground 121.7.
8:51:25	FO	681 roger, we vacate runway on the 23L and stand by for the tow car.
8:51:32	C2	Ok, CAL681 left turn join runway 23L, and hold between N9 and N7, stand by further.
8:51:56	FO	Operation 681 落地
8:51:59	OP	教官謝謝您恭喜謝謝
8:52:01	C2	CAL681 contact Taipei Ground 121.7 for further.
8:52:05	FO	121.7 CAL681.
8:52:08	FO	Ground CAL681 holding N7.
8:52:11	C3	CAL681 Taipei Ground roger, confirm you want tow car.
8:52:18	FO	681 where is our parking bay?
8:52:21	C3	CAL681 confirm you need a tow car to tow you to bay 608.
8:52:26	FO	608 roger, so we need tow car.
8:52:29	C3	CAL681 roger now hold your position.
8:52:34	FO	Hold N7, CAL681.
8:53:07	FO	OPS, CAL681
8:53:09	OP	681 go ahead
8:53:11	FO	拖車要多久
8:53:13	OP	教官，馬上就好,請 Standby
8:53:15	FO	儘快哦，我們 Captain 有問題,趕快
8:53:18	OP	Copy
8:53:29	C3	CAL681 taxi a little bit ahead and hold between N7 and N9.
8:53:36	FO	681 roger
8:53:38	C3	中華 681，台北。
8:53:40	FO	請講
8:53:52	FO	681 請講
8:53:54	C3	中華 681，台北。
8:53:56	FO	681 請講
8:53:59	C3	中華 681，台北。
8:54:01	FO	中華 681，請講。
8:54:04	C3	教官請你原地稍待。
8:54:07	FO	瞭解，左前方一台車不能滑行。
8:54:10	C3	對的，你要在原地稍待一下。現在地面消防車在通行。
8:54:14	FO	Roger.
8:54:21	FO	.....Tow car 要等到民國幾百年
8:55:04	C3	中華 681，台北。
8:55:06	FO	681 請講。

8:55:07	C3	681 你留在原地稍待，現在請你關車。
8:55:11	FO	關車
8:55:13	FO	681 Roger.。
8:55:37	FO	Ops,中華 681
8:55:42	OP	681 請講
8:55:43	FO	拖車到底要多久
8:55:45	OP	Tow car 已經出來了，我不曉得他們在拖什麼,請再 Standby 一下
8:55:49	FO	上面是人命
8:56:13	FO	XXXX
8:56:40	FO	拖客人的飛機…..
8:57:16	FO	Operation CAL681
8:57:20	OP	Go ahead please
8:57:21	FO	拖車到底來不來,再不來我自己開車滑行
8:57:25	OP	你能不能跟塔台連繫一下，我們通知拖車很久了,拖車沒有過來，如果你通知塔台,同意的話，你可以先滑行
8:57:37	FO	拖車跑去拖 Pax Aircraft,上面機長死了誰要負責
8:57:45	OP	Roger roger
8:57:47	FA	塔台讓你滑 ,你就滑了嘛
8:57:48	FO	我引擎關了
8:57:50	FA	哦,那你引擎關了，你不能跟塔台連絡?
8:58:29	FO	地面中華 681。
8:58:31	C3	請講。
8:58:33	FO	Request start engine，Tow car 等太久了，Captain 可能會有問題，我想 Request start engine，自己滑。
8:58:39	C3	好的，可以自己開車。
8:58:41	FO	謝謝。
8:59:25	C3	中華 681，台北。
8:59:26	FO	681 請講。
8:59:27	C3	681 準備好滑行的時候通知一下。
8:59:29	FO	Roger 兩分鐘。
9:00:04	FO	從剛剛還沒改平我就想上廁所
9:00:07	AREA	都…(Cockpit interphone call)
9:00:08	FO	回答他一下
9:00:11	FA	請講
9:00:12	FO	681Ready for taxi
9:00:14	C3	681 你跟著前方有一輛航務組黃車，跟他滑，預計走 Echo。
9:00:22	C3	681 請你稍待一下，你飛機底下有人，我們通知他們離開。
9:00:26	FA	底下飛機底下有人
9:00:28	FO	Roger 啊Tow car 來了 我等 Tow car 我Shutdown engine 謝謝

9:00:30	FA	我跟你講教官已經催了很久,我們公司規定 FO 不准滑,現在拖車來了，拖車來了（Interphone 對後艙）
9:01:03	FO	地面座艙，GND Cockpit GND Cockpit
9:01:13	GND	Cockpit from GND.
9:01:14	FO	Go ahead
9:01:15	GND	請把 Gear pin 從窗戶上面丟下來好嗎?我們必需把 Gear pin 插上才可以拖
9:01:20	FO	你們沒有 Bypass pin 嗎?
9:01:22	GND	Bypass pin 已經插好了
9:01:24	FO	那為什麼需要 Gear pin 呢?
9:01:26	GND	這個是機場的規定,要把 Landing gear 的 Gear pin 插起來,才能拖
9:01:31	FO	我現在一個人怎麼離開座位?
9:01:35	GND	好請稍待
9:01:38	FO	Parking brake 要不要 Release
9:01:41	GND	暫時先不用，因為拖車還沒接起來
9:01:47	FO	規定，規定，XXX 了,還規定
9:01:59	FO	他要上來嗎？他要從底下上來
9:02:19	FO	他應該會推開，你幫他開一下好了
9:02:22	GND	麻煩你開一下我們人員上去拿 Gear pin，
9:02:28	FO	不要踩到 不要踩到蓋子
9:02:37	FO	地面座艙
9:02:39	GND	請講
9:02:40	FO	抱歉態度不太好,因為機長.....
9:02:45	GND	我們知道我們知道
9:02:49	FO	把它蓋著就好
9:03:11	FO	要拖車的時候 腳踏板絕對不要碰到
9:03:17	FA	他的煞車吧？
9:03:25	FA	這個要鬆
9:03:26	FO	還沒，等他
9:03:27	FA	等他叫
9:03:28	FO	Standby for the parking brake
9:03:32	GND	Cockpit from ground
9:03:33	FO	Go ahead
9:03:34	GND	教官請鬆煞車
9:03:37	FO	煞車鬆，請拖，謝謝
9:03:39	GND	拖動
9:03:43	FA	請講(對後艙)
9:03:48	FA	教官已經在催了很多次，但是公司有公司的規定，公司不讓他滑行在這邊等，拖車已經接上了，馬上就走了，好不好 他已經催了很多次

9:04:27	FO	Operation CAL 681
9:04:33	FO	Operation CAL 681
9:04:35	OP	Go ahead 681
9:04:37	FO	那個樓梯車有沒有在停機坪旁待命,機長拖太久了,拜託麻煩，一定要在旁邊待命
9:04:44	OP	Copy
9:04:45	FO	謝謝
9:05:40		End of recorder

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附錄二　中正塔台地面席／消防車／中正航務組指揮／救護車無線電(頻道459.2MHz)通訊紀錄抄本

I HEREBY CERTIFY THAT THE FOLLOWING IS A TRUE TRANSCRIPTION OF THE RECORDED CONVERSATIONS PERTAINING TO THE REPORTED CASE.

Name：林怡忠

Title：塔台長

中正塔台地面席/消防車/中正航務組指揮/救護車無線電(頻道459.2MHz)通訊紀錄抄本

TRANSCRIPT OF COMMUNICATION BETWEEN Taipei TWR Ground Control/ Fire Engine/ FOC/ Ambulance, on May 8, 2000 on CH One (459.2).

UTC	Com.	Contents
003200	救護車	消防隊，救護車呼叫。
	消防隊	救護車請你不要呼叫，請你在原地待命。
	FOC	航務一號，...呼叫。
	FOC 1	航務一號回答。
003212		他在 6 號跑道。
		是的，謝謝。
003217	消防車	塔台，南站消防車脫離 24。
	塔台	Roger。
	??	塔台，請問一下，在 SP 上的 EVA 的飛機要拖到哪裡？
	塔台	他待會兒要拖到 B5，現在讓他到 S6 上稍待可以嗎？
		S6 上稍待是嗎？
	塔台	會不會影響到你們？
	塔台	SP 上的長榮拖車，塔台。
	長榮拖車	長榮拖車回答，請講。
	塔台	你現在左轉加入 S6，在 SS 外稍待。
	長榮拖車	長榮拖車瞭解，謝謝。
003318	消防車	北站消防車直接切入這個接駁機坪，我們走接駁機坪裡面。
	消防車	北站消防車收到。
003450	FOC103	塔台，黃車 103 呼叫，Over。
	FOC103	塔台，黃車 103 呼叫，Over。
003505	塔台	請稍待。
003510	FOC103	103 位置在 W 交通道，請求經 W、SP 到 S1 Stand by, over。
003517	塔台	黃車 101，可以通行。

	FOC103	103 可以通行。
003523	消防車	塔台，北站消防車已到達 608 待命，請問回航航機還多久可以落地？
	塔台	目前還沒有消息。
	消防車	Roger。
003535	塔台	預計是 45 分。
	塔台	預計落地時間是 45 分。
	黃車 103	塔台，黃車 103 已到 S1 Stand by，over。
	塔台	稍待。
	消防二號	救護車，消防二號。
	救護車	請講。
003740	消防二號	請你到消防車一號旁邊來。
003745	塔台	OK，航務組消防車跟黃車 103，塔台。
		黃車 103 回答，請講。
		塔台，黃車 103 回答，請講。
003802	塔台	中華 681 現在請求用 5 左落地，用 5 左落地，請你們移防到北邊來。
		Roger，103 由 SC、W 到 5 左跑道，over。
	塔台	Roger，可以走 SC、W 進入 NP 前呼叫。
		Roger，NP 前呼叫。
003832	???	N10 北面消防車到 N6 待命。
003840	塔台	塔台廣播，消防車你們可以走滑行道，然後自行避讓航機。
		消防車 Roger 請求進入 E。
	塔台	可以的。
003903	消防一號	塔台，消防一號呼叫。
	塔台	請講。
	消防一號	位置 608，請求進入 SS、W 到 N6 待命。
	塔台	可以的。
003937		到 N10 待命。
		Roger。
003942	消防 108	消防 108 航務組。
	航務組	108 回答。
003948	航務組	你有沒有帶手機，能夠，可以的話，打個電話到航務組來給我。
	消防 108	Roger。
004002	黃車 103	塔台，黃車 103，預計到達 NP 前，Over。
004018	黃車 103	塔台，黃車 103，是否可以繼續由 NP 到 N1 Stand by，over。
004030	黃車 105	103，105 現在在國內機坪待命。
	黃車 103	Roger。

004048	消防車	塔台，消防車位置在 W 前，請求由 NP 前往 N6 待命。
	塔台	可以到 N6。
004058	消防車	收到，可以到 N6。
004110	黃車 101	塔台，黃車 101 呼叫。
	塔台	101 呼叫塔台嗎？
004117	黃車 101	101 現在位置在 E Cross 跟 NP 交口，我們請求進入副跑道。
	塔台	103 對不對？
004125	黃車 101	黃車 101。
	塔台	101 可以進入副跑道。
004135	黃車 101	塔台麻煩可不可以告訴我們一下，681 預計甚麼時候可以落地。
	塔台	現在螢幕上看不到。
	黃車 101	請你有進一步消息，麻煩廣播。
004145	塔台	OK，中華 681 預計在 7 分鐘後落地。
	黃車 101	Roger，在 7 分鐘後落地。
004158	消防車	塔台，北站消防車已到 N6 待命。
	塔台	Roger。
004205	消防車	塔台，南站消防車到達 N10 待命。
	塔台	Roger。
004228	黃車 103	塔台，黃車 103 請求由 NP 到 N6 Stand by，over。
	塔台	103 可以的。
	黃車 103	Roger 103。
004306	黃車 105	103，105 呼叫。
	黃車 103	103 回答請講。
004312	黃車 105	等一下航機落地，我就直接 Follow 飛機了。
	黃車 103	Roger。
004324	塔台	塔台廣播，中華 681 在五邊 25 浬。
	消防車	消防車 Roger。
004550	黃車 103	105，黃車呼叫 103，over。
	黃車 105	105 回答。
004555	黃車 103	它待會脫離跑道後，我 follow 他到接駁機坪，over。
	黃車 105	Roger，跑道上面交給我。
	黃車 103	Roger。
004628	塔台	塔台廣播，五號跑道五邊要落地的就是中華 681。
	消防一號	消防一號 Roger。
004642	黃車 105	塔台，105 現在在國內線機坪，681 落地後我直接進入 follow。
	塔台	105，Roger。

	黃車 105	謝謝！
004845	黃車 101	塔台，黃車 101 呼叫。
	塔台	101 請講。
004854	黃車 101	請問五邊落地的飛機，是不是中華 681？
	塔台	對的，現在要落地的就是中華 681。
	黃車 101	101，Roger。
004906	黃車 103	塔台，黃車 103 呼叫，Over。
	塔台	103 請講。
	黃車 103	請問落地 681 有沒有預計由那一個滑行道脫離，over。
	塔台	我沒辦法預測，看他自己的落地情況。
	黃車 103	oh，over。
004923	中華拖車	塔台你好，中華拖車。
	塔台	中華拖車，請講。
	中華拖車	中華 605 在維護區拖往 A4 號，請放行。
	塔台	稍待。
	中華拖車	Roger，在維護區稍待。
005015	消防一號	塔台，消防一號呼叫。
	塔台	消防一號，請講。
		….
	塔台	落地以後你們可以自行進入跑道。
	消防車	Roger，謝謝。
	塔台	飛機落地後，你們可以自行進入跑道。
005122	航務員	消防車不要進入跑道，走副跑道就可以了，速度放慢。
	消防車	消防車知道。
005134	中華拖車	塔台，中華拖車呼叫。
	塔台	拖車，有飛機要走 E，請稍待。
	中華拖車	好，謝謝。
005152	消防車	南站消防車跟塔台呼叫，現在歸隊。
	塔台	南站消防車 Roger。
005200	消防車	塔台，南站消防車現在脫離 N10。
	塔台	Roger。
005206	消防車	北站消防車除救護車外，都可以呼叫歸隊。
	塔台	北站消防車知道。
005253	黃車 101	塔台，黃車 101 呼叫。
	塔台	101 請講。
	黃車 101	現在 681 停在副跑道上，現在下一步準備怎麼樣？
005300	塔台	他要找拖車拖行，他不自己滑，要找拖車拖。
	黃車 101	101roger。

005310	塔台	所有消防車都可以撤離了，謝謝。
	消防一號	消防一號，roger，謝謝。
005318	救護車	塔台，請問一下需不需要救護車？
	塔台	救護車現在先稍待一下。
	救護車	救護車我建議你還是跟著飛機好了。
005335	消防車	塔台，北站消防車呼叫。
	塔台	北站，請講。
005340	消防車	北站消防車請求 N7 回北機坪。
	塔台	Roger，可以的。
005355	消防車	北站消防車注意，現在飛機滑行。
005410	黃車 105	塔台，105 脫離五左跑道，Runway clear。
	塔台	Roger，謝謝。
005416	消防車	塔台，南站消防車請求穿越 24 跑道至南消。
	塔台	你可以過 24。
	消防車	謝謝，可以過。
005434		黃車 101，這個中華要用拖車拖嗎？
	塔台	中華拖車，OK，可以拖行，E 交通道前呼叫。
	中華拖車	中華拖車，可以拖行，北消前呼叫，謝謝。
005455		中華 681 是不是要用拖車拖回來？
	塔台	對的。
	黃車 101	拖車要用拖桿，請你準備拖桿，通知可以到副跑道上。
		好！好！知道。
005508	消防車	塔台，北站消防車脫離北邊跑道，進入北消，謝謝。
	塔台	Roger。
005514	消防車	塔台，南站消防車脫離 24，謝謝。
	中華兩號拖車	塔台，中華兩號拖車呼叫。
005522	塔台	中華兩號拖車，請講。
		飛機貨機 617 在 Cargo511，拖回中華維護區，請放行。
005538		Cargo511 的現在可以後推。
005548	黃車 101	桃勤拖車，航務組黃車 101 呼叫。
	桃勤拖車	桃勤拖車。
	黃車 101	請問你們拖車位置在那裡？
	桃勤拖車	我們現在準備拖，還沒有。
005612	黃車 101	請儘快過來，請儘快，謝謝。
005704	塔台	Cargo511 的，你要拖到甚麼位置？
		Cargo511 的要拖回中華維護區。
005711	塔台	Roger，後推完成之後，往前拖，暫時不要進入 E。
		Roger，謝謝。

005818	塔台	黃車 101，塔台。
	黃車 101	黃車 101，回答。
	塔台	黃車 101，塔台。
005849	塔台	黃車 101，塔台。
	黃車 101	塔台，黃車 101 回答。
005854	塔台	中華 OD 通知，中華 681 請他再開車，自行滑到 608。
	黃車 101	Roger。
005904	黃車 101	我們引導他到 608，謝謝。
005911	塔台	OK，我請他自行開車，然後，開車完畢就用滑行的。
	黃車 101	現在 E 上面這個,他是不是要走 E 過去。
005918	塔台	那我可以安排。
	黃車 101	Roger。
005940	塔台	黃車 101,我們請飛機跟著你,走副跑道、E 到 608。
	黃車 101	101，Roger。
010025	塔台	黃車 101，塔台。
	塔台	黃車 101，塔台。
010039	黃車 101	101 回答。
	塔台	黃車 101，塔台。
	黃車 101	塔台，黃車 101 回答。
010046	塔台	現在拖車又過去了，可能又要變更了。
	黃車 101	101roger，101 還是在副跑道等待。
010051	塔台	Roger。
010245	黃車 101	塔台，黃車 101 現在脫離副跑道，回到北機坪，脫離波長，謝謝。
	塔台	101，Roger，謝謝。
010388	桃勤拖車	塔台，桃勤拖車。
	塔台	桃勤拖車，請講。
	桃勤拖車	現在副跑道的拖車，現在準備好了，是不是可以開始拖。
010345	塔台	好，你走副跑道，然後 ECHO 到南邊。
	桃勤拖車	好，知道。
011054		塔台，CAL681 是不是繼續拖到 608。
	塔台	CAL681 走 SP 到 608。
		Roger，知道，SP 到 608，謝謝。
011122	塔台	桃勤拖車 CAL681，塔台。
	桃勤拖車	聽到，請講。
	塔台	你在 S6 前面稍待，國泰進來，他第一架飛機進來。
	桃勤拖車	好、好，知道，國泰離開後，我們再到 608。

011136	塔台	對。
011224	塔台	CAL681 拖車直接走 SP 到 608。
		（註：此時桃勤拖車在 ECHO 滑行道上，塔台指示拖車在 S6 前稍待，係為航管隔離之預防措施，桃勤拖車前進過程塔台未曾延誤。）
011600	黃車 105	航務組，105 呼叫，over。
	航務組	請講。
	黃車 105	請一位教官送照相機到 608。
	航務組	608....嗎？
011620	黃車 105	對，照相機。
012005	桃勤小客車	塔台，桃勤小客車呼叫。
	塔台	桃勤小客車，塔台，請講。
	桃勤小客車	桃勤小客車現在在 NP 交通道，W 前，等待許可進入 W 到 608 受傷區去工作。
012023	塔台	桃勤小客車可以通行。
	桃勤小客車	可以通行，桃勤小客車，Roger，謝謝。
012032	塔台	你要走那裡？
	桃勤小客車	我到南面交通道。
	塔台	桃勤小客車，roger。
012128	桃勤小客車	塔台，桃勤小客車，脫離 W，謝謝，再見。
	塔台	桃勤小客車，roger，再見。
013012	航務組	航務一號，航務組。
013020	航務組	航務一號，航務組。
013132	航務組	航務一號，航務組。
013135	航務組	航務一號，航務組。
013144	航務一號	航務一號回答。
		（註：由上述時間至 0140 時均無有關 CAL681 之通話。）

此頁空白

附錄三　CI681 航機／中正近場台／中正塔台／中正地面席無線電(頻道 125.1/118.7/121.9 MHz)通訊紀錄抄本

I HEREBY CERTIFY THAT THE FOLLOWING IS A TRUE TRANSCRIPTION OF THE RECORDED CONVERSATIONS PERTAINING TO THE REPORTED CASE.

Name：林怡忠
Title：塔台長

CI681 航機/中正近場台/中正塔台/中正地面席無線電(頻道 125.1/118.7/121.9MHz)通訊紀錄抄本　TRANSCRIPT OF COMMUNICATION BETWEEN CAL681/ Taipei Approach/ Taipei Tower/ Taipei Ground on May 8, 2000 on FREQUENCY 125.1/ 118.7/ 121.9

P:Pilot of Cal681

C1: Controller of Taipei Approach

C2: Controller of Taipei Tower

C3: Controller of Tapei Ground

UTC	Com.	Contents
003815	C1	CAL681, Taipei
	P	681,CAL681 with you, passing FL178 for 150.
003822	C1	CAL681 Taipei Approach roger, ident, descend and maintain 11000, Taipei QNH 1013 Runway 05L.
003830	P	1013 11000, DESCEND 11000,CAL681 thank you,say again wind.
	C1	CAL681 now the wind is070 at 14.
	P	Thank you.
003910	C1	CAL681 descend and maintain 4000.
	C1	CAL681 descend and maintain 4000.
	P	Confirm 681 descend to 4000.
	C1	CAL681 affirmative, descend and maintain 4000.
	P	Descend and maintain 4000, CAL681, AND request high speed below 10000.
003934	C1	CAL681 approved as requested.
	P	CAL681 thank you.
003946	C1	CAL681 depart BRAVO turn right heading 080 intercept locaizer runway 05L.
	P	080 depart from BRAVO intercept localizer runway 5L,CAL681.
004235	P	681 establish on localizer runway 5L.

	C1	CAL681 roger, 25 miles from outer marker, cleared ILS runway 05L approach.
	P	Cleared ILS runway 5L approach, CAL681.
004554	C1	CAL681 contact Taipei Tower 118.7, good day.
	P	118.7 good day CAL681.
	P	Taipei Tower CAL681 ILS runway 05L twelve miles.
004612	C2	CAL681 Taipei Tower, runway 05L, wind 080 at 17, QNH 1013 cleared to land.
	P	Cleared to land Cal681, runway 5L roger, please say again the wind.
	C2	CAL681 surface wind 080 at 17.
	P	080 at 17 CAL681.
		和哥...你好，有沒有問題，沒問題吧！
004644	P	沒問題，我現在十浬進場 ILS。
		和哥 overload, overweight 的情況之下，就是 flare 會比較不夠，如果認為 flare 如果不夠的話，就是 release 把他調整一下。
	P	Roger.
		OK.
004859		你現在幾浬？
	P	3.5。
		OK，注意上面的 floor，……Floor release,然後 flap….
004930	C2	中華 681，這是台北塔台。
	P	請講。
	C2	剛才跟你通話的是不是你們的 OD？
	P	IP.
004939	C2	請問他怎麼發射這個波道的？
	P	我不曉得。
004945	C2	如果要使用麻煩通知我們一下，還有其他飛機在管制當中。
	P	Roger we are landing now.
	C2	Roger.
005118	C2	CAL681 highspeed N7 turn off, and cross runway 05R, contact ground 121.7.
	P	681 roger, we vacate runway on the 23L and stand by for the tow car.
005130	C2	OK, CAL681 left turn join runway 23L, and hold between N9 and N7, stand by further.
005205	C2	CAL681 contact Taipei Ground 121.7 for further.
	P	121.7 CAL681.
005209	P	Ground CAL681 Holding N7.

	C3	CAL681 Taipei Ground roger, confirm you want tow car.
	P	681 where is our parking bay?
005219	C3	CAL681 confirm you need a tow car to tow you to bay 608.
	P	608 roger, so we need tow car.
	C3	CAL681 roger now hold your position.
	P	Hold N7, CAL681.
005328	C3	CAL681 taxi a little bit ahead and hold between N7 and N9.
	C3	中華 681，台北。
005354	C3	中華 681，台北。
	C3	中華 681，台北。
	P	中華 681 請講。
005403	C3	教官請你原地稍待。
	P	瞭解，左前方一台車不能滑行。
	C3	對的，你要在原地稍待一下。現在地面消防車在通行。
	P	Roger.
005502	C3	中華 681，台北。
	P	681 請講。
005508	C3	681 你留在原地稍待，現在請你關車。
	P	681Roger.
005830	P	地面中華 681。
	C3	請講。
005833	P	Request start engine，等太久了，Captain 可能會有問題，Request start engine，自己滑。
005841	C3	好的，可以自己開車。
	P	謝謝。
005924	C3	中華 681 台北。
	P	681 請講。
	C3	681 準備好滑行通知一下。
	P	Roger 好的。
010012	P	CAL681 ready for taxi.
	C3	681 你跟前方航務黃車，跟他滑，預計走 ECHO。
010034	C3	681 等一下，你飛機下面有人，我們通知他們離開。
	P	靠上來了，我檢查一下 shutdown engine。

此頁空白

附錄四　塔台及航務組之電話紀錄抄本

I HEREBY CERTIFY THAT THE FOLLOWING IS A TRUE TRANSCRIPTION OF THE RECORDED CONVERSATIONS PERTAINING TO THE REPORTED CASE.

Name：林怡忠

Title：塔台長

塔台及航務組之電話紀錄抄本

TRANSCRIPT OF COMMUNICATION BETWEEN Taipei TWR/ Interphone on May 8, 2000 on Telephone NO. 3983023 & 87702192

UTC	Com.	Contents
		….
005440	塔台	塔台。
	航務組	塔台請問一下他那個中華 681 是不是要用拖車來拖？
	塔台	對，他需要拖車。
	航務組	請他在原地熄火。
	塔台	好。
	航務組	請他在原地熄火。
	塔台	熄火是啊？
	航務組	熄火、熄火。
	塔台	好，OK，OK。
		….
005758	TWR	塔台你好。
	CAL OD	你好，我簽派中心。681 可以要他自己滑，因為拖車一直都沒有來到，現在機長已經昏迷很危險。
	TWR	拖車不來，他要自己滑是嗎？
	CAL OD	對，對。
	TWR	機長知道了嗎？
	CAL OD	機長知道，機長他已經在問我們了。
	TWR	好，好。
		….
005827	APP	喂。
	標準組	你好，我是林柔君。
	APP	乀。
	標準組	那個松山塔台電話我們這邊一直撥不進去，那就是說想知道華航從胡志明回來那一班不曉得他進 Cate 了沒，如果沒有，希望不要滑行。

	APP	我不曉得，你等一下。
	標準組	好。
		….
	TWR	請講。
	標準組	喂，塔台嗎？
	TWR	對。
	標準組	你好，請等一下。
	TWR	喂。
	標準組	喂，我華航的 POI，他那個停下來是停在什麼地方？
	TWR	停在副跑道上，然後在 N7 和副跑道交接處。
	標準組	好，好，那就是停下來，現在正在處理是不是？
	TWR	入，你們有一位先生是說請機長自行滑，然後拖車不派出來了是不是這樣？
	標準組	不是，他沒有機...他現在是...我覺得機長...請他派拖車...請他停到副跑道上不擋事的地方...用拖車拖回去好了，因為...
	TWR	他現在擋到了，他現在擋到了。
	標準組	那是不是請他往前滑一點不擋事的地方就好了。
	TWR	是，那你是要請他自己滑，對不對？
	標準組	不要自己滑，請他用飛機....請用拖車。
	TWR	沒有，沒有，你們另一位先生是說請他自己滑，你們拖車不派了。
	標準組	哪位先生？
	TWR	你們另一位。
	標準組	我不是華航，我是民航局。
	TWR	喔！民航局，對不起。
	標準組	我不建議他滑，因為他這個副駕駛沒有接受過滑行訓練。
	TWR	可是他們機長自己這樣子呢！您是哪位？
	標準組	我姓范，范鴻棣。
	TWR	這樣子喔！您是什麼組的？
	標準組	我是華航 POI 主管華航飛安的。
	TWR	喔！可是他因為現在是說他們的簽派員是說...喔！現在拖車又出來了，您是說他們現在要用拖的是不是？
	標準組	對，對。
	TWR	你等一下。
	標準組	我打電話給他們...
	TWR	拖車已經出來了，那他們應該會用拖車拖了。

	標準組	好，好。
	TWR	OK。
	標準組	謝謝。
0010050	TWR	不會。
		....

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附錄五　台北區域管制中心/中正近場台/中正塔台/航空站航務組內部通話紀錄抄本

I HEREBY CERTIFY THAT THE FOLLOWING IS A TRUE TRANSCRIPTION OF THE RECORDED CONVERSATIONS PERTAINING TO THE REPORTED CASE. Name：林怡忠 Title：塔台長		
台北區域管制中心/中正近場台/中正塔台/航空站航務組內部通話紀錄抄本 TRANSCRIPT OF INTERPHONE COMMUNICATION BETWEEN Taipei Area Control Center (TACC) /Taipei Approach (Approach) /Taipei Tower (Tower) /CKS Airport Flight Operation Section (FOS) on May 8, 2000		
UTC	Com.	Contents
001748	TACC	塔台啊，那個中華 681 因為飛機上有乘客生病，待會兒馬上回來，要一輛救護車。
001756	Tower	要一輛救護車，好，謝謝。
001800	TACC	那裡。
001803	Tower	中華 681 要回航你知道嗎？
	Approach	不知道。
	Tower	好！現在告訴你，機上有一名乘客生病，就是這個原因。
	Approach	好！中華 681，好、好，謝謝。
001821	FOS	航務組。
001823	Tower	那個中華 681 說要回來，要回航。
	FOS	中華 681 要回航。
	Tower	原因是機上有一名乘客生病了。
	FOS	有一名乘客生病了。
	Tower	需要一輛救護車。
	FOS	好。
	Tower	時間還沒確定，麻煩排 BAY 一下。
	FOS	好！好！
002030	Approach	教官，中華 681 停那邊？
	Tower	還在安排中。
	Approach	啊？
	Tower	還在安排中。還在安排中。
	Approach	它是從那邊回來的，要去那裡啊！
	Tower	中華 681。
	Approach	香港還是那邊？
	Tower	你看你的起飛條。
	Approach	好，我去找。

002339	FOS	那個回來以後停 608。
	Tower	好，謝謝。
002510	FOS	昏倒了。
	Tower	請。
	FOS	喂，Hello，Captain 昏倒了，所以消防車要出動。
	Tower	甚麼，681 是 Captain 昏倒了。
	FOS	真的，所以消防車要出動。
	Tower	好，瞭解。
002555	Approach	請。
	Tower	中華 681 航務組通知是 Captain 昏倒了。
	Approach	訝？
	Tower	我們要叫消防車。
	Approach	好。
	Tower	消防車，落地後跑道暫時關閉。
	Approach	好。
002653	Tower	妹妹啊。
	Approach	Hello。
	Tower	681 麻煩你跟 radar man 講一下，他是....。
	Approach	Radar man 知道了。
	Tower	副駕駛飛的話，稍微對它們注意一下。
	Approach	好，我們叫 SP 去跟 OD 講。我們發直接進場的許可。
	Tower	對、對，讓他 SMOOTH 進來就好了。
002805	Tower	Hello。
	FOS	這個能不能夠請問一下，還有多久時間落地。
	Tower	他 BRAVO 預計 38 分，大概 45 分吧！
	FOS	45 分落地，OK，好，謝謝。
	Tower	消防隊你通知，還是我們通知？
	FOS	那個，還是你們那邊通知，你要把情況通知他。
	Tower	好，謝謝你。
003255	Tower	請。
	TACC	中華 681 回頭，他要救護車，你們知道哦！
	Tower	知道，講了。
	TACC	OK，好、好。
003313	FOS	航務組你好。
		再跟你確認哦，中華 681 他需要一輛救護車。
		要救護車。
		我剛才，我跟前面那個...。
		好，救護車那個，我再通知。
		謝謝，Bye-bye。

002550		秀秀啊，你在作 D Man，中華 681 到底是飛機有問題還是飛機上的人有問題？
		跟塔台講過了，他要救護車。
002620		現在知道 Captain 昏倒了，誰說的？塔台傳來說，Captain 昏倒了，我來打電話問華航航務中心，我要去問一下，我們給他長五邊直接進來，OK。
003230		西部請講。
		中華 681 申請 First Priority，他說 Patient critical condition，我取消 ATC 速限了。
		OK，好。
003405		我是南部，我給他走最近的路。
		中華 681 你是直飛 TIA。
		我給他走最近的路，後續如何處理？
		好，沒問題，後續我建議跟台中借空域，下到低高度，從後龍 Straght-in 進來，我這邊可以配合，早點下。
		我跟你說，他直飛 TIA 有沒有問題。
		我這邊都沒問題，因為他是 Number One Priority。
003625		中華 681BRAVO FIX 之後自行攔截 ILS 5 左跑道可以嗎？
		6 號，6 號。
		他是 6 號是嗎？
		是的。
003710		中華 681 請求 5 左。
		好，我們消防車重新部署。

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附錄六　心電圖報告

Graded Exercise Summary Report

CIVIL AVICTIOON ME: CAL CENTER

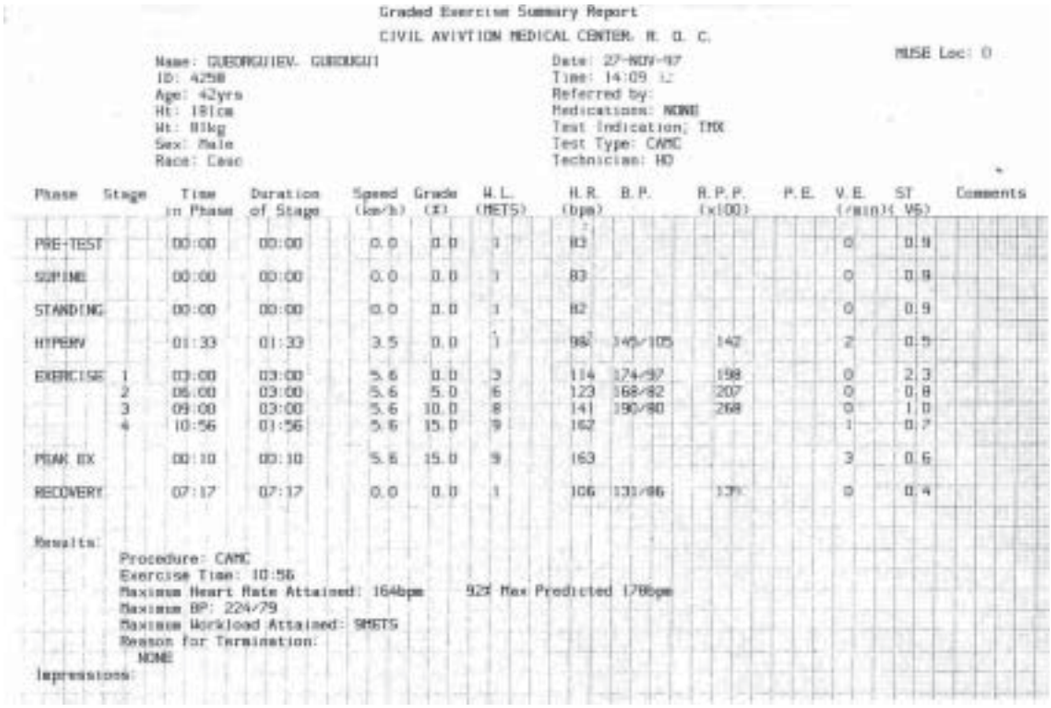
MUSE Loc: 0

Name: GUEORGUIEV. GUEO.
ID: 25044
Age: 43yrs
Ht: 181cm
Wt: 81kg
Sex: Male
Race: Cauc

Date: 06-NOV-98
Time: 09:00:51
Referred by:
Medications:
Test Indication: TMX
Test Type: CAMC
Technician: KU

Phase	Stage	Time in Phase	Duration of Stage	Speed (km/h)	Grade (%)	W.L. (METS)	H.R. (bpm)	B.P.	R.P.P. (x100)	P.E.	V.E. (/min)	ST ( )	Comments
PRE-TEST		00:00	00:00	0.0	0.0	1	86	128/90	110		0	0.6	
SUPINE		00:00	00:00	0.0	0.0	1	89				0	0.6	
STANDING		00:00	00:00	0.0	0.0	1	91				0	0.6	
HYPERV		00:17	00:17	3.5	0.0	1	88				2	0.6?	
EXERCISE	1	01:00	01:00	5.6	0.0	1	102				2	0.8?	
	2	04:00	03:00	5.6	5.0	6	116				1	0.2	
	3	07:00	03:00	5.5	10.0	8	144				0	0.8	
	4	08:20	01:20	5.6	15.0	9	160	164/80	262		1	0.9	
PEAK EX		00:10	00:10	5.6	15.0	9	160				1	0.9	
RECOVERY		07:04	07:04	0.0	0.0	1	95	110/70	105		0	0.4	

Results:
Procedure: CAMC
Exercise Time: 08:20
Maximum Heart Rate Attained: 160bpm　　90% Max Predicted 177bpm
Maximum BP: 164/80
Maximum Workload Attained: 9METS
Reason for Termination:
NONE
Impressions:



Graded Exercise Summary Report

CIVIL AVIVTION MEDICAL CENTER. R. O. C.

MUSE Loc: 0

Name: GUEORGUIEV. GUEORGUI
ID: 4258
Age: 42yrs
Ht: 181cm
Wt: 81kg
Sex: Male
Race: Cauc

Date: 27-NOV-97
Time: 14:09 :2
Referred by:
Medications: NONE
Test Indication: TMX
Test Type: CAMC
Technician: HD

Phase	Stage	Time in Phase	Duration of Stage	Speed (km/h)	Grade (%)	W.L. (METS)	H.R. (bpm)	B.P.	R.P.P. (x100)	P.E.	V.E. (/min)	ST (V5)	Comments
PRE-TEST		00:00	00:00	0.0	0.0	1	83				0	0.9	
SUPINE		00:00	00:00	0.0	0.0	1	83				0	0.9	
STANDING		00:00	00:00	0.0	0.0	1	82				0	0.9	
HYPERV		01:33	01:33	3.5	0.0	1	98	145/105	142		2	0.5	
EXERCISE	1	03:00	03:00	5.6	0.0	3	114	174/97	198		0	2.3	
	2	06:00	03:00	5.6	5.0	6	123	168/82	207		0	0.8	
	3	09:00	03:00	5.6	10.0	8	141	190/80	268		0	1.0	
	4	10:56	01:56	5.6	15.0	9	162				1	0.7	
PEAK EX		00:10	00:10	5.6	15.0	9	163				3	0.6	
RECOVERY		07:17	07:17	0.0	0.0	1	106	131/86	139		0	0.4	

Results:
Procedure: CAMC
Exercise Time: 10:56
Maximum Heart Rate Attained: 164bpm　　92% Max Predicted 178bpm
Maximum BP: 224/79
Maximum Workload Attained: 9METS
Reason for Termination:
NONE
Impressions:

Graded Exercise Summary Report

CIVIL AVIACTION MEDICAL CENTER

MUSE Loc: 0

Name: GUEORGUIEV, GUEORGUI
ID: 0000025044
Age: 44yrs
Ht: 181cm
Wt: 84kg
Sex: Male
Race: Orient

Date: 08-NOV-1999
Time: 06:42:42
Referred by:
Medications:
Test Indication: TMX
Test Type: CAMC
Technician: KO

Phase	Stage	I.ms in Phase	Duration of Stage	Speed (km/h)	Grade (%)	W.L. (METS)	H.R. (bpm)	B.P.	R.P.P. (x100)	P.E.	V.E. (/min)	ST ( )	Comments
PRE-TEST		00:00	00:00	0.0	0.0	1	89	122/74	109		0	0.8	
SUPINE		00:00	00:00	0.0	0.0	1	89				0	0.8	
STANDING		00:00	00:00	0.0	0.0	1	89				0	0.8	
HYPERV		00:25	00:25	3.5	0.0	1	90				0	0.9	
EXERCISE	1	01:00	01:00	5.6	0.0	2	103				0	0.7	
	2	04:00	03:00	5.6	5.0	6	125				0	1.1	
	3	07:00	03:00	5.6	10.0	8	150	146/76	219		4	0.9	
	4	07:33	00:33	5.6	15.0	8	155				0	0.8	
PEAK EX		00:10	00:10	5.6	15.0	8	156				0	0.8	
RECOVERY		07:03	07:03	0.0	0.0	1	94	116/72	114		0	0.6	

Results:

Procedure: CAMC
Exercise Time: 07:33
Maximum Heart Rate Attained: 156bpm 90% Max Predicted 176bpm
Maximum BP: 146/76
Maximum Workload Attained: 8METS
Reason for Termination:
NONE

Impressions:

附錄七　航空人員體格檢查標準

人員檢定與訓練〇五—〇三A

航空人員體格檢查標準

中華民國六十二年十一月十七日民用航空局企法（六二）字第七九三〇號令頒佈
中華民國六十四年一月十日民用航空局企法（六四）字第〇一九九號令修正
中華民國七十一年五月十九日民用航空局企法（七一）字第三六二八號令修正
中華民國七十六年四月三十日民用航空局企法（七六）字第二八九八號令修正
中華民國八十年九月二十日民用航空局企法（八〇）字第七三九號令修正
中華民國八十一年三月三十一日民用航空局企法（八一）字第二九七二號令修正
中華民國八十二年八月二十六日民用航空局企法（八二）字第〇九一九八號令修正

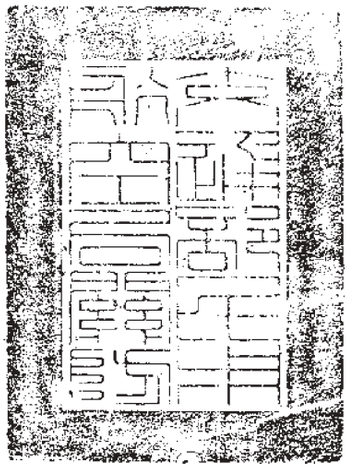
人員檢定與訓練〇五—〇三A航空人員體格檢查標準

交通部民用航空局 令

發文日期：中華民國八十九年二月二日
發文字號：企法發字第 0002 號

修正「航空人員體格檢查標準」。

附「航空人員體格檢查標準」。



副本：行政院衛生署、交通部、青杏醫學文教基金會、心臟研究基金會、中華民國航空醫學會、中華民國眼科醫學會、中華民國職業病醫學會、中華民國環境職業醫學會、中華民國內科醫學會、中華民國外科醫學會、中華民國耳鼻喉科醫學會、中華民國精神醫學會、中華民國骨科醫學會、中華民國牙科醫學會、中華民國腎臟醫學會、中華民國家庭醫學醫學會、中華民國民航飛行員學會、國防醫學院航太醫學中心、中華航空公司、遠東航空公司、立榮航空公司、亞太航空公司、瑞聯航空公司、德安航空公司、金鷹航空公司、凌天航空公司、大鵬航空公司、中興航空公司、復興航空公司、長榮航空公司、華信航空公司、西北航空公司、聯合航空公司、加拿大國際航空公司、沙烏地航空公司、荷蘭皇家航空公司、菲律賓航空公司、澳洲航空公司、瑞亞航空公司、紐西蘭航空公司、英國亞洲航空公司、印尼航空公司、荷蘭馬丁航空公司、國泰航空公司、盧森堡航空公司、泰國航空公司、馬來西亞大馬亞洲航空公司、楓葉航空公司、美國保羅航空公司、美國優比速航空公司、新加坡航空公司、皇家汶萊航空公司、日亞航空公司、日本日空航空公司、越南航空公司、越南太平洋航空公司、美國大陸航空公司、美商聯邦快遞股份有限公司、東亞太平洋空運有限公司、澳門航空公司、法國國際東方航空公司、香港港龍航空公司、馬來西亞航空公司、澳洲安捷航空公司、美國長青國際航空公司、美國密克羅尼西亞航空公司、亞洲航空公司、長榮航太科技公司、華普飛機引擎科技公司、

航空人員體格檢查標準修正條文

第一章 總則

第一條 本標準依民用航空法第二十六條第二項規定訂定之。

第二條 航空人員體格檢查給證依本標準處理之。

第三條 航空人員之體格應經民用航空局（以下簡稱民航局）檢查。但民航局得委託航空體格檢查醫師（以下簡稱體檢醫師）檢查之。

前項體檢醫師委託要點由民航局訂定之。

第四條 航空人員體格標準分為甲類體位、乙類體位與丙類體位三大類。其適用對象如下：

一、甲類體位：商用駕駛員、高級商用駕駛員、民用航空運輸業駕駛員。

二、乙類體位：學習駕駛員、自用駕駛員、普通航空業駕駛員、飛航機械員、飛航管制員。

三、丙類體位：地面機械員、航空器維修廠、所維修員、簽派員。

第五條 航空人員申請體格檢查（以下簡稱體檢）時，對航空人員體檢紀錄表規定之自填項目，應據實逐項填報簽字。

第六條 民航局或體檢醫師認為有必要時，得要求航空人員提供有關資料或指定醫療機構、專科醫師檢查，作為評定之參考。

因前項規定所生之費用，由航空人員負擔。

第七條　航空人員之體檢經評定符合規定之標準或經民航局准予缺點免計者，由民航局核發體格檢查及格證（以下簡稱體檢證，如附件一），航空人員應於執業時隨身攜帶。

航空人員之體格經評定不符合規定之標準者，民航局應將評定不符合標準之理由及申請覆議之規定以書面通知之。

第八條　航空人員對前條之評定有異議時，應於不符合標準通知書送達之次日起三十日內向民航局提起覆議。

民航局於覆議時，得召開醫事審查會議，並邀請專家、學者參加審議，且於審議時，準用第六條規定。

民航局之覆議決定書，應附記如不服本決定，得於決定書送達之次日起三十日內向有權管轄機關提起訴願。

第九條　航空人員之體檢應依下列規定期限實施：

一、商用駕駛員、高級商用駕駛員、民用航空運輸業駕駛員應每六個月檢查一次。但年逾六十歲者，應每四個月檢查一次。

二、學習駕駛員、自用駕駛員、普通航空業駕駛員應每十二個月檢查一次。但年逾六十歲

四、胸腔壁、肋骨或縱膈腔之手術後遺症。

五、任何腎臟及泌尿道疾病或手術後之後遺症。

第十九條　內科檢查標準如下：

一、不得有任何足以影響安全執行職務之疾病或機能失常。

二、心臟不得有下列情形之一或見諸病史：

(一)冠狀動脈疾病。

(二)第二度以上之房室傳導阻滯或解離。

三、不得有足以影響安全執行職務之下列情形之一：

(一)嚴重之肥厚性心肌症或擴大性心肌症。

(二)心臟左束枝傳導阻滯。

(三)先天性心臟病。

(四)心臟瓣膜疾病。

(五)心律不整。

(六)傳導異常。

(七)曾患心包膜炎、心內膜炎或心肌炎。

（八）心臟雜音。

四、血壓檢查標準如下：

（一）收縮期血壓為一百四十毫米汞柱以下，舒張期血壓為九十毫米汞柱以下。

（二）依賴單一藥物控制血壓符合前目規定之血壓標準且無併發症者，視為正常。

五、不得有循環系統顯著之機能上或構造上之違常。

六、不得有肺組織、縱膈腔、肋膜之急性疾病。

七、不得有自發性氣胸病史。

八、不得有罹患慢性阻塞性肺部疾病合併症狀。

九、不得有經確定活動性肺結核。

十、不得有足以影響安全執行職務之腸胃道或肝臟、膽囊、胰臟嚴重機能障礙或疾病。

十一、不得有足以影響安全執行職務之腎臟、泌尿道或生殖器疾病。

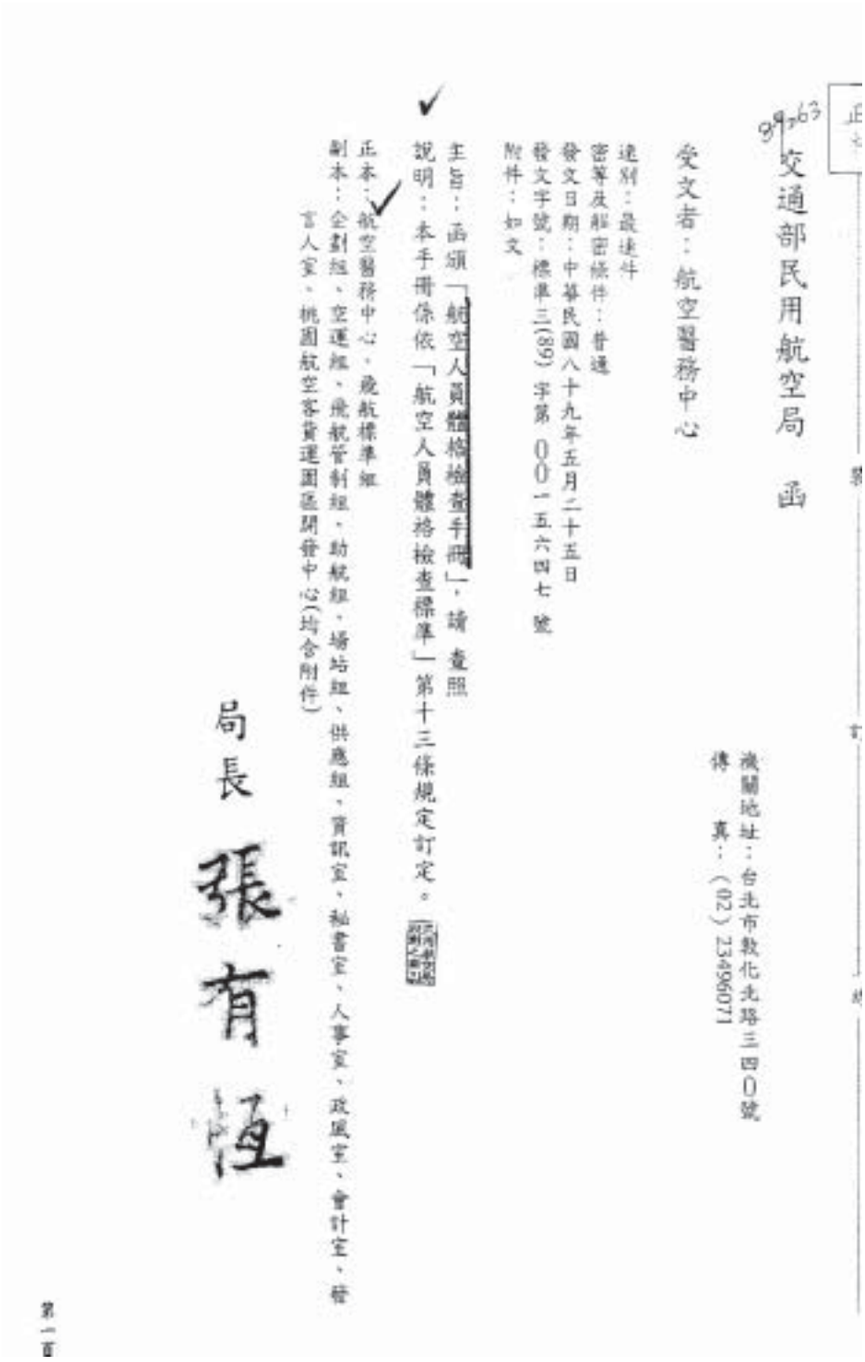
十二、不得有足以影響安全執行職務之局部性或全身性淋巴腺腫大、脾腫大或有血液疾病

十三、不得有惡性腫瘤。

十四、不得有足以影響安全執行職務之新陳代謝、營養或內分泌之障礙。

十五、不得有糖尿病。

附錄八　民用航空人員體格檢查手冊



交通部民用航空局　函

受文者：航空醫務中心

速別：最速件
密等及解密條件：普通
發文日期：中華民國八十九年五月二十五日
發文字號：標準三(89)字第００一五六四七號
附件：如文

主旨：函頒「航空人員體格檢查手冊」，請查照

說明：本手冊係依「航空人員體格檢查標準」第十三條規定訂定。

正本：航空醫務中心、飛航標準組
副本：企劃組、空運組、飛航管制組、助航組、場站組、供應組、資訊室、秘書室、人事室、政風室、會計室、發言人室、桃園航空客貨運園區開發中心(均含附件)

局長　張有恆

機關地址：台北市敦化北路三四０號
傳　真：(02) 23496071

民用航空人員體格檢查手冊

第一章　通則

第一條　本手冊依航空人員體格檢查標準（以下簡稱本標準）第十三條規定訂定之。

第二條　航空體格檢查醫師（以下簡稱體檢醫師）依本標準檢查航空人員身心健康狀況，並依檢查結果研判是否合於簽署體格檢查及格證（以下簡稱體檢證）條件，或需進一步治療診查。

本手冊僅係原則性之指導，實際作業時體檢醫師應根據其醫學專業，仔細逐項檢查及記錄，並依航空人員之類別種類、任務、其他狀況，應用其航醫知識，做最適當之研判及決定。

第三條　體檢醫師負責航空人員之體檢、研判、簽署體檢證，並應瞭解錯誤之給證，將使體格不合格之航空人員於操縱航空器或執行任務時，有導致飛航安全之虞。

體檢醫師如故意未按規定之檢查程序或涉及違法行為，致不合格之體檢缺陷未被發現，危及飛航安全者，體檢醫師應對其後果負責。

第四條　航空人員於體檢時對其以往病史隱匿不填，致使體檢醫師不克作重點檢查時，經民用航空局（以下簡稱民航局）查證屬實者，由民航局依民用航空法相關規定辦理。

第五條　體檢證由體檢醫師簽署後，由民航局核發。

體檢有異常發現時，應做進一步之評估或經由討論、專家顧問協助處理之。

第六條　體檢醫師如有理由懷疑持有體檢證之航空人員之身心、行為狀況有問題時，經報請民航局同意後

得實施臨時體檢。

第七條　體檢證應註明實際接受體檢之日期，而非發證日期；甲類體檢證適用甲類、乙類、丙類航空人員職務，乙類體檢證適用乙類、丙類航空人員職務，丙類體檢證適用丙類航空人員職務，其有效期間應附註於體檢證中。航空人員申請不同類別之體檢證時，體檢醫師應檢視航空人員有關體檢資料。

第八條　體檢醫師認為有必要時，得要求航空人員提供有關資料或指定醫療機構、專科醫師檢查，其結果體檢醫師應彙整並由所屬醫療機構開會討論作成決議，報請民航局作為評定之參考。

第九條　航空人員之體檢結果如不合本標準時，當事人可依缺點免計程序提出申請，經鑑定認為無礙飛航安全，准按缺點免計規定辦理之。

第十條　航空人員之體檢結果經評定不符合本標準時，體檢醫師應檢具資料並註明理由及引用法條函送民航局辦理。

第十一條　航空人員之個人病歷、工作人員應嚴守秘密不得洩露，唯有負責之體檢醫師始得將有關病情告知航空人員。

第二章　處理程序與原則

第十二條　心臟雜音之處理如下：

一、航空人員有心臟雜音者，應作心臟超音波檢查評估。

二、心臟超音波得由指定之心臟專科醫師檢查，隨後每六個月至一年應繼續追蹤檢查。

第十三條　冠狀動脈疾病之篩檢及處理如下：

一、甲類或乙類航空人員應作運動心電圖檢查。

二、運動心電圖呈陽性結果者，應接受進一步檢查，如心電圖呈陽性，除檢討有無冠狀動脈疾病之危險因子而加以改正外，並在指定時間內安排作核子醫學(核醫)心臟掃瞄檢查。

三、檢查結果正常者，可照常工作，如為異常者，則立即安排至指定醫院作心導管檢查；如心導管檢查正常，由民航局發證；心導管檢查結果異常者（冠狀動脈阻塞程度大於50%者），依第十條規定辦理。

四、檢查正常者，以後每次之運動心電圖應加以比較，如出現變化，應接受核子醫學心臟掃瞄檢查。

五、曾做心導管檢查者，如隨後運動心電圖有明顯變化或心臟血管疾病危險因子未見改善時，則應隨時作進一步檢查。

第十四條　心律不整之處理如下：

一、靜止心電圖或運動心電圖呈現心律不整時，應做二十四至四十八小時心電圖檢查及評估。

二、陣發性心室上心搏過速者，經電氣生理檢查，且接受高頻輻射導管電燒術治療成功後，超過觀察理想者，得依缺點免計程序提出申請。

三、心律不整者，除二十四小時心電圖監控檢查外，得視需要另做屈學運動心電圖、超音波檢查、電氣生理、心導管檢查、或其他項目檢查。

四、陣發性單次心房臟縮震顫者，應接受下列檢查：四次二十四至四十八小時心電圖檢查、甲狀腺功能檢查、心臟超音波檢查、頭部核磁共振造影檢查、心導管血管攝影及電氣生理檢查等。如上述檢查均正常，得依缺點免計程序提出申請。

第十五條　高血壓之處理如下：

一、血壓異常者，需追蹤檢查複評估。

二、檢查發現有高血壓者，應按下列方式處理：

(一)追蹤檢查(包含終端器官受傷程度評估)，如不能恢復至正常數值，建議專科門診。

(二)評估其危險因子，建議其注意改正。

(三)對疑為高血壓患者，宜作二十四小時自動血壓監測，以評估其血壓之變動。

三、專科門診治療高血壓時，應提供主治醫師之處方及診斷證明，並定期檢查血壓及血清之電解質濃度。

四、使用二種以上藥物控制血壓者，得依缺點免計程序提出申請。

第十六條　高血脂症之處理如下：

一、總膽固醇超過220mg/dl、低密度膽固醇超過150mg/dl、三酸甘油脂超過200mg/dl，建議飲食治療，營養師諮商，或膽固醇危險度比值超過五者，依情況建議戒煙、減重、運動，並定期追蹤檢查。

二、總膽固醇或三酸甘油脂超過300mg/dl需積極治療，有潛在安全顧慮者，應邀集專科醫師評鑑。

第十七條　甲狀腺問題之處理如下：

一、甲狀腺功能亢進者，應轉至新陳代謝科專科診治，穩定後再作評估。

二、甲狀腺結節腫者，應立即赴專科進一步檢查。

第十八條　血糖異常之處理如下：

一、有下列情形之一經診斷為糖尿病：

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附錄九　死因鑑定報告

鑑定資料

一、鑑定文號：桃園地檢署八十九年度相字第三四〇號、第八四一號。

二、鑑定標本：解剖內臟、血、尿、胃內容物。

案情摘要

死者GUEORGUIEV G. I.，男，四十五歲，為華航A300客機正駕駛於八十九年五月八日上午八時許在台北往越南之CAL681班機上執行任務，在抵台南上空時突然發生失能狀況，經機上有醫師緊急救治，落地後送桃園敏盛醫院時認已死亡。

航醫中心體檢出現白血球過多，肝功能、牙齒略有異常。八十八年十一月廿五日之體檢未做X光檢查。

鑑定經過

屍體經家屬及檢察官王怡青在場確認後於八十九年五月十六日上午九時二十分於台北市立第二殯儀館實施解剖。

一、肉眼觀察結果：

男屍身長一八〇公分，體重約九十五公斤，營養體格良，黑灰短髮三公分後頭禿頂。

整體檢查無外傷。

臉無異常，眼球呈死後脫水下陷，瞳孔等圓〇．四公分直徑，眼結膜無異常。

耳、鼻、口無異常。

前胸部：有急救所發生之皮膚壓迫痕，無其他異常。

腹部、四肢：無異常，無外傷。

依式自下頜中線切開至恥骨聯合，皮下組織豐富二．五公分厚。

腹腔：無腹水，無出血，無外傷，無異常，各臟器之位置關係無異常。

胸腔：無積水，無出血，無骨折，無粘連。

臚腔：頭皮無出血，無骨折，無異常。

各臟器依序摘出檢查，並採樣做組織切片。

心：重三五〇公克，冠狀動脈在左前支起始部五〇%以上狹窄，瓣膜無異常，心肌無肉眼變化。主動脈呈粥腫樣變化，在腹主動脈有鈣化及潰瘍出現。

肺：左重一〇〇〇公克，右重一二五〇公克，無異物，水腫，淤血著明，無炎症反應。

肝：重一七〇〇公克，色無異常，膽囊無結石無異常。

脾：重一二〇公克，無異常。

腎：左重二五〇公克，右重二二〇公克，淤血外無異常。

腎上腺：兩側均無異常。

胃：有內容物爲半固體之梅子干渣殘留，紅色，無其他食物，死前一小時進食，無出血，無潰瘍。

小腸、結腸：無異常。

胰腺：重九〇公克，無異常。

喉：有水腫，有異物梅干渣在喉頭聲門上緣，無炎症反應。

氣管：無異物。

食道：無異常。

腦膜無出血，無異常。

腦：重一三〇〇公克，無水腫，有淤血。在左中腦動脈見二個〇．五公分直徑之動脈瘤，完整，腦底之血管無異常，無硬化。

採血、胃內容物、尿做毒化。

二、顯微鏡觀察結果：

除心冠動脈狹窄外，無其他特殊異常。

三、病理檢察結果：

死者GUEORGUIEV G.I.，男，四十五歲，因急性心冠動脈狹窄阻塞，並有梅子干殘渣異物見於喉頭，猝死，自然死，隨身之藥品經刑事局檢驗結果無特殊之毒藥物成分。

參考航醫中心之體檢紀錄，未發現有心臟異常之表現，在解剖時之嚴重心臟冠狀動脈阻塞應在血中膽固醇過高時提高警覺，又在腹主動脈見著明之血管硬化，鈣化及潰瘍形成，在腹部X光應可能有表現值得參考注意。又該死者在航醫中心祇有二年之體檢記錄，應要求將以前之體檢記錄併入供發證之參考。

四、參考資料：

(一)血液、尿液、胃內容物含酒精0.008%(W/V)、小於0.002%(W/V)及0.102%(W/V)。無其他毒藥物成分。

(二)死者生前心電圖報告正常（八十七年十二月下旬及八十八年十一月廿五日），生前抽煙習慣，八十八年五月十八日體液檢查顯示高密度膽固醇過低，胸部X光正常。八十七年十一月六日起即發現白血球偏高，經複驗乃原因不明。

鑑定結果

死者GUEORGUIEV G.I.，男，四十五歲，因心冠動脈狹窄阻塞死亡。自然死。以下空白

法務部法醫研究所　鑑定人：方中民

法務部法醫研究所 鑑定書專用章

中華民國　八十九　年　七　月　日

附錄十　藥物鑑定報告

內政部警政署刑事警察局鑑驗通知書

中華民國 89 年 06 月 05 日刑鑑字第 61378 號

受文機關	航空器飛航安全委員會	委文驗號	89 年 05 月 10 日 (89)飛安字第 00105 號 函
副送本單抄位	本局鑑識科	鑑單驗位	鑑識科毒物組(B49 C050) (毒鑑字第 890109 號)
案由	鑑驗有關 華航 CAL681 航班「機長死亡」意外事件證物。		
鑑驗資料	1.編號 1 藥物。 2.編號 2 藥物。 3.編號 3 藥物。 4.編號 4 藥物。 5.編號 5 藥物。 6.編號 6 藥物。	7.編號 7 藥物。 8.編號 8 藥物。 9.編號 9 藥物。 10.編號 10 藥物。 11.編號 11 藥物。 12.編號 12 藥物。	13.編號 13 藥物。 14.編號 14 藥物。 15.編號 15 藥物。 16.編號 16 藥物。 17.編號 17 藥物。 18.編號 1 食品。
鑑驗方法	一、氣化物呈色分析法。 二、氣相層析質譜分析法。 三、液相層析質譜分析法。 四、掃描式電子顯微鏡 X 光能譜分析法。 五、頂空氣相層析質譜分析法。		六、感應偶合電漿光譜分析法。 七、磷酸呈色分析法。 八、高錳酸根呈色分析法。 九、薄層分析法。 十、紅外線光譜分析法。
鑑驗結果	如附頁。		
備考	關於送驗各藥物之副作用，隨個人之體質及疾病史而有輕、重之別，請洽詢專科醫師。		

裝 訂 線

一致，隨機抽取兩顆鑑驗，餘貳顆。
2.a.均檢出維他命 C(即抗壞血酸 ascorbic acid)成分。
b.均未檢出氯化物成分。
均未檢出一級毒品海洛因(Heroin)或嗎啡(Morphine)成分。
均未檢出二級毒品安非他命(Amphetamine)或甲基安非他命(Methamphetamine)成分。
3.維他命 C：用於預防及治療壞血病。
五、編號 5 藥物：
1.包裝印有"Inhaler"字樣，係塑膠棒狀外用藥，壹支。棒內僅有一棉條，取其棉條浸泡液分析。
2.a.檢出薄荷(menthol)成分。
檢出水楊酸甲酯(methyl salicylate)成分。
檢出 triacetin 成分。
b.未檢出氯化物成分。
未檢出一級毒品海洛因(Heroin)或嗎啡(Morphine)成分。
未檢出二級毒品安非他命(Amphetamine)或甲基安非他命(Methamphetamine)成分。
3.薄荷(menthol)：具健胃、驅風、清涼等作用。
水楊酸甲酯(methyl salicylate)：用於神經痛、關節痛、肌肉痛擦劑，
triacetin：具抑制微菌生長之作用。
六、編號 6 藥物：
1.包裝印有"xylometazoline"字樣，壹瓶。約 10 毫升，取 1 毫升鑑驗，餘約 9 毫升。
2.a.檢出 Xylometazoline 成分。
檢出 trolamine 成分。
b.未檢出氯化物成分。
未檢出一級毒品海洛因(Heroin)或嗎啡(Morphine)成分。
未檢出二級毒品安非他命(Amphetamine)或甲基安非他命(Methamphetamine)成分。
3.xylometazoline：對鼻腔內微小動脈有收縮作用，用於一般感冒、鼻塞、流鼻水、過敏性鼻炎。
trolamine：具止痛效果。
七、編號 7 藥物：
1.藥粒印有"ALLERGOPOS"字樣，壹瓶。約 10 毫升，取 1 毫升鑑驗，餘約 9 毫升。
2.a.檢出 tetrahydrozoline 成分。
b.未檢出氯化物成分。
未檢出一級毒品海洛因(Heroin)或嗎啡(Morphine)成分。
未檢出二級毒品安非他命(Amphetamine)或甲基安非他命(Methamphetamine)成分。
3. tetrahydrozoline：具收縮血管、抗粘膜充血和殺菌等作用，用於眼睛結膜炎、結膜充血。
八、編號 8 藥物：
1.藥粒印有"Ospexin"字樣，共壹拾顆。每顆重約 700 毫克，顏色外觀均

一致，隨機抽取肆顆鑑驗，餘陸顆。
2.a.均檢出 cephalexin 成分。
b.均未檢出氰化物成分。
均未檢出一級毒品海洛因(Heroin)或嗎啡(Morphine)成分。
均未檢出二級毒品安非他命(Amphetamine)或甲基安非他命(Methamphetamine)成分。
3. cephalexin：為抗生素之一種，具強烈殺菌作用。
九、編號 9 藥物：
1.藥粒印有"NCIPD"字樣，共貳顆。每顆重約 700 毫克，顏色外觀均一致，取壹點伍顆鑑驗，餘約零點伍顆。
2.a.均檢出氧化鎂、氧化鋁成分。
均檢出薄荷(menthol)成分。
b.未檢出氰化物成分。
未檢出一級毒品海洛因(Heroin)或嗎啡(Morphine)成分。
未檢出二級毒品安非他命(Amphetamine)或甲基安非他命(Methamphetamine)成分。
3.氧化鎂、氧化鋁、薄荷之成分組合，用作胃部制酸劑。
十、編號 10 藥物:
1.瓶身印有"CARBOPHOS"字樣，壹瓶，內含錠片壹拾肆顆。每顆重約 1400 毫克，顏色外觀均一致，隨機抽取兩顆鑑驗，餘壹拾貳顆。
2.a.均檢出活性碳成分。
均檢出碳酸鈣成分。
均檢出磷酸鈣成分。
b.均未檢出氰化物成分。
均未檢出一級毒品海洛因(Heroin)或嗎啡(Morphine)成分。
均未檢出二級毒品安非他命(Amphetamine)或甲基安非他命(Methamphetamine)成分。
3.活性碳、碳酸鈣、磷酸鈣之成分組合，用作解毒劑。
十一、編號 11 藥物:
1.瓶身印有"Betadine"字樣，壹瓶。內含液體約 8 毫升，取 2 毫升鑑驗，餘約 6 毫升。
2.a.檢出碘成分。
b.未檢出氰化物成分。
未檢出一級毒品海洛因(Heroin)或嗎啡(Morphine)成分。
未檢出二級毒品安非他命(Amphetamine)或甲基安非他命(Methamphetamine)成分。
3.碘:具殺菌、消毒等作用。
十二、編號 12 藥物:
1.瓶身印有"IMODIUM-RICHTER"字樣，壹瓶。內含綠-紫色膠囊陸顆，，綠-灰色膠囊參顆，各取貳顆鑑驗，餘綠-紫色膠囊肆顆，綠-灰色膠囊壹顆。
2.a.均檢出 Loperamide 成分。
b.均未檢出氰化物成分。
均未檢出一級毒品海洛因(Heroin)或嗎啡(Morphine)成分。

均未檢出二級毒品安非他命(Amphetamine)或甲基安非他命(Methamphetamine)成分。

3.Loperamide:對腸胃炎、飲食或功能異常所引起之腹瀉具抑制作用，用作止瀉劑。

十三、編號 13 藥物:

1.瓶身貼有"ASPISAL Analgesic Quality Value 325mgNDC508-44 757-12 made in USA"字樣，壹瓶。內含顏色外觀一致之錠劑肆顆，隨機抽取壹顆鑑驗，餘參顆。

2.a.檢出乙醯水楊酸(Acetylsalicylic acid)成分。

b.未檢出氰化物成分。

未檢出一級毒品海洛因(Heroin)或嗎啡(Morphine)成分。

未檢出二級毒品安非他命(Amphetamine)或甲基安非他命(Methamphetamine)成分。

3.乙醯水楊酸(acetylsalicylic acid)：用於慢性關節炎、症候性神經痛、腰痛症、感冒之熱解、頭痛、牙痛等。

十四、編號 14 藥物:

1.外包裝標示"KALII PERMANGANAS"字樣，壹包。內含深棕色固體，毛重為 13.5 公克，淨重 12.3 公克，取 1.0 公克鑑驗，餘 11.3 公克。

2.a.檢出高錳酸鉀(KMnO4)成分，純度百分之柒拾壹以上。

b.未檢出氰化物成分。

未檢出一級毒品海洛因(Heroin)或嗎啡(Morphine)成分。

未檢出二級毒品安非他命(Amphetamine)或甲基安非他命(Methamphetamine)成分。

3.高錳酸鉀:本成分水溶液與有機物作用時，放出多量之氧，具有強大之消毒作用。

十五、編號 15 藥物:

1.藥膏，印有"Latycin 5g eye-ointment"字樣，壹支。取其內容物 0.5 公克鑑驗。

2.a.檢出四環素(Tetracycline)成分。

b.未檢出氰化物成分。

未檢出一級毒品海洛因(Heroin)或嗎啡(Morphine)成分。

未檢出二級毒品安非他命(Amphetamine)或甲基安非他命(Methamphetamine)成分。

3.四環素:係抗生素之一種，具抗菌、消炎等作用。

十六、編號 16 藥物:

1.藥膏，印有"nemybacin 2.5g"字樣，壹支。取其內容物 0.5 公克鑑驗。

2.a.檢出疑似新綠菌素(Neomycin)成分，由於本局並無新綠菌素標準品可供比對，無法確認此成分。

b.未檢出氰化物成分。

未檢出一級毒品海洛因(Heroin)或嗎啡(Morphine)成分。

未檢出二級毒品安非他命(Amphetamine)或甲基安非他命(Methamphetamine)成分。

3.新綠菌素:係抗生素之一種，具抗菌、消炎等作用。

十七、編號 17 藥物:

1.粉劑，包裝上印有"Medi pulv Antiseptic powder"字樣，壹包。取粉劑0.5公克鑑驗。
2.a.檢出 Chlorhexidine 成分。
b.未檢出氟化物成分。
未檢出一級毒品海洛因(Heroin)或嗎啡(Morphine)成分。
未檢出二級毒品安非他命(Amphetamine)或甲基安非他命(Methamphetamine)成分。
3. Chlorhexidine:具抗菌、消炎等作用。

十八、編號 1 食物:
1.糕點，壹包。經檢視，其包裝完整，印有"元祖 子福 Q 餅 50±2 公克"字樣，毛重為 53.5 公克，淨重 50.0 公克，取 5.0 公克鑑驗，餘 45.0 公克。
2.a.檢出鈉、鎂、鈣、銅、磷等元素成分。。
b.未檢出氟化物成分。
未檢出一級毒品海洛因(Heroin)或嗎啡(Morphine)成分。
未檢出二級毒品安非他命(Amphetamine)或甲基安非他命(Methamphetamine)成分。
3.鈉、鎂、鈣、銅、磷:為食品中常見元素，皆無急毒性。

十九、以上驗餘證物均封妥隨文檢還。

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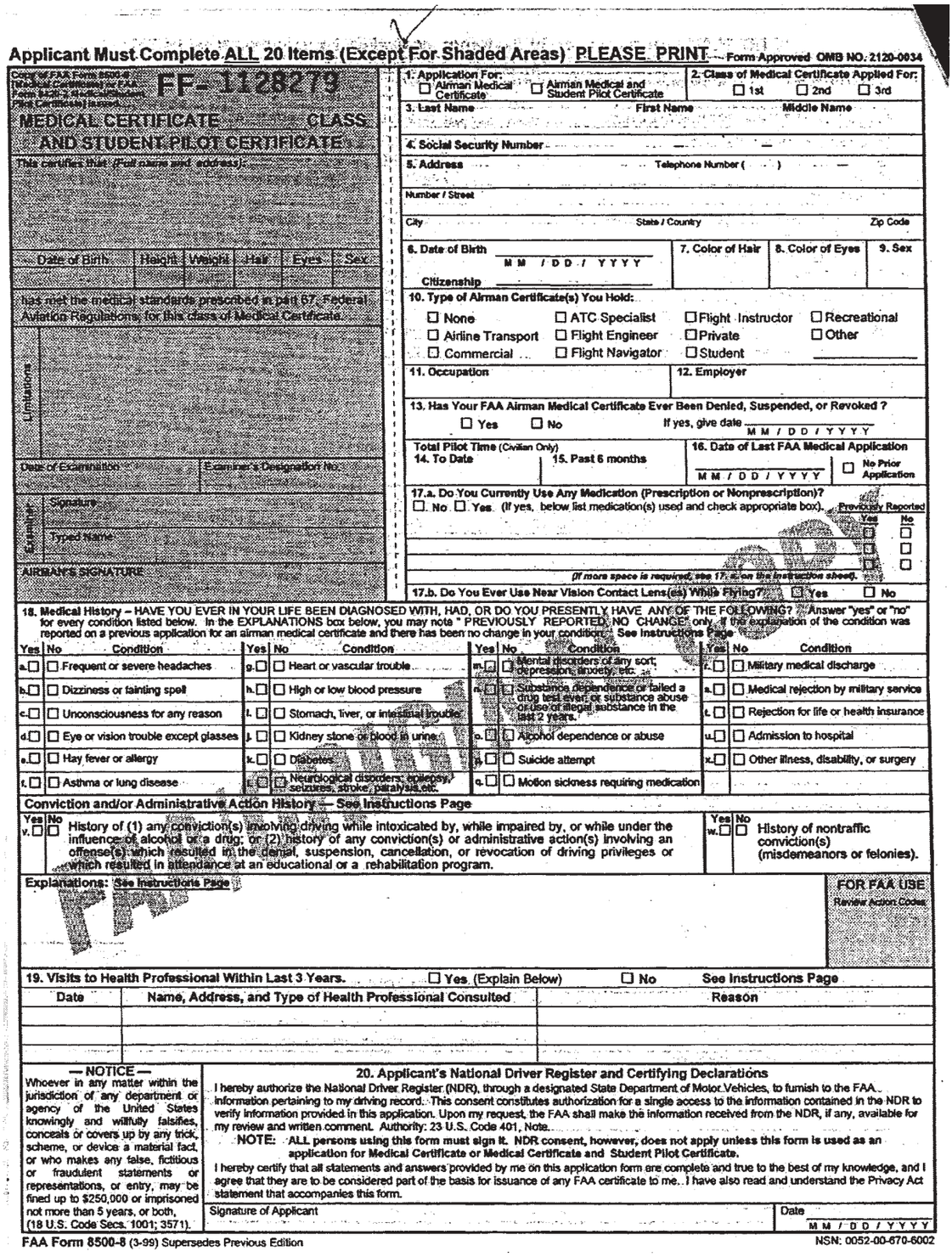
附錄十一　FAA體檢表首頁



Applicant Must Complete ALL 20 Items (Except For Shaded Areas) PLEASE PRINT — Form Approved OMB NO. 2120-0034

Copy of FAA Form 8500-8 [Medical Certificate or FAA Form 8420-2 Medical Student Pilot Certificate] issued:

FF- 1128279

MEDICAL CERTIFICATE — CLASS AND STUDENT PILOT CERTIFICATE

This certifies that: (Full name and address)

Date of Birth	Height	Weight	Hair	Eyes	Sex

has met the medical standards prescribed in part 67, Federal Aviation Regulations, for this class of Medical Certificate.

Limitations

Date of Examination | Examiner's Designation No.

Examiner: Signature / Typed Name

AIRMAN'S SIGNATURE

1. Application For: ☐ Airman Medical Certificate ☐ Airman Medical and Student Pilot Certificate
2. Class of Medical Certificate Applied For: ☐ 1st ☐ 2nd ☐ 3rd
3. Last Name — First Name — Middle Name
4. Social Security Number — — —
5. Address — Telephone Number ( ) —
Number / Street
City — State / Country — Zip Code
6. Date of Birth (M M / D D / Y Y Y Y) — Citizenship
7. Color of Hair
8. Color of Eyes
9. Sex
10. Type of Airman Certificate(s) You Hold:
☐ None ☐ ATC Specialist ☐ Flight Instructor ☐ Recreational
☐ Airline Transport ☐ Flight Engineer ☐ Private ☐ Other
☐ Commercial ☐ Flight Navigator ☐ Student
11. Occupation
12. Employer
13. Has Your FAA Airman Medical Certificate Ever Been Denied, Suspended, or Revoked? ☐ Yes ☐ No — If yes, give date (M M / D D / Y Y Y Y)
Total Pilot Time (Civilian Only) 14. To Date — 15. Past 6 months
16. Date of Last FAA Medical Application (M M / D D / Y Y Y Y) ☐ No Prior Application
17.a. Do You Currently Use Any Medication (Prescription or Nonprescription)? ☐ No ☐ Yes (If yes, below list medication(s) used and check appropriate box). Previously Reported: Yes / No
(If more space is required, use 17. a. on the instruction sheet).
17.b. Do You Ever Use Near Vision Contact Lens(es) While Flying? ☐ Yes ☐ No

18. Medical History – HAVE YOU EVER IN YOUR LIFE BEEN DIAGNOSED WITH, HAD, OR DO YOU PRESENTLY HAVE ANY OF THE FOLLOWING? Answer "yes" or "no" for every condition listed below. In the EXPLANATIONS box below, you may note " PREVIOUSLY REPORTED; NO CHANGE" only if the explanation of the condition was reported on a previous application for an airman medical certificate and there has been no change in your condition. See Instructions Page

Yes	No	Condition	Yes	No	Condition	Yes	No	Condition	Yes	No	Condition
a. ☐	☐	Frequent or severe headaches	g. ☐	☐	Heart or vascular trouble	m. ☐	☐	Mental disorders of any sort; depression, anxiety, etc.	r. ☐	☐	Military medical discharge
b. ☐	☐	Dizziness or fainting spell	h. ☐	☐	High or low blood pressure	n. ☐	☐	Substance dependence or failed a drug test ever, or substance abuse or use of illegal substance in the last 2 years.	s. ☐	☐	Medical rejection by military service
c. ☐	☐	Unconsciousness for any reason	i. ☐	☐	Stomach, liver, or intestinal trouble	o. ☐	☐	Alcohol dependence or abuse	t. ☐	☐	Rejection for life or health insurance
d. ☐	☐	Eye or vision trouble except glasses	j. ☐	☐	Kidney stone or blood in urine	p. ☐	☐	Suicide attempt	u. ☐	☐	Admission to hospital
e. ☐	☐	Hay fever or allergy	k. ☐	☐	Diabetes	q. ☐	☐	Motion sickness requiring medication	x. ☐	☐	Other illness, disability, or surgery
f. ☐	☐	Asthma or lung disease	l. ☐	☐	Neurological disorders; epilepsy, seizures, stroke, paralysis,etc.						

Conviction and/or Administrative Action History — See Instructions Page

Yes	No		Yes	No	
v. ☐	☐	History of (1) any conviction(s) involving driving while intoxicated by, while impaired by, or while under the influence of alcohol or a drug; or (2) history of any conviction(s) or administrative action(s) involving an offense(s) which resulted in the denial, suspension, cancellation, or revocation of driving privileges or which resulted in attendance at an educational or a rehabilitation program.	w. ☐	☐	History of nontraffic conviction(s) (misdemeanors or felonies).

Explanations: See Instructions Page

FOR FAA USE — Reviewer Action Codes

19. Visits to Health Professional Within Last 3 Years. ☐ Yes (Explain Below) ☐ No See Instructions Page

Date	Name, Address, and Type of Health Professional Consulted	Reason

— NOTICE —
Whoever in any matter within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals or covers up by any trick, scheme, or device a material fact, or who makes any false, fictitious or fraudulent statements or representations, or entry, may be fined up to $250,000 or imprisoned not more than 5 years, or both, (18 U.S. Code Secs. 1001; 3571).

20. Applicant's National Driver Register and Certifying Declarations

I hereby authorize the National Driver Register (NDR), through a designated State Department of Motor Vehicles, to furnish to the FAA information pertaining to my driving record. This consent constitutes authorization for a single access to the information contained in the NDR to verify information provided in this application. Upon my request, the FAA shall make the information received from the NDR, if any, available for my review and written comment. Authority: 23 U.S. Code 401, Note.

NOTE: ALL persons using this form must sign it. NDR consent, however, does not apply unless this form is used as an application for Medical Certificate or Medical Certificate and Student Pilot Certificate.

I hereby certify that all statements and answers provided by me on this application form are complete and true to the best of my knowledge, and I agree that they are to be considered part of the basis for issuance of any FAA certificate to me. I have also read and understand the Privacy Act statement that accompanies this form.

Signature of Applicant — Date (M M / D D / Y Y Y Y)

FAA Form 8500-8 (3-99) Supersedes Previous Edition — NSN: 0052-00-670-6002

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附錄十二　國際民航組織機場服務手冊緊急應變計畫第 4.2 節場站外失事

4.2.1　通則

場站外失事機場緊急應變計劃及相互支援協議應一併實施，各單位作業行動詳見 4.2.2-4.2.11 。

4.2.2　初始通告

場站外失事應為目擊證人提供給警察消防隊或地方警告簽派中心（Alarm and Dispatch Centre）該中心基於緊急狀況特性通報給適當單位。

4.2.3　航管服務行動

4.2.3.1 使用圖 8-2 之警告通訊系統進行初使通告。

4.2.3.2 提供有管轄權的緊急應變單位，失事位置、參考方格圖、其他基本資料，包含失事時間及失事時間、航機機型，隨後視可能再提供乘客數、燃油量、駕駛員及機載危險物品數量位置等。

4.2.3.3 依據機場應變計劃通知警備、航站管理、醫療服務單位，提供方格參考資訊。

4.2.3.4 視需要發佈 NOTAM 內容為：

"Airport rescue and Fire fighting service protection unavailable until (Time) or until further notice. All equipment committed to aircraft accident."

4.2.3.5 複查檢查表中上述應進行的行動，寫下完成通告時間、簽名。

4.2.4 航站消救人員之行動

4.2.4.1 場站外失事正常應由航管單位、地方警察、消防隊通知航站消救單位，根據相互支援協議應有受指定之消救車輛應趕赴現場。

4.2.4.2 航站消救單位應

(a) 前往由地方警察協調適當之出入道路到達失事現場。

(b) 與相互支援消救單位進行協調。

(c) 赴現場途中與具管轄權之消救單位交換下列資訊：

(1) 等待點及運作區

(2) 人力及裝備狀況

(3) 其它確定資訊

4.2.4.3 航站消防資深人員應向有管轄權之地方消防隊資深人員報告並請求指示。

4.2.4.4 先前簽訂之協議應由航站消防單位及場外支援單位簽訂包含航廈及棚廠應有消防裝備，牽涉航廈之消防應由何單位指揮等。

4.2.5 警備服務的行動

4.2.5.1 第一位抵達的機場警備，有責任與現場指揮官協調並負警備職責，需建立緊急車輛出入口道路之通暢，直到指定之警察單位到達。

4.2.5.2 警備單位主要責任為交通順暢及現場警衛。應通知適當之聯絡中心可抵達現場之出入路線。與現場指揮官聯繫後進行出入路線之交通管制輔助緊急應變車輛。

4.2.5.3 警衛及警察須處理失事現場週邊交通，避免破壞散落現場之物品。

4.2.5.4 失事現場須設警戒標誌隔離入侵、媒體、旁觀者、打劫者。建立警告標誌警告侵入現場人員將可能受到重大傷害，接近失事現場100公尺處嚴禁煙火。

4.2.5.5 聯絡介於所有警備點、指揮所及緊急操作中心應立即完成通連。

4.2.5.6 圖8-2顯示應立即通知人員。

4.2.5.7 警備單位或或授權單位應訂定背章、現場通行證及識別卡的樣式。

4.2.5.8 特別提供飛航資料記錄器及座艙語音記錄器的保護、增加信件保護、保管危險物品及保護人員防止爆炸及放射物傷害。

4.2.6 航站管理之行動

相互支援協議規定航站管理應採取下列行動：

(a) 到達失事現場

(b) 若須要時啟動航站緊急應變中心及行動指揮所

(c) 應具管轄權之指揮要求擴大支援

(d) 通知航空公司

(e) 通知圖8-2之其它單位

(f) 提供醫療裝備及人員

4.2.7 醫療服務行動

4.2.7.1 民防及地方應組織醫療服務，航站之醫護中心也應參與。

4.2.7.2 依據與航站週邊單位訂定之相互支援協議航站醫療應提供部份醫療用品、設備及人員至失事現場。

4.2.8 醫院行動

4.2.8.1 提供醫療服務

4.2.8.2 確定緊急事件發生時，適當醫生、護士、手術室、心理治療單位、外科、血袋已備妥。

4.2.9 航空公司行動

4.2.9.1 航空公司資深代表須報告予現場行動指揮官協調航空公司作業狀況，若失事航空公司非機場使用者，機場管理者應指定場內適當航空公司處理，直到該航空公司人員到達。

4.2.9.2 航空公司資深代表應提供機載乘客名單、飛航組員及危險物品放置位置，危險品包含易爆物、壓縮、液態氣體、易燃液固體、氧氣瓶、有毒物質、傳染、放射物質，並將該危險品資料之告知消防指揮及醫療協調者。

4.2.9.3 安排交通工具運送未受傷乘客指定的未受傷人員休息區，禁止可行走之受傷乘客之運送，除非獲得醫護協調者允許。

4.2.9.4 航空公司人員應前往未受傷人員休息區，由資深人員負責指派該公司人員負責接待、登記及福利工作。

4.2.9.5 航空公司在未受傷區的代表，須觀察乘客須要適時提供額外的醫療服務、衣物、電話設備等服務。

4.2.9.6 接待人員須在乘客由失事現場前往休息區之下車處等候，指引乘客登記處位置，這些人員應了解廁所、電話、衣物、飲食位置。

4.2.9.7 登記人員應於手冊中記錄乘客姓名，意欲如何安排行程，如旅館安排轉機或其他運輸工具，登記人員須列出乘客身體及心理或潛在狀況，之後給與乘客一個身份標籤（如附錄七第十

段），登記後指示該乘客到福利協調者處。

4.2.9.8 航空公司代表須負責通知航機已失事給：

a） 健康及社福處（衛生局及社會局）

b） 海關

c） 境管局

d） 郵局

e） 環境處理單位

4.2.9.9 資深航空公司人員有通知親友之義務。

4.2.9.10 航空公司應協同機場公關室或其他單位發佈新聞。

4.2.9.11 航空公司有責任經失事調查單位同意移動航機殘骸。可參閱（Airport Service Manual（Doc9137),Part5-Removal of Disable Aircraft）

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附錄十三　國際民航組織機場服務手冊緊急應變計畫第十二章通訊

12.1　通則

所有參與機場單位須建立雙向連絡的管道，包含場外支援單位，使得指揮所及緊急應變中心能持續和所有單位連絡，同時備用連絡管道也應規劃在應變計劃。

12.2　通訊網

12.2.1 超過一個單位進行搶救時之通訊聯繫至為重要。

12.2.2 應利用充份數量的直線電應答機，電話及其他通訊設備建立主要、次要的通訊管道。此通訊網須連至緊急應變中心及行動指揮所及所有參與單位。

12.2.3 應提供下述單位間直通的通訊方式並規劃備用方式：

a） 塔台或航務值班、航站管理者、機航操作單位或航空公司至場站消防搶救單位間。

b） 塔台至航務組間，消防告警室／消防簽派中心至途中及抵達現場之消防搶救組員間。

c） 場內外適當相互支援單位間，並包含警告程序通知所有預劃可能協助支援人員。

d） 消救車輛間，載具內之組員須有相互連絡的能力。

12.3　通訊裝備

12.3.1 須提供充分數量之通訊裝備以確定人員及裝備之快速應變緊急事件，應備有下述通訊裝備。

12.3.2 充分數量之無線電：雙向、可攜式提供每一參與單位與指揮所之連絡。

12.3.3 嚴控通話守則避免佔線，每單位應使用獨特的頻道並指定一個指揮專用頻道。

12.3.4 行動指揮所之無線電頻道必須可直通航機及地面管制員並裝設耳機減少干擾。

12.3.5 和座艙直通也可利用座艙地面線(Cockpit to Ground lines)，須要配套之連接器、線材、麥克風及耳機，因此須航站消救人員及航空公司相互配合。

12.3.6 行動指揮所需具備足量電話及行動電話線路與場外單位通聯以減少無線電頻率通話負載過重。

12.3.7 醫療單位及救護車須要通訊能力利用週遭醫療機構之先進生命支援系統。

12.3.8 行動指揮所須裝備通訊規劃良好之車輛及通訊操作人員。

12.3.9 需記錄緊急應變中心或行動指揮所含時間的所有通聯狀況。

12.3.10 其他通訊裝備之考量如擴音器。

12.4 場坪及候機室意外

12.4.1 航站管理或航空公司應建立發生在候機或機坪意外之通訊系統，以利快速反應（機坪意外包含客艙失火，燃油外洩，航車碰撞，緊急醫療）。

12.4.2 機坪主管應配置雙向直通中央控制室之通訊設備。

12.4.3 航機謝載區或空橋(loading gate or jet way)須有電話裝設於登機口及機坪層，緊急電話號碼須明示在電話機上。

12.5 測試及驗證

12.5.1 每天需測試通訊系統（包含無線電及電話通訊網）。

12.5.2 完整及即時之單位、人員電話號碼表須提供每位參予緊急應變人員，並須每月更新。

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附錄十四　國際民航組織機場服務手冊緊急應變計畫第九章檢傷分類及醫療照顧

9.1　立即照顧航機失事傷患

許多人於失事受傷後未受到即時醫療照料而喪失生命，醫療單位之快速反應、檢傷分類及後送醫療機構是必要的。

9.2　檢傷分類法則（適用所有緊急狀況）

排序、分類病患決定處理方式及後送之優先順序。

9.2.1　傷亡人員應分為四級

第一順位：立即照料（Immediate care）

第二順位：稍後照料（Delay care）

第三順位：輕傷（Minor care）

第四順位：已死亡（Deceased）

9.2.2　第一位抵達現場之合格訓練的醫療人員須持續運作檢傷分類工作，直到較資深人員或航站醫療人員抵達為止。受難者須從檢傷分類區移至適當照料的等待區；受傷者須在適當照料的等待區穩定後送至適當醫院。

9.2.3　第一順位受傷者應優先處理及後送，此為檢傷分類人員之職責。

9.2.4　檢傷分類就地完成應是最有效，唯現場須將受傷者快速移動，計可能移動最小距離並遠離現場，至不影響消救及上風、上坡處為原則。

9.2.5　檢傷分類應使用識別卡輔助安排運送至適當醫院。

9.3　標準化的傷患識別卡及使用

9.3.1 由顏色、記號使識別卡更簡單易讀，可加速大量傷患時之照顧及加速後送至適當醫療機構。

9.3.2 識別卡設計－須防水、防天氣狀況：

第一順位或立即照料：紅色、羅馬符號Ⅰ、兔子記號

第二順位或稍後照料：黃色、羅馬符號ⅠⅠ、烏龜記號

第三順位或輕傷：綠色、羅馬符號ⅠⅠⅠ、救護車有X記號

第四順位或死亡：黑色

9.3.3 若無識別卡可使用，可用膠帶書寫羅馬符號或直接書寫於額頭或皮膚，指出優先順位及須如何處理，馬克筆若無法取得唇膏也可使用。

9.4 照料的原則

9.4.1 現場應完成嚴重受傷人員之穩定病情，避免在未穩定前即快速送醫。

9.4.2 消救人員或許為第一批到達人員，這些人須了解要將嚴重受傷人員看顧及穩定。某些案例火勢控制及預防並非第一要務，消救人員須受外傷救護訓練人員指示。第一輛搶救車輛須攜帶傷患照料裝備如：氣管插管、繃帶、氧氣瓶及相關裝備，穩定受嗆傷及外傷人員，供給搶救人員充份氧氣，燃需注意受燃油浸泡及溢出衣物燃爆氧氣筒之危險。

9.4.3 前幾分鐘穩定病情直到較專業人員處理，特別外傷小組人員到達，可進行較複雜之處理（如心肺復甦術－CPR）。

9.4.4 檢傷分類程序及附屬救護方式應由一位醫療救護協調者執行，但該協調者未到前應由消救指揮負責。

9.4.5 醫療救護協調者須將所有醫療救護的狀況告知現場指揮，協調者主要的功能在於管理，不應參與醫療救護行為。

9.4.6　易辨識醫療救護協調者須著白帽，前後書寫 Medical Coordinator 反光字樣之白外套或夾克。

9.4.7　第一順位傷者應為：

a） major hemorrhages 腦溢血；

b） severe smoke inhalation 嚴重嗆傷；

c） asphyxiating thoracic and cervico- maxillo- facial injuries 窒息；

d） cranial traumata with coma and rapidly progressive shook 頭骨外傷昏迷及快速休克；

e） compound fractures 穿破骨折；

f） extensive burn 超過 30 percent 體表面積嚴重灼傷；

g） crush injuries 壓傷；

h） tiny type of shock 其他型式休克；

i） spinal cord injuries 脊髓受傷。

9.4.8　照料方式應為

a） 急救

b） 保持清醒

c） 給氧

d） 置於帳內等待運送

9.4.9　第二順位傷者應為

a） 未窒息胸性外傷

b） 封閉式骨折

c） 有限度灼傷（少於 30% 體表面積）

d） 頭蓋骨外傷未昏迷及休克

e） 傷及身體柔軟部分

9.4.10　此級傷者不須最早送醫。

9.4.11　第三順位傷者為輕傷，因此級傷者可能干擾他級優先順位之執行，

因此仍須由現場運送到指定的等待區。

9.4.12 航空公司或紅十字須提供第三順位傷者照顧、安撫及辨別預先規劃照料區，如空棚廠、消防站、航站某一區。須有空調、電燈、水、電話、廁所等裝備。所有航空公司人員及航站租戶均須知道此位置。

9.5 傷患流動控制

9.5.1 如圖 9-1 傷患應通過四個照料區

a） 集合區 collection area －嚴重傷患在此區由消救人員交給醫護人員。

b） 檢傷分類區 triage area －至少距現場上風處 90m ，可多處設置。

c） 照料區 care area －分類後放於照料區，分為三級：

第一順位：紅色之交通錐或旗幟以為辨別

第二順位：黃色之交通錐或旗幟以為辨別

第三順位：綠色之交通錐或旗幟以為辨別

d） 運送區 Transportation area －放於照料區及出口道路間，僅能設一區，否則須有相互通聯網。

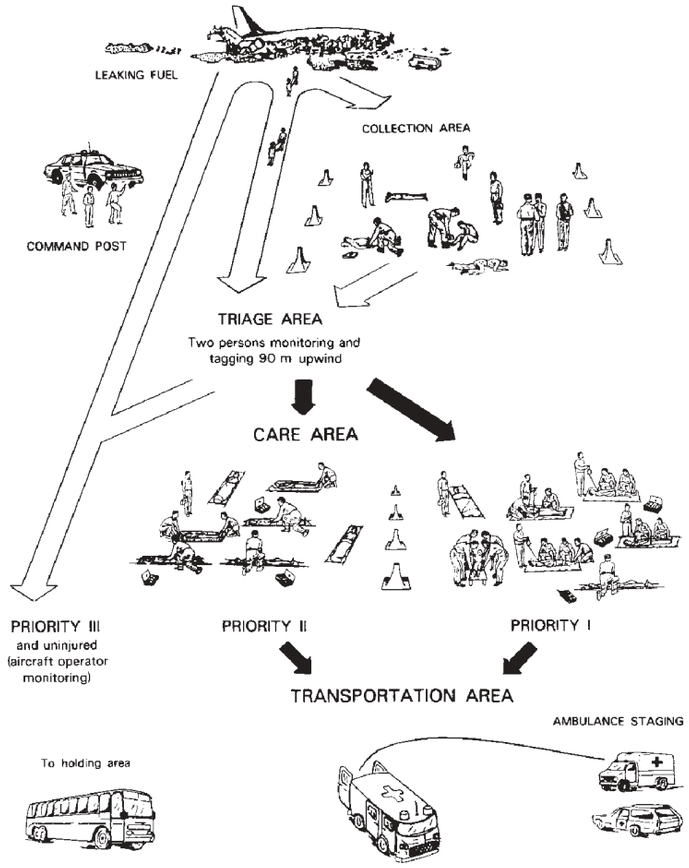

圖 9-1　現場檢傷分類及醫療照顧流程

9.5.2　行動設備有助第一、二順位人員穩定病情及照顧，一般使用不超過 30 分鐘。

a）輕便或復甦型救護車由第一順位傷患使用，復甦型救護車可很快速送到醫院。

b）紅色帳篷為安置嚴重傷患，具空調及燈光，可和所有須要的醫療器材送到現場。

c）黃色帳篷安置第二順位病患。

此頁空白

附錄十五　事故調查期中飛安通告

編號：ASC-IFSB-89-05-1

事件：民國八十九年五月八日中華航空公司CI-681機長失能返降中正機場，醫護人員未能立即登機進行急救

通報日期：中華民國八十九年五月十九日

通報事項：

一　對該機於三萬一千呎平飛，副駕駛發現機長失能返降之事件，本會經初步調查，發現該機於落地後醫護人員未能立即登機進行急救。

二　為避免類似對乘員醫護之延誤，本會提出建議如下：

(一) 飛航組員遭遇緊急狀況時，應採用標準術語MAY DAY, MAY DAY 或 PAN, PAN以傳達當時嚴重情況給有關人員。

(二) 機場各機關、單位及航空公司獲悉前述緊急情況，應密切聯絡交換資訊，並俟航機落地後，採取最有效之方法並在第一時間派醫護人員登機實施緊急救護。

航空器飛航安全委員會　執行長　戎凱

此頁空白

附錄十六　交通部民用航空局報告修正意見

正本

交通部民用航空局　函

裝　訂　線

機關地址：台北市敦化北路三四0號
傳　真：（02）23496071

受文者：行政院飛航安全委員會

速別：最速件
密等及解密條件：密(公布後解密)
發文日期：中華民國八十九年十二月二十七日
發文字號：標準一(八九)密 字第 S000七九四 號
附件：如文

主旨：檢送本局對華航 CI-681 組員失能事件調查報告草案修正意見，請 鑒察。

說明：

一、復 貴會八十九年十二月六日(89)飛安密字第一二〇〇二號函。

二、本局綜合意見摘要如下：

(一)我民航駕駛員體檢標準診檢方式、步驟及處置，相較於國際間適用標準已堪稱嚴謹。

(二)任何 40 歲以上之男性，無論其原來有無心臟疾病或異常檢查結果，均有發生"危性心肌梗塞"之可能，但與本病例情況不合(建請參考 89.10.11 貴單位就本案之審查會議與會醫師所獲共識)。

(三)依本報告 PAGE 33 2.1.1 所提「鑑定情況」—肉眼觀察：左前支起始部祇有 50%的狹窄，係在符合航空人員甲類體檢標準之要求範圍內；顯微鏡觀察：除心冠動脈狹窄外，無其他

特殊異常。就以上二項檢查結果而論，並未發現有冠狀動脈阻塞現象，唯在解剖報告中又提出嚴重心臟冠狀動脈阻塞之論點，前後有矛盾之處。

(四)梅核是否會引起急性氣道梗塞(究係吞下或嘔出)建請再詳加研究。

(五)飛航駕駛員失能肇因之預防至為重要，是故成因之判斷及於預防措施均宜審慎研議，建議邀集國內、外相關醫學專家共同就本案再行評定，以資公信。

(六)航醫中心對冠心病危險因子之檢查，歷來均列為航空體檢之重點項目，今後當再加強與航空公司醫務、航務部門連繫，俾嚴加掌控。

三、本調查報告草案文字修正建議如附件(請參考)。

正本：行政院飛航安全委員會
副本：本局飛航標準組

局長 張有恆

附錄十七　中華航空公司報告修正意見

中華航空公司（函）

受文者：航空器飛航安全委員會

速別：速件
密等：密
發文日期：二〇〇〇年十二月十九日
發文字號：2000PS/OF00943A
附件：修正建議表

主旨：檢呈本公司對 CI-681 事件調查報告草案條文修正建議表乙份(如附件)，請參辦。

說明：遵鈞會飛安密字第一二00二號函辦理。

正本：航空器飛航安全委員會
副本：交通部民用航空局(含附件)

總經理 宗才鶴

發文地址：台北市南京東路三段一三一號
傳　真：(〇二) 二五一四—六九八九

收文章 89 年 12 月 27 日
ASC DCC-00 12-005

華航對CI-681事件調查報告草案條文修正建議表

項次	報告原文	建議修正條文	說明
一	第三章結論3.1調查結果。第七條：「…起飛後不久副駕駛改採自動駕駛…」。	…起飛後不久副駕駛採用自動駕駛…。	副駕駛係依飛航操作程序。
二	第三章3.1之第八條：「…未有增加飛航組員工作量之故障」。	「…未有增加飛航組員工作量之情況」。	故障二字宜引人誤導。
三	第三章3.1之第九條：「…惟未使用緊急狀況術語通報」。	…惟未使用標準緊急狀況術語通報。	副駕駛已通報惟因情況緊急未及使用標準術語。
四	第三章3.1第十四條：「…未瞭解該副駕駛…致傳遞偏差消息」。	…「未及時瞭解該副駕駛…致傳遞不完整之消息」。	
五	第三章3.1第十五條：「亞派中心人員未瞭解該機…於地面有九分鐘延誤」。	「…亞派中心人員不知該機…於地面九分鐘之時間」。	
六	第三章3.1第十七條：「華航亞派中心人員未充分瞭解公司…」。	建議全條刪除	PIC依FOM規定有權做任何緊急狀況之處理決定。
七	第三章3.3第一條：「體檢機關及航空公司未能加強…」。	請斟酌刪除	1此種疾病可預知嗎？ 2航空公司有提醒之義務嗎？
八	第三章3.3第二條：「駕駛員本身未重視體檢結果…」。	請斟酌刪除	身體狀況既是機師賴以工作之本錢，未重視之事實根據為何？
九	第四章4.2第一條：「要求駕駛員重視體檢」。	請斟酌刪除	如右
十	第四章4.2第二條：「應對駕駛員中可能具潛在冠心病遭以列管，並提出保健建議」。	請斟酌刪除	「可能具…」如何偵知？實務上可行性為何？本公司對具潛在冠心病已有列管及提出保健建議。
十一	第二章2.4.2：「…惟華航航務手冊第二章醫療緊急狀況中組員失能之處置程序及第十四章緊急程序之危難及緊急時，無線電通話程序中均未敘述緊急情況(危難及緊急)之宣告條件為何…」。	請斟酌刪除本段文字	建議刪除

附錄十八　AHA/ACC Scientific

AHA/ACC Scientific Statement

Assessment of Cardiovascular Risk by Use of Multiple-Risk-Factor Assessment Equations

A Statement for Healthcare Professionals From the American Heart Association and the American College of Cardiology

Scott M. Grundy, MD, PhD; Richard Pasternak, MD; Philip Greenland, MD; Sidney Smith, Jr, MD; Valentin Fuster, MD, PhD

The past decade has witnessed major strides in the prevention of coronary heart disease (CHD) through modification of its causes. The most dramatic advance has been the demonstration that aggressive medical therapy will substantially reduce the likelihood of recurrent major coronary syndromes in patients with established CHD (secondary prevention). The American Heart Association (AHA) and the American College of Cardiology (ACC) have published joint recommendations for medical intervention in patients with CHD and other forms of atherosclerotic disease (1). A similar potential exists for risk reduction in patients without established CHD (primary prevention). However, the risk status of persons without CHD varies greatly, and this variability mandates a range in the intensity of interventions. Effective primary prevention thus requires an assessment of risk to categorize patients for selection of appropriate interventions. The present statement is being published jointly by the AHA and ACC to outline current issues and approaches to global risk assessment for primary prevention. The approaches described in this statement can be used for guidance at several levels of primary prevention; however, the statement does not attempt to specifically link risk assessment to treatment guidelines for particular risk factors. Nonetheless, it provides critical background information that can be used in the development of new treatment guidelines.

The major and independent risk factors for CHD are cigarette smoking of any amount, elevated blood pressure, elevated serum total cholesterol and low-density lipoprotein cholesterol (LDL-C), low serum high-density lipoprotein cholesterol (HDL-C), diabetes mellitus, and advancing age (Table 1). The quantitative relationship between these risk factors and CHD risk has been elucidated by the Framingham Heart Study (2) and other studies. These studies (2) show that the major risk factors are additive in predictive power. Accordingly, the total risk of a person can be estimated by a summing of the risk imparted by each of the major risk factors. Other factors are associated with increased risk for CHD (Table 2). These are of 2 types: conditional risk factors and predisposing risk factors. The conditional risk factors are associated with increased risk for CHD, although their causative, independent, and quantitative contributions to CHD have not been well documented. The predisposing risk factors are those that worsen the independent risk factors. Two of them—obesity and physical inactivity—are designated major risk factors by the AHA (3,4). The adverse effects of obesity are worsened when it is expressed as abdominal obesity (5), an indicator of insulin resistance.

Clinical Importance of Global Estimates for CHD Risk

Preventive efforts should target each major risk factor. Any major risk factor, if left untreated for many years, has the potential to produce cardiovascular disease (CVD). Nonetheless, an assessment of total (global) risk based on the summation of all major risk factors can be clinically useful for 3 purposes: 1) identification of high-risk patients who deserve immediate attention and intervention, 2) motivation of patients to adhere to risk-reduction therapies, and 3) modification of intensity of risk-reduction efforts based on the total risk estimate. For the latter purpose, patients at high risk because of multiple risk factors may require intensive modification of ≥1 risk factors to maximize risk reduction. Guidelines for the management of individual risk factors are provided by the second Adult Treatment Panel report (ATP II) of the National Cholesterol Education Program (NCEP) (6), the sixth report of the Joint National Committee (JNC VI) of the National High Blood Pressure Education Program (7), and the American Diabetes Association (ADA) (8). All of these guidelines are currently endorsed or supported by the AHA and the ACC. These reports (6–8) advocate adjusting the intensity of risk factor management to the global risk of the patient. In ATP II and JNC VI (6,7), overall risk is estimated by adding the categorical risk factors. They do not use a total risk estimate based on summation of risk factors that have been graded according to severity; this latter

This statement was approved by the American Heart Association Science Advisory and Coordinating Committee in June 1999 and by the American College of Cardiology Board of Trustees in July 1999. This document is available on the World Wide Web sites of the American Heart Association (www.americanheart.org) and the American College of Cardiology (www.acc.org). Reprints of this document (the complete guidelines) are available for $5 each by calling 800-253-4636 (US only) or writing the American College of Cardiology, Resource Center, 9111 Old Georgetown Road, Bethesda, MD 20814-1699. To purchase additional reprints: up to 999 copies, call 800-611-6083 (US only) or fax 413-665-2671; 1000 or more copies, call 214-706-1466, fax 214-691-6342, or e-mail pubauth@heart.org. To make photocopies for personal or educational use, call the Copyright Clearance Center, 978-750-8400.

(J Am Coll Cardiol 1999;34:1348–59)

PII S0735-1097(99)00387-3

TABLE 1. Major Independent Risk Factors

Cigarette smoking
Elevated blood pressure
Elevated serum total (and LDL) cholesterol
Low serum HDL cholesterol
Diabetes mellitus
Advancing age

approach has been advocated recently by Framingham investigators (2). The use of categorical risk factors has the advantage of simplicity but may be lacking in some of the accuracy provided by graded risk factors.

Some researchers and clinicians believe that the summation of graded risk factors provides advantages over the addition of categorical risk factors. For instance, the use of graded risk factors has been recommended in risk-management guidelines developed by joint European societies in cardiovascular and related fields (9). Advocates of this approach contend that the increased accuracy provided by the grading of risk factors outweighs the increased complexity of the scoring procedures. If the Framingham system is to be used, however, its limitations as well as its strengths must be understood. The AHA's Task Force on Risk Reduction recently issued a scientific statement (10) that reviewed and assessed the utility of Framingham scoring as a guide to primary prevention. The present report expands on this assessment and considers factors that must be taken into account when the Framingham algorithm is used (2).

Primary Versus Secondary Prevention

The present report focuses mainly on risk assessment for coronary disease and not on risk for other cardiovascular outcomes. Framingham scores estimate risk for persons without clinical manifestations of CHD (2). Therefore, the scores apply only to primary prevention, ie, to prevention in persons without established CHD. Once coronary atherosclerotic disease becomes clinically manifest, the risk for future coronary events is much higher than that for patients without CHD (6), regardless of other risk factors, and in this case, Framingham scoring no longer applies. The AHA and ACC have issued joint guidelines for the management of risk factors for patients with established CHD and other forms of atherosclerotic disease (1).

TABLE 2. Other Risk Factors

Predisposing risk factors
Obesity*†
Abdominal obesity†
Physical inactivity*
Family history of premature coronary heart disease
Ethnic characteristics
Psychosocial factors
Conditional risk factors
Elevated serum triglycerides
Small LDL particles
Elevated serum homocysteine
Elevated serum lipoprotein(a)
Prothrombotic factors (eg, fibrinogen)
Inflammatory markers (eg, C-reactive protein)

*These risk factors are defined as major risk factors by the AHA (3,4).

†Body weights are currently defined according to BMI as follows: normal weight 18.5–24.9 kg/m^2; overweight 25–29 kg/m^2; obesity >30.0 kg/m^2 (obesity class I 30.0–34.9, class II 35.9–39.9, class III ≥50 kg/m^2). Abdominal obesity is defined according to waist circumference: men >102 cm (>40 in) and women >88 cm (35 in) (5).

Definition of CHD

Interpretation of risk estimates for CHD requires a precise definition of CHD. Framingham estimates traditionally predict total CHD, which includes angina pectoris, recognized and unrecognized myocardial infarction, coronary insufficiency (unstable angina), and CHD deaths. In contrast, many clinical trials (11–14) that have evaluated specific risk-reducing therapies have specified major coronary events (recognized acute myocardial infarction and CHD deaths) as the primary coronary end points. In accord, the recent Framingham report (2) also provided estimates for "hard" CHD, excluding angina pectoris. The inclusion of coronary insufficiency (unstable angina) and unrecognized myocardial infarction (defined by electrocardiography) probably gives estimates of hard CHD that are somewhat higher than combined end points reported in several clinical trials (11–14). A recent clinical trial, the Air Force/Texas Coronary Artery Prevention Study (AFCAPS/TexCAPS) (15), specified acute coronary events, including unstable angina, acute myocardial infarction, and coronary death, as the primary end point. This combined end point probably corresponds closely to the Framingham study's definition of hard CHD. Definitions of coronary end points assume critical importance when risk cutpoints are defined to select patients for specific therapies.

Absolute Risk Estimates

Absolute risk is defined as the probability of developing CHD over a given time period. The recent Framingham report (2) specifies absolute risk for CHD over the next 10 years. Although absolute risk scores can be used to evaluate preventive strategies, 4 caveats must be kept in mind. First, Framingham scores derive from measurements made some years ago; the possibility exists that absolute risk for any given level of risk factors in the general population may have changed since that time. Second, absolute risk in the Framingham population for any given set of risk factors may not be the same as that for all other populations, for example, those of differing ethnic characteristics. Third, Framingham risk scores represent average values; however, considerable individual variability in risk exists within the Framingham population. For example, several other factors not included in the Framingham scores potentially modify absolute risk for individuals (see Table 2). Finally, Framingham scores are not necessarily elastic; the magnitude of risk reduction achieved by modifying each risk factor may not equal (in reverse) the increment in risk accompanying the factors.

TABLE 3. Definition of a Low-Risk State*

Serum total cholesterol 160 to 199 mg/dL
LDL-C 100 to 129 mg/dL
HDL-C ≥45 mg/dL in men and ≥55 mg/dL in women
Blood pressure <120 mm Hg systolic and <80 mm Hg diastolic
Nonsmoker
No diabetes mellitus

*According to Framingham Heart Study (2).

Definition of Low Risk

The Framingham report (2) defined low risk as the risk for CHD at any age that is conferred by a combination of all the following parameters: blood pressure <120/<80 mm Hg, total cholesterol 160 to 199 mg/dL (or LDL-C 100 to 129 mg/dL), and HDL-C ≥45 mg/dL for men or ≥55 mg/dL for women in a nonsmoking person with no diabetes (Table 3). This definition of low risk seems appropriate and should be widely applicable; for example, in the follow-up of 350 000 screenees of the Multiple Risk Factor Intervention Trial (16), most of the excess mortality from CHD could be explained by the presence of the major risk factors above these levels. The NCEP (6) designated a total cholesterol level of <200 mg/dL (or LDL-C of <130 mg/dL) as a desirable level. Framingham investigators (2) included total cholesterol levels in the range of 160 to 199 mg/dL (and LDL-C of 100 to 129 mg/dL) in their definition of the low-risk state. In addition, NCEP (6) recognized an LDL-C level of ≤100 mg/dL as optimal and as the goal of therapy for secondary prevention. This level corresponds to a total cholesterol level of ~<160 mg/dL. An elevated LDL-C level appears to be the primary CHD risk factor, because some elevation of LDL seems to be necessary for the development of coronary atherosclerosis (17). A very-low-risk state can be defined as an LDL-C level of <100 mg/dL in the presence of other low-risk parameters (Table 3). Therapeutic efforts to reestablish a very-low-risk state appear to be justified for secondary prevention (1,6); in primary prevention, however, a very low LDL-C level is not currently deemed necessary (6).

Relative Risk Versus Absolute Risk: Estimations From Framingham Scores

The relative risk is the ratio of the absolute risk of a given patient (or group) to that of a low-risk group. Literally, the term relative risk represents the ratio of the incidence in the exposed population divided by the incidence in unexposed persons. The denominator of the ratio can be either the average risk of the entire population or the risk of a group devoid of risk factors. The Framingham definition of the low-risk state provides a useful denominator to determine the effect of risk factors on a patient's risk. Both the absolute and relative risk can be derived from the recently published risk score sheets (2).

The first step in estimating risk is to calculate the number of Framingham points for each risk factor (Table 4). For initial assessment, measurements of serum levels of total cholesterol (or LDL-C) and HDL-C are required (2). The points for total cholesterol instead of LDL-C are listed in Table 4 because some of the Framingham database did not include LDL-C. Hence, total cholesterol gives more robust estimates. Evaluation for cholesterol disorders requires measurement of LDL-C, which is also the primary target of cholesterol-lowering therapy (6). The blood pressure value used in scoring is that obtained at the time of assessment, regardless of whether the patient is taking antihypertensive

TABLE 4. Global Risk Assessment Scoring

	Risk Points	
Risk Factor	Men	Women
Age, y		
<34	−1	−9
35–39	0	−4
40–44	1	0
45–49	2	3
50–54	3	6
55–59	4	7
60–64	5	8
65–69	6	8
70–74	7	8
Total cholesterol, mg/dL		
<160	−3	−2
169–199	0	0
200–239	1	1
240–279	2	2
≥280	3	3
HDL cholesterol, mg/dL		
<35	2	5
35–44	1	2
45–49	0	1
50–59	0	0
≥60	−2	−3
Systolic blood pressure, mm Hg		
<120	0	−3
120–129	0	0
130–139	1	1
140–159	2	2
>160	3	3
Diabetes		
No	0	0
Yes	2	4
Smoker		
No	0	0
Yes	2	2
Adding up the points		
Age _____		
Cholesterol _____		
HDL-C _____		
Blood pressure _____		
Diabetes _____		
Smoker _____		
Total points _____		

Age (Low-risk level)*	30-34 (2%)	35-39 (3%)	40-44 (3%)	45-49 (4%)	50-54 (5%)	55-59 (7%)	60-64 (8%)	65-69 (10%)	70-74 (13%)	Absolute Risk‡ Total CHD	Absolute Risk¶ Hard CHD
Points†											
0	1.0									2%	2%
1	1.5	1.0	1.0							3%	2%
2	2.0	1.3	1.3	1.0						4%	3%
3	2.5	1.7	1.7	1.3	1.0					5%	4%
4	3.5	2.3	2.3	1.8	1.4	1.0				7%	5%
5	4.0	2.6	2.6	2.0	1.6	1.1	1.0			8%	6%
6	5.0	3.3	3.3	2.5	2.0	1.4	1.3	1.0		10%	7%
7	6.5	4.3	4.3	3.3	2.6	1.9	1.6	1.3	1.0	13%	9%
8	8.0	5.3	5.3	4.0	3.2	2.3	2.0	1.6	1.2	16%	13%
9	10.0	6.7	6.7	5.0	4.0	2.9	2.5	2.0	1.5	20%	16%
10	12.5	8.3	8.3	6.3	5.0	3.6	3.1	2.5	1.9	25%	20%
11	15.5	10.3	10.3	7.8	6.1	4.4	3.9	3.1	2.3	31%	25%
12	18.5	12.3	12.3	9.3	7.4	5.2	4.6	3.7	2.8	37%	30%
13	22.5	15.0	15.0	11.3	9.0	6.4	5.6	4.5	3.5	45%	35%
>14	26.5	>17.7	>17.7	>13.3	>10.6	>7.6	>6.6	>5.3	>4.1	>53%	>45%

* Low absolute risk level = 10-year risk for total CHD end points for a person the same age, blood pressure < 120/<80 mmHg, total cholesterol 160-199 mg/dL, HDL-C ≥45 mg/dL, nonsmoker, no diabetes. Percentages show 10-year absolute risk for total CHD end points.

† Points = number of points estimated from Table 4

‡ 10-year absolute risk for total CHD end points estimated from Framingham data corresponding to Framingham points (Table 4)

¶ 10-year absolute risk for hard CHD end points approximated from Framingham data corresponding to Framingham points (Table 4)

Color Key for Relative Risk

Green	Violet	Yellow	Red
Below Average risk	Average risk	Moderately above average risk	High risk

Figure 1. Relative and absolute risk estimates for CHD in men as determined for Framingham scoring (2). The number of Framingham points is derived as shown in Table 4. Relative risk estimates for each age range are compared with baseline risk conferred by age alone (in the absence of other major risk factors). Relative risk is graded and color coded to include below average, average, moderately above average, and high-risk categories. Distinctions in relative risk are arbitrary. Average risk refers to that observed in the Framingham population. Absolute risk estimates are given in the 2 right-hand columns. Absolute risk is expressed as the percentage likelihood of developing CHD per decade. Total CHD risk equates to all forms of clinical CHD, whereas hard CHD includes clinical evidence of myocardial infarction and coronary death. Hard CHD estimates are approximated from the published Framingham data (2).

drugs. The average of several blood pressure measurements is needed for an accurate determination of the baseline level. Finally, in the present report, Framingham risk scores for borderline elevations have been modified to assign stepwise incremental risk in accord with current NCEP (6) and JNC VI (7) guidelines. Failure of Framingham scores to identify stepwise increments in risk in borderline zones probably reflects the relatively small size of the Framingham cohort. Diabetes is defined as a fasting plasma glucose level >126 mg/dL, to conform with recent ADA guidelines (18); in the Framingham study, diabetes was defined as a fasting glucose level >140 mg/dL. The designation of "smoker" indicates any smoking in the past month. The total risk score sums the points for each risk factor.

Risk ratios, relative to the low-risk state (Table 3), are shown for men in Figure 1 and for women in Figure 2; for each age, the number shown gives the relative risk. In addition, 10-year absolute risk values are shown for both total and hard CHD. The definition of hard CHD is that used by Framingham investigators; values shown for hard CHD are approximately two thirds those for total CHD, which are in accord with the recent Framingham report (2). Gradations of increasing relative risk are given in color. At the midpoint of this gradation is the average risk for the Framingham cohort for each age range. Ratios above average are divided into moderately high relative risk and high relative risk. A 3-fold increase in relative risk above the lowest risk level is designated moderately high risk; a 4-fold or greater increase is called high risk. Absolute risk levels rise progressively with age, even in the absence of risk factors.

Relative risk is useful for providing the physician with an immediate perspective of a patient's overall risk status relative to a low-risk state. This perspective can be helpful as a frame of reference for both physician and patient. Moreover, relative risk probably can be used to compare risk among individuals in populations in which baseline absolute risk has not been established. Absolute baseline risk (low-risk level) almost certainly varies among different populations, but the relative contributions of individual risk factors to total risk appear to be similar among all populations. Although the comparability of relative risk has not been proven rigorously, examination of available data from different epidemiological studies (19–28) suggests this to be the case.

It is apparent from Figures 1 and 2 that the relative risk associated with a given set of risk factor levels (expressed as a single Framingham number) declines with advancing age. At the same time, 10-year absolute risk rises with aging. Both changes have implications for prevention. Higher relative risk estimates in young adults are an indication of the high long-term risk accompanying the risk factors; they point to the need to institute a long-term risk-reduction strategy. On the other hand, the increasing absolute risk that accompanies advancing age reveals the opportunity for reducing absolute short-term risk by an immediate aggressive reduction of risk factors in older people. However, the best candidates for aggressive risk reduction among older patients may be those with moderately high or high relative risk. Recent guidelines have emphasized absolute risk estimates for use in treatment guidelines. Even so, the utility of relative risk estimates for areas of primary prevention that are most contentious, specifically, in young adults and elderly patients, should not be overlooked in the development of future guidelines.

Age	40–44	45–49	50–54	55–59	60–64	65–69	70–74		
(Low-risk level)*	(2%)	(3%)	(5%)	(7%)	(8%)	(8%)	(8%)	Absolute Risk	Absolute Risk
Points †								Total CHD‡	Hard CHD¶
0	1.0							2%	1%
1	1.0							2%	1%
2	1.5	1.0						3%	2%
3	1.5	1.0						3%	2%
4	2.0	1.3						4%	2%
5	2.0	1.3						4%	2%
6	2.5	1.7	1.0					5%	2%
7	3.0	2.0	1.2					6%	3%
8	3.5	2.3	1.4	1.0				7%	3%
9	4.0	2.7	1.6	1.1	1.0	1.0	1.0	8%	3%
10	5.0	3.3	2.0	1.4	1.3	1.3	1.3	10%	4%
11	5.5	3.7	2.2	1.6	1.4	1.4	1.4	11%	7%
12	6.5	4.3	2.6	1.9	1.6	1.6	1.6	13%	8%
13	7.5	5.0	3.0	2.1	1.9	1.9	1.9	15%	11%
14	9.0	6.0	3.6	2.6	2.3	2.3	2.3	18%	13%
15	10.0	6.7	4.0	2.9	2.5	2.5	2.5	20%	15%
16	12.0	8.0	4.8	3.4	3.0	3.0	3.0	24%	18%
≥ 17	>13.5	>9.0	>5.4	>3.9	5.4	5.4	5.4	>27%	>20%

* Low absolute risk level = 10-year risk for total CHD end points for a person the same age, blood pressure < 120/<80 mmHg, total cholesterol 160-199 mg/dL, HDL-C ≥55 mg/dL, nonsmoker, no diabetes. Percentages show 10-year absolute risk for total CHD end points.

† Points = number of points estimated from Table 4

‡ 10-year absolute risk for total CHD end points estimated from Framingham data corresponding to Framingham points (Table 4)

¶ 10-year absolute risk for hard CHD end points approximated from Framingham data corresponding to Framingham points (Table 4)

Key for Relative Risk

Green	Violet	Yellow	Red
Below average risk	Average risk	Moderately above average risk	High risk

Figure 2. Relative and absolute risk estimates for CHD in women as determined for Framingham scoring (2). The number of Framingham points is derived as shown in Table 4. Relative risk estimates for each age range are compared with baseline risk conferred by age alone (in the absence of other major risk factors). Relative risk is graded and color coded to include below average, average, moderately above average, and high-risk categories. Distinctions in relative risk are arbitrary. Average risk refers to that observed in the Framingham population. Absolute risk estimates are given in the 2 right-hand columns. Absolute risk is expressed as the percentage likelihood of developing CHD per decade. Total CHD risk equates to all forms of clinical CHD, whereas hard CHD includes clinical evidence of myocardial infarction and coronary death. Hard CHD estimates are approximated from the published Framingham data (2).

Absolute Short-Term Risk

Estimates of short-term risk (absolute risk in the next 10 years) are potentially useful for the identification of patients who need aggressive risk reduction in the clinical setting. Patients at high short-term risk may need pharmacological agents to control risk factors. The precise level of absolute risk that defines a patient at high short-term risk has been an issue of some uncertainty and involves a value judgment. Theoretically, this level of risk justifies aggressive risk-reduction intervention and is set through an appropriate balancing of efficacy, costs, and safety of therapy. Over time and depending on economic considerations, the thinking about this critical cutpoint of risk may change. Furthermore, little dialogue has occurred in the United States regarding the process of choosing a single absolute risk cutpoint for high short-term risk. The NCEP has taken the lead in adjusting the aggressiveness of cholesterol-lowering therapy to the absolute risk of patients. The NCEP identified patients having established CHD and other atherosclerotic disease as being at very high risk and deserving of aggressive therapy. For primary prevention, LDL-C goals were established by counting risk factors, but they did not define absolute risk in precise, quantitative terms. Future guidelines for risk reduction in the United States likely will put greater emphasis on quantitative global risk assessment.

Recently, guidelines of the joint European Societies (9) have identified high short-term risk as an absolute risk that imparts a >20% probability of developing CHD in the next 10 years. Once a patient reaches this threshold of risk, guidelines similar to those for secondary prevention are triggered. This threshold may be reasonable, but several comments must be made about how the European guidelines were derived. The authors (9) made use of older Framingham risk equations, (29) but their own risk estimates were based only on age, cigarette smoking, blood pressure, and total cholesterol. HDL-C levels were not included. Framingham risk equations (2,29) consistently include HDL-C, which is a powerful independent risk factor. The absence of HDL-C as a risk factor in European guidelines must be considered a limitation. As previously mentioned, European guidelines (9) used Framingham's total CHD as the coronary end point, which is a liberal coronary outcome and lowers the barrier to initiation of secondary-prevention guidelines. Irrespective of these details, there appears to be considerable consensus in the European cardiovascular community that a 10-year risk for clinical coronary end points of >20% justifies the category of high short-term risk. One concern about European guidelines is that although they creatively bridge the gap between primary and secondary prevention, they seemingly deemphasize the need for long-term primary prevention in the clinical setting.

Absolute Long-Term Risk

Framingham scoring does not directly project long-term risk (>10 years), although such risk can be approximated by the summing of risk scores over successive age categories and the subtraction of those persons removed by having CHD events. Thus, 20-year risk should be at least twice the 10-year risk. An important aim of primary prevention is to reduce CHD over the long term and not just over the short term. For a patient in the age range of 50 to 54 years, a 20-year projection of absolute risk may be of more interest to both the physician and the patient than a 10-year projection. Such a patient whose 10-year risk for CHD is 15% may not qualify as being at high short-term risk, but this same patient has a >30% probability of developing CHD before age 75. This latter projection needs to considered when primary prevention strategies are planned.

Another critical point to make about long-term risk is that any single coronary risk factor, eg, cigarette smoking, hypertension, high serum cholesterol, or diabetes, can lead to premature CHD (or stroke) if left untreated over a period of many years. Therefore, each of the major risk factors deserves intervention in the clinical setting, regardless of the short-term absolute risk. The centerpiece of long-term risk reduction is modification of lifestyle habits, eg, smoking cessation, change in diet composition, weight control, and physical activity (30). Nonetheless, in patients in whom long-term risk is high, the use of drugs for treatment of hypertension or serum cholesterol disorders may be warranted, as described in JNC VI (7) and ATP II (6), respectively.

Severity of Major Risk Factors

Framingham scoring takes into account gradations in risk factors when estimating absolute risk. The scoring does not adequately account for severe abnormalities of risk factors, eg, severe hypertension, severe hypercholesterolemia, or heavy cigarette smoking. In such cases, Framingham scores can underestimate absolute risk. This underestimation is particularly evident when only 1 severe risk factor is present. Thus, heavy smoking (31) or severe hypercholesterolemia (32) can lead to premature CHD even when the summed score for absolute risk is not high. Likewise, the many dangers of prolonged, uncontrolled hypertension are well known. These dangers underscore the need to control severe risk factors regardless of absolute short-term risk estimates.

Diabetes Mellitus as a Special Case in Risk Assessment

That diabetes mellitus is a major risk factor for CVD is well established (2). Both type 1 diabetes (33) and type 2 diabetes (34) confer a heightened risk for CVD. Type 2 diabetes is of particular concern because it is so common and usually occurs in persons of advancing age, when multiple other risk factors coexist. There is a growing consensus that most patients with diabetes mellitus, especially those with type 2 diabetes, belong in a category of high short-term risk. When the risk factors of diabetic patients are summed, their risk often approaches that of patients with established CHD (35). The absolute risk of patients with type 2 diabetes usually exceeds the Framingham score for hyperglycemia because other risk factors almost always coexist. Another reason to elevate the patient with diabetes to a higher risk category than suggested by Framingham scoring is the poor prognosis of these patients once they develop CHD (36). These factors point to the need to intensify the management of coexisting risk factors in patients with diabetes (7,37). These considerations about the very high risk of patients with diabetes apply to ethnic groups that have a relatively high population risk for CHD. The inclusion of patients with type 2 diabetes in the very-high-risk category may not be appropriate when they belong to ethnic groups with a low population risk.

Absolute Risk Assessment in Elderly Patients

One of the more prominent features of the Framingham risk scoring is the progressive increase in absolute risk with advancing age (Figures 1 and 2). This increase undoubtedly reflects the cumulative nature of atherogenesis. With advancing age, people typically accumulate increasing amounts of coronary atherosclerosis. This increased plaque burden itself becomes a risk factor for future coronary events (38–40). Framingham scoring for age reflects this impact of plaque burden on risk. Still, average scores mask the extent of variability in plaque burden in the general population. To apply average risk scores for age to individual patients may lead to miscalculation of true risk, particularly because Framingham applies so much weight to age as a risk factor. Miscalculation of risk could lead to inappropriate selection of patients for aggressive risk-reduction therapies. This fact points to the need for flexibility in adapting treatment guidelines to older persons. The tempering of treatment recommendations with clinical judgment becomes increasingly important with advancing age, particularly after the age of 65. In the future, measures of subclinical atherosclerosis may improve the accuracy of global risk assessment in older patients. When risk scoring is used to adjust the intensity of risk factor management in elderly patients, relative risk estimates may be more useful than absolute risk estimates. Relative risk estimates essentially eliminate the age factor and are based entirely on the major risk factors. These estimates allow the physician to stratify and compare patients of the same age, and patients at highest relative risk could be selected for the most aggressive risk management.

Certain Limitations of Framingham Database

Certain features of the Framingham scores reflect limitations of the data set. For example, LDL-C and HDL-C levels are known to be continuous in their correlation with CHD risk. Presumably because of an insufficient number of subjects in all categories, these continuous relationships are not consistently observed between each incremental category (2). Moreover, the assigned scores for each category are not entirely consistent with the notations for graded risk proposed by the NCEP (6) and the JNC (7). Framingham scores probably require adjustment to account for the continuous relationship between risk factors and CHD (6,7). As stated previously, this adjustment was made in Table 4. Finally, there is no indication that Framingham scoring has been corrected for regression dilution bias (41); this bias results from the random fluctuation of risk factors over time such

that single measures of risk factors systematically underestimate the association between risk factors and CHD.

Prediction scores from Framingham illustrate the substantial difference in CHD risk between men and women before age 70. The difference between men and women particularly stands out for hard CHD end points. The diagnosis of angina contributes a sizable fraction of all CHD end points in middle-aged women and accounts for the notable difference between total CHD and hard CHD in this age group. Nonatherosclerotic anginal syndromes may have been mislabeled among total CHD end points in some Framingham women. The relatively small rise in risk for total CHD events after age 55 should not obscure the progressive increase in risk for hard CHD in older women. Framingham findings on hard end points are more consistent with population studies that show a sharp rise in CHD morbidity and mortality in women after age 70. Even so, a discrepancy in CHD risk between men and women persists throughout all age groups.

Use of Conditional and Predisposing Risk Factors in Risk Assessment

In addition to the major risk factors (Table 1), a series of other risk correlates have been identified (Table 2). Their presence may denote greater risk than revealed from summation of the major risk factors. Their quantitative contribution and independence of contribution to risk, however, are not well defined. Usually, therefore, they are not included in global risk assessment. This does not mean that they do not make an independent contribution to risk when they are present. A sizable body of research supports an independent contribution of each. Their relation to CHD is more complex than is that of the major risk factors. In some cases, they are statistically correlated with the major risk factors; hence, their own independent contribution to CHD may be obscured by the major risk factors. In other cases, their frequency in the population may be too low for them to add significant independent risk for the entire population; in spite of this, they could be important causes of CHD in individual patients. Several of the other risk factors represent direct targets of therapy, either because they are causes of the major risk factors or because circumstantial evidence of a role in atherogenesis is relatively strong. Thus, even though these other risk factors are not recommended for inclusion in absolute risk assessment, their exclusion from this function should not be taken to imply that they are clinically unimportant. Their role in evaluation and management of patients at risk deserves some consideration.

Obesity

The AHA defines obesity as a major risk factor for CVD (42). Risk is accentuated when obesity has a predominant abdominal component (5). Obesity typically raises blood pressure and cholesterol levels (42–44) and lowers HDL-C levels (43,44). It predisposes to type 2 diabetes (5). It also adversely affects other risk factors: triglycerides (43,44); small, dense LDL particles (45); insulin resistance (46,47); and prothrombotic factors (48,49). Although not shown by the Framingham data (2), other long-term longitudinal studies suggest that obesity predicts CHD independently of known risk factors. The association between excess body weight and CHD seems particularly strong in white Americans. For example, in one long-term prospective study (50), men aged 40 to 65 years with body mass index (BMI) 25 to 29 kg/m^2 were 72% more likely to develop fatal or nonfatal CHD than were men who were not overweight. In another study (51), women whose BMI was 23 to 25 kg/m^2 carried a 50% increase in risk for CHD compared with women with lower BMIs. The overall relation between body weight and CHD morbidity and mortality is less well defined for Hispanics, (52) Pima Indians (53), and black American women (54); even so, obesity is a risk factor for type 2 diabetes, which itself is a risk factor for CHD. Much remains to be learned about the biological mechanisms underlying the association between obesity and CHD, but without question, a strong association exists. Consequently, obesity is a strong risk factor for CHD (3) and is a direct target for intervention (5). Prevention of obesity and weight reduction in overweight persons are integral parts of the strategy for long-term risk reduction. The recent report of the NHLBI Obesity Education Initiative (5) provides a comprehensive guideline for the management of overweight and obese patients in clinical practice.

Physical Inactivity

The AHA also classifies physical inactivity as a major risk factor. (4) Many investigations (55), including the Framingham Heart Study (56–59), demonstrate that physical inactivity confers an increased risk for CHD. The extent to which physical inactivity raises coronary risk independently of the major risk factors is uncertain (60). Certainly, physical inactivity has an adverse effect on several known risk factors (60). Even though physical inactivity is an independent risk factor, physical activity levels are difficult to reliably measure in individual patients. For these reasons, physical inactivity is not included in quantitative risk assessment. In spite of these limitations in assessment, previous studies (61,62) document that regular physical activity reduces risk for CHD. Physical inactivity constitutes an independent target for intervention. Physicians should encourage all of their patients to engage in an appropriate exercise regimen, and high-risk patients should be referred for professional guidance in exercise training. The AHA recently published practical recommendations for exercise regimens designed to reduce risk for CVD (63).

Family History of Premature CHD

There is little doubt that a positive family history of premature CHD imparts incremental risk at any level of risk factors. This association has been shown by the Framingham Heart Study (64). Nonetheless, the degree of independence from other risk factors and the absolute magnitude of incremental risk remain uncertain. For this reason, Framingham investigators did not include family history among the major independent risk factors. The NCEP (6) counts a positive family history of CHD as an independent risk factor that modifies the intensity of LDL-lowering therapy. Regardless of whether family history is used to modify risk management in individual patients, the taking of a family history is

Other Risk Correlates

Other potential risk factors include elevated concentrations of lipoprotein(a), fibrinogen, and C-reactive protein. Routine measures of these risk factors currently are not recommended. An elevated serum lipoprotein(a) correlates with a higher incidence of CHD in some studies (102,103) but not in others (104,105). Furthermore, specific therapeutics to reduce lipoprotein(a) levels are not available; some investigators have suggested that an elevated lipoprotein(a) level justifies a more aggressive lowering of LDL-C. An elevated fibrinogen level also is correlated with a higher CHD incidence (106,107). Again, no specific therapies are available, except that in smokers, smoking cessation may reduce fibrinogen concentrations (108). Finally, C-reactive protein is promising as a risk predictor (109,110). The preferred method for measurement appears to be a high-sensitivity test (111). C-reactive protein appears to be related to systemic inflammation; however, its causative role in atherogenesis is uncertain.

Implications for Clinical Risk Reduction

Identification of risk factors lies at the heart of clinical efforts to reduce risk for CVD and/or CHD. Every major risk factor predisposes to CHD and other cardiovascular events, particularly if left unattended for long periods. In addition, when multiple risk factors occur in a single individual, risk is compounded, which justifies efforts to estimate global risk. The summation of contributions of individual risk factors can be a valuable first step in planning a risk-reduction strategy for individual patients. This first step should be divided into 2 phases. First, absolute risk should be estimated from the major risk factors (listed in Table 1). Framingham risk scoring provides an acceptable tool for most non-Hispanic white, Hispanic, and black Americans. People of South Asian origin appear to have about twice the absolute risk for any set of risk factors as whites. In contrast, East Asian Americans may have a lower absolute risk than other ethnic groups in the United States. Second, when absolute risk has been estimated from the major risk factors, consideration can be given to modifying the estimate in the presence of other risk factors (Table 2). Clinical judgment is required to estimate incremental risk incurred by these latter factors. Risk estimates are useful both for short-term, high-risk primary prevention and for long-term (or lifetime) primary prevention. Implications for global risk assessment can be considered for each.

Short-Term Prevention

Recent clinical trials demonstrate that significant risk reduction can be achieved by aggressive reduction of risk factors in high-risk patients. Clinical trials have shown that excess risk can be reduced by ~33% to ~50% in ~5 years. This is particularly the case when risk-reduction strategies use smoking cessation, blood pressure–lowering agents, cholesterol-lowering drugs, and aspirin. Clinical trials strongly suggest that glucose control reduces the incidence of various cardiovascular end points in patients with either type 1 diabetes (112) or type 2 diabetes (113). Other clinical trials (114,115) strongly suggest that aggressive LDL-lowering therapy reduces risk for CHD in patients with type 2 diabetes. For this reason, detection of patients at high risk, with the aid of global risk assessment, should be an important aim of routine medical evaluation of all patients. Specific therapies for risk reduction in high-risk patients are described in the NCEP ATP II report for cholesterol management (6), the JNC VI report for treatment of hypertension (7), and by the ADA's guidelines for treatment of diabetes mellitus (8). Once appropriate therapies are selected, global risk scores can also be used to help instruct patients and to improve compliance with preventive interventions.

Long-Term Prevention

Global risk assessment is particularly useful in young and middle-aged adults for assessing relative risk and absolute long-term risk (Figures 1 and 2). Even though short-term risk may not be high in younger patients who have multiple risk factors of only moderate severity, long-term risk can be unacceptably high. Risk assessment in these patients will highlight the need for early and prolonged intervention on risk factors. In young adults, relative risk ratios help to reveal long-term risk for CHD. Although long-term prevention may not call for the use of risk-reducing drugs, it definitely will require the introduction of lifestyle modification (ie, smoking cessation in smokers, weight control, increased physical activity, and a diet low in cholesterol and cholesterol-raising fats). The AHA provides guidelines to assist healthcare professionals in the implementation of life-habit modifications (30). There is a common misconception that most of the excess risk accumulated over many years can be erased by aggressive short-term prevention introduced later in life. Although the use of risk-reducing drugs can significantly lower risk when begun in later years, there is no evidence that it can return a patient to the low-risk status of a younger person. This reduction can only be accomplished by decreasing the magnitude of coronary plaque burden through long-term control of risk factors. Therefore, appropriate intervention, guided by risk assessment that is performed periodically in early adulthood and early middle age, has the potential to bring about a significant reduction in long-term risk.

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undoubtedly important. A positive family history for premature CHD calls forth the need to test a patient's relatives for both premature CVD and the presence of risk factors.

Psychosocial Factors

There has long been an interest in the contribution of personality and socioeconomic factors to CHD risk. Recently, specific factors including hostility, depression, and social isolation have been shown to have predictive value (65–67). These factors, however, are not included in the Framingham data and cannot be incorporated into the model currently. Nonetheless, they might be taken into account in individual patients when an overall strategy for risk reduction is being developed.

Ethnic Characteristics

The Framingham population represents the world's most intensively studied population for cardiovascular risk factors. This study is of great value in developing population-based risk estimates in this population. Because Framingham residents are largely whites of European origin, it is uncertain whether baseline absolute risk is similar to that in other populations. Available evidence suggests that absolute risk varies among different populations independently of the major risk factors. For example, absolute risk among South Asians (Indians and Pakistanis) living in Western society appears to be about twice that of whites, even when the 2 populations are matched for major risk factors (68–70). This higher baseline risk should be considered when South Asians living in the United States are evaluated. Available comparisons of non-Hispanic white, non-Hispanic black, and Hispanic Americans (71,72) point to a comparable absolute risk status, but large systematic comparisons are in the early stages. It is also possible that some populations have a lower baseline risk than the whites studied in Framingham. For example, results of the Honolulu Heart Study (27) suggest that Hawaiians of East Asian ancestry have only about two thirds the absolute risk of Framingham subjects. In the Seven Countries Study (73), the population of Japan exhibited a much lower risk for CHD for a given set of risk factors than other populations. Differences in absolute risk among different demographic groups suggest the need for adjustments in estimates of absolute risk from Framingham scores depending on racial and ethnic origins. Although absolute risk scores may not be transportable to all populations, relative risk estimates probably are reliable across groups. To date, comparison studies are insufficient to provide quantitative estimates of the adjustments needed for Framingham scores when they are applied to individuals from different demographic backgrounds. In spite of the limitations of the Framingham data, absolute risk estimates as applied to some populations seem applicable to the large populations of non-Hispanic white, Hispanic, and black Americans in the United States. For other groups, relative risk estimates still seem applicable.

Hypertriglyceridemia

Framingham scoring does not ascribe independence to triglyceride levels in risk assessment. Framingham investigators (74) nonetheless have reported that elevated serum triglycerides are an independent risk factor, as have other reports. (75–77) Hypertriglyceridemia is correlated with other risk factors (78); however, its degree of independent predictive power is difficult to assess. Several clinical trials (79–81) found that drugs that primarily affect triglyceride-rich lipoproteins reduce CHD risk when used with patients with hypertriglyceridemia. Elevated triglycerides consequently may become a target of therapy independent of LDL lowering. The reduction of serum triglyceride levels will also decrease the concentrations of small LDL particles, another putative risk factor (82,83). Of course, weight reduction in overweight patients and adoption of regular exercise by sedentary persons will lower triglyceride levels, which is one way in which these changes in lifestyle reduce CHD risk.

Insulin resistance is another risk correlate for CHD (84,85). The mechanisms of association between insulin resistance are complex and likely multifactorial. Regardless, a large portion of all patients who are candidates for global risk assessment have insulin resistance and its accompanying metabolic risk factors (the metabolic syndrome). The components of this syndrome include the atherogenic lipoprotein phenotype (elevated triglycerides, small LDL particles, and low HDL-C levels) (78,86), elevated blood pressure, a prothrombotic state, and often, impaired fasting glucose (87). The metabolic syndrome is a clinical diagnosis, but the risk accompanying it can be assessed in large part by Framingham scoring. This scoring does not count impaired fasting glucose as an independent risk factor, although Framingham publications (88–90) would support doing so. Insulin resistance can be assumed to be present in a patient with obesity (BMI >30 kg/m^2) (46,47) or overweight (BMI 25 to 29.9 kg/m^2) plus abdominal obesity (46,47), especially when accompanied by elevated plasma triglycerides (78,91), low HDL-C (92), or impaired fasting glucose (93). Insulin resistance is acquired largely through obesity and physical inactivity, although a genetic component undoubtedly exists. The only therapies presently available for insulin resistance for patients without diabetes are weight reduction (94) and increased physical activity (95).

Homocysteine

A high serum concentration of homocysteine is associated with increased risk for CHD (96–98). The AHA recently published an advisory on homocysteine that provides an in-depth review of the relation between homocysteine and CVD (99). Several mechanisms whereby elevated homocysteine predisposes to CVD have been postulated. However, it remains to be proved in controlled clinical trials that a reduction in serum homocysteine levels will reduce risk for CHD. In some patients, nonetheless, high levels of homocysteine can be lowered by recommended daily intake of folic acid (99–101). If homocysteine levels are elevated, patients should be encouraged to consume the recommended daily intake of folic acid, as well as vitamins B_6 and B_{12}. Routine measurement of homocysteine levels was not recommended for purposes of risk assessment, but measurement is optimal in high-risk patients (99).

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KEY WORDS: AHA/ACC Scientific Statement ■ coronary disease ■ risk factors ■ risk assessment

附錄十九　Airport Operations

FLIGHT SAFETY FOUNDATION
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Use of Standard Phraseology by Flight Crews and Air Traffic Controllers Clarifies Aircraft Emergencies

International Civil Aviation Organization procedures for declaring mayday or pan pan eliminate ambiguity about an aircraft in distress or an aircraft in an urgency condition, respectively. Declaring an emergency generates maximum assistance from air traffic controllers worldwide, but delay in declaring an emergency may create confusion or narrow the pilot's options.

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FSF Editorial Staff

Ten years ago, during the U.S. National Transportation Safety Board's (NTSB) investigation of the Avianca Airlines Flight 052 accident, U.S. Federal Aviation Administration (FAA) air traffic controllers said that they expected flight crews to use the specific words "mayday" or "emergency" to declare an emergency.[1,2]

The investigation considered — among other issues — whether international procedures and phraseology for pilot-controller emergency communications were adequate. One outcome was safety recommendations to distinguish situations in which an aircraft is in distress because of low fuel and situations in which a flight crew cannot accept any undue delays because of low fuel. Otherwise, there was consensus that the procedures and phraseology were adequate.

Declaring an emergency obligates controllers — under procedures of the International Civil Aviation Organization (ICAO), FAA and other civil aviation authorities — to give maximum assistance and priority handling to an aircraft in distress. The term "priority handling" (and similar terms such as "traffic priority") have not been defined officially by ICAO or FAA, but "priority" in air traffic control (ATC) refers to aircraft order of service established by procedures for determining the order of importance. Priority handling may be provided to aircraft for various reasons other than an emergency (for example, a medical transport mission or search-and-rescue operations); nevertheless, specific procedures for declaring an emergency ensure the maximum level of priority handling.

David Canoles, manager, FAA air traffic evaluation and investigation staff, said, "In general, all traffic in the system is handled on a first-come, first-served basis. Priority handling does not mean urgency or distress, it simply means no undue delay.

"In an emergency, however, the controller can break all the rules to assist the pilot."[3]

Cay Boquist, chief of the ICAO Air Traffic Management Section, said that air traffic controllers commonly use priority in the dictionary sense, but pilots and controllers have come to understand priority handling to mean specifically a method of ATC operation in which controllers typically would provide

direct routing to an airport, would reroute other aircraft to the extent necessary to avoid delays and would not use holding for the aircraft receiving priority handling.[4]

Boquist said that the following excerpts from ICAO documents summarize key concepts of priority handling of aircraft and pilot-controller authority to take necessary action during an emergency:

- "An aircraft known or believed to be in a state of emergency, including being subjected to unlawful interference, shall be given priority over other aircraft;"[5]
- "The approach sequence shall be established in a manner which will facilitate the arrival of the maximum number of aircraft with the least average delay. A special priority may be given to: a) an aircraft which anticipates being compelled to land because of factors affecting the safe operation of the aircraft (engine failure, shortage of fuel, etc.); b) hospital aircraft or other aircraft carrying any sick or seriously injured person requiring urgent medical attention; [and,]"[6]
- "The various circumstances surrounding each emergency situation preclude the establishment of exact detailed procedures to be followed. ... Air traffic control units shall maintain full and complete coordination, and personnel shall use their best judgment in handling emergency situations."[7]

The action or inaction of pilots and controllers during an emergency may have immediate safety consequences, and may affect court judgments about legal responsibility if an accident occurs. (See "Analysis of U.S. Court Cases Shows Compatibility of Safety, Legal Responsibility" on page 3.)[8]

ICAO procedures for emergency communication do not "prevent the use, by an aircraft in distress, of any means at its disposal, to attract attention, make known its position and obtain help."[9]

Specific ICAO terms — for declaring an emergency and for telling ATC about an aircraft in an urgency condition — were designed to be simple but unmistakable signals taught during the basic training of pilots and air traffic controllers worldwide.

To declare an emergency, the pilot precedes the message with the word "mayday," preferably spoken three times, at the beginning of the first distress communication. ("Mayday" comes from the French "m'aidez," which means "help me.")

To declare an urgency condition, the pilot precedes the message with pan pan, preferably spoken three times. (ICAO said that pilots also can precede each subsequent communication in distress radio communication or urgency radio communication with mayday or pan pan, respectively.)[10]

Following ICAO procedures, the pilot of the aircraft in distress should transmit on the air-ground frequency in use at the time (that is, normally the station communicating with the aircraft or in whose area of responsibility the aircraft is operating). Emergency frequency 121.5 MHz or an alternative aeronautical mobile frequency can be used "if considered necessary or desirable," but some aeronautical stations do not guard continuously the emergency frequency. In using any means available to attract attention and communicate about the aircraft's conditions, the pilot also may activate the appropriate secondary surveillance radar transponder mode and code. The pilot should tell ATC, speaking slowly and distinctly, as many of the following items of information as possible (the exact procedures of a specific civil aviation authority or airline may vary):

- The identification of the station addressed;
- The identification of the aircraft;
- The nature of the distress condition;
- The intentions of the pilot-in-command (PIC); and,
- The present position, altitude and heading.[11]

Flight crews should expect air traffic controllers to take the following actions:

- Acknowledge immediately the crew's distress message;
- Take control of the communications or clearly transfer that responsibility to another controller (and notify the flight crew);
- Take immediate action to inform other ATC facilities (and the aircraft operator as soon as possible);
- Warn other ATC facilities to prevent the transfer of non-related communications to the frequency in use for distress communication;
- Possibly impose radio silence on that frequency for either all stations of the mobile service (that is, all aircraft and ground facilities) in the area or for any station that interferes with the distress traffic; and,
- Announce the termination of distress communication and of radio silence, if imposed.[12]

ICAO's policy on languages to be spoken in international aviation is that the language of the ground station (typically the language of the country in which the station is located) determines the primary language to be used in air-ground communications. If English is not the language of the ground station, however, ATC services in English should be available on request. English, in effect, serves as a universal medium of radio communications.[13]

Analysis of U.S. Court Cases Shows Compatibility of Safety, Legal Responsibility

Two aviation principles — that the pilot-in-command (PIC) of an aircraft has authority for the safe conduct of flight and that pilots may exercise emergency authority to deviate from the normal regulations and clearances — are among many that come into play when U.S. courts determine legal responsibilities following an aircraft accident.

Declaration of an emergency by either a flight crewmember or an air traffic controller may become a pivotal element of judging whether an aviation professional exercised the degree of care expected by society — by following applicable regulations and standard operating procedures, for example.

Steven Riegel, a senior aviation counsel in the U.S. Department of Justice, in 1997 analyzed the legal responsibilities of pilots and air traffic controllers in the context of in-flight emergencies by reviewing the relevant laws and regulations, discussing 10 court cases that involved pilot-controller emergency communication and citing several dozen court decisions that have set legal precedents.[1]

Based on his experience representing U.S. air traffic controllers in legal matters, Riegel said that typically controllers expect to handle aircraft emergencies as part of their normal services to pilots, focus on assisting pilots who declare an emergency and do not want to generate unnecessary paperwork.

Riegel said, "Air traffic controllers are trained to provide maximum assistance to pilots in an emergency situation, but the majority of controllers are not pilots, and no controller can be as familiar as the pilot with a particular pilot's situation, capabilities and needs in an emergency. Therefore, the more specificity in a pilot's request, the better the controllers can accommodate the requests."

Riegel made the following points among the findings in his analysis:

- Pilots and air traffic controllers have concurrent responsibilities for the safety of an aircraft flight and passengers;
- The pilot and the air traffic controller switch roles in some respects after the pilot declares an emergency. That is, the PIC then tells air traffic control (ATC) his or her intentions, deviates from normal rules and clearances as necessary, and obligates air traffic controllers to provide maximum assistance to enable the flight crew to conduct the flight via the course of action determined by the PIC;
- In the United States, Federal Aviation Regulations (FARs) have the force and effect of law, and the recommended procedures adopted by the International Civil Aviation Organization may be significant in establishing in court the standard of care expected of aviation professionals;
- U.S. courts have held that the authority of the PIC includes presumptions that aircraft pilots will handle unusual and unexpected occurrences appropriately, will exercise discipline on the flight deck, will be cognizant at all times of any hazards that they can perceive (and declare an emergency when appropriate), and will reject any ATC vectors, instructions or clearances that would jeopardize safety;
- Litigation involving the actions of air traffic controllers may consider whether ATC met the standard of care of maximum assistance after declaration of an emergency, but controllers have not been expected to have known an aircraft's situation beyond what has been communicated by the flight crew or has been reasonably apparent (for example, by observing the aircraft using radar);
- Air traffic controllers must warn aircraft to avoid a hazard when they are aware of the hazard, but they are not necessarily negligent when they deviate from guidelines issued by FAA, do not warn pilots about something that the pilot should know in ordinary circumstances, or do not anticipate that an aircraft emergency will develop from the limited information that they have received;
- FAA personnel can assume that pilots will know and follow all FARs applicable to the flight operation, will exercise their best judgment and, to a reasonable degree, will provide information that is relevant to the pilot's decision making; and,
- U.S. courts have not accepted arguments that pilots should be exempt from enforcement action if they declared an emergency and this action was, in reality, not related to an in-flight emergency that required immediate attention.♦

— FSF Editorial Staff

Reference

1. Riegel, Steven. "In-flight Emergencies: Legal Responsibilities of Pilots and Air Traffic Controllers." Paper presented at the 31st annual Southern Methodist University Law Symposium, Dallas, Texas, U.S., February 1997.

Describing the need for a universally available language, ICAO said, "It is always possible that an emergency may require communication with a ground station not foreseen in the original planning [of crewmember assignments by language qualification], and that the handicapping or prevention of such emergency communications by the lack of a language common to the aircrew and the ground station could lead to an accident."[14]

Standardized phraseology and communication procedures help to compensate for distractions and ambiguity of context inherent in pilot-controller radio communication even when English is used. For example, in the 1977 fatal accident involving two Boeing 747 aircraft on a runway in Tenerife, Canary Islands, Spain, one pilot's use of the phrase "at takeoff" was misinterpreted by a tower controller to mean that his aircraft was ready for takeoff when the pilot actually was beginning the takeoff.[15]

Several civil aviation authorities, international aviation organizations, controllers and pilots said that they believe that ICAO procedures for pilot-controller emergency communication work well. They said that in current practice, the following commonalities, and a few differences, are significant:

- ICAO procedures and phraseology for declaring an emergency are well documented, but many flight crews use alternate phraseology in their first language if circumstances permit;
- Air traffic controllers in some countries are receiving more training to be alert to signs of an aircraft emergency or impending emergency, to question flight crews and to declare an emergency for the flight crew in some situations;
- Some said that ICAO phraseology for communicating an urgency condition apparently is not used, or not used appropriately, by many flight crews;
- Hesitancy or reluctance to declare an emergency was not considered to be a significant issue for airline pilots, especially in the United States and most of Europe;
- Flight crews do not gain anything significant by not declaring an emergency when circumstances indicate that they should do so; and,
- The universal, overriding objective of ATC is to provide assistance, not to enforce regulations, when an aircraft is in a distress situation or an urgency situation. Typically, declaring an emergency does not carry any penalty and does not prompt an automatic investigation of the emergency, because civil aviation authorities want to encourage pilots to request ATC assistance at the earliest possible time. Flight crews might be expected to document what occurred for their airline and/or civil aviation authorities, however, and may not be exempt from regulatory enforcement action for other reasons.

Accident Focused Attention on Issues in Declaring an Emergency

The following statements concerning pilot-controller emergency communication were part of the discussion in NTSB's final report on the Avianca Flight 052 accident:[16]

- "If a pilot, or flight crew, has a limited English-language vocabulary, he has to rely heavily on the meaning of the words he does know. If those words have a vague meaning, such as the word 'priority,' or if a clear set of terms and words [is] not used by pilots and controllers, confusion can occur, as it did in this accident";
- "The word 'priority' was used in procedures manuals provided by The Boeing Co. to the airlines. A captain from Avianca Airlines testified that the use by the first officer of the word 'priority,' rather than 'emergency,' may have resulted from training at Boeing. The captain also testified that airline personnel, who provided flight and ground instruction to the first officer of AVA052, were trained by Boeing. He stated that these personnel received the impression from the training that the words priority and emergency conveyed the same meaning to air traffic control. … Also, in its published procedures, Avianca Airlines uses the term 'priority' regarding the communication of low fuel status";
- "When [U.S.] ATC controllers were asked the phraseology that they would respond to immediately when a flight crew indicated a low-fuel emergency, they replied 'mayday,' 'pan pan' and 'emergency.' The controllers stated that, although they would do their utmost to assist a flight that requested 'priority,' the word would not require a specific response and that if a pilot is in a low-fuel emergency and needs emergency handling, he should use the word 'emergency'";
- "The question also was raised during the investigation about whether pilots might use such words as 'priority,' when they really needed emergency assistance, because of concern about receiving a flight violation or having to write a report to the FAA after landing. … However, [FAA] said that there would not be unwarranted actions against any pilot who had declared an emergency and that if a pilot has an emergency, he or she is encouraged to declare it"; [and,]
- "The evidence gathered by the [NTSB] during its investigation of the Avianca accident suggests that FAA ATC phraseology is not always understood by [non-U.S.] pilots."

U.S. Airline Pilots Believe Key Lessons Have Been Learned

Capt. Paul McCarthy, executive air safety chairman for the Air Line Pilots Association, International (ALPA), said that the Avianca Flight 052 accident was significant in revealing the types of problems that might occur in communications during an emergency.[17]

The NTSB report said that the accident flight crew did not adequately communicate its increasingly critical fuel situation to the controllers who handled the flight; that the first officer (who made all recorded transmissions to U.S. controllers) incorrectly assumed that his request for priority handling by ATC had been understood as a request for emergency handling; that the captain experienced difficulties in monitoring communications between the first officer and ATC; and that the first officer did not use the appropriate phraseology to communicate to ATC the aircraft's minimum fuel status. The Colombia Department of Civil Aeronautics, in comments on the NTSB report, said that "the control tower gave no special meaning to the statement made by the flight crew 'And we are running out of fuel, sir' made during their missed approach."

The Avianca Airlines Route Manual contained the following information about low-fuel state, said the NTSB report:

- "Advise ATC of your minimum fuel status when your fuel supply has reached a state where, upon reaching [the] destination, you cannot accept undue delay;
- "Be aware that this is not an emergency situation but merely an advisory that indicates an emergency situation is possible should any undue delay occur; [and,]
- "Be aware [that] a minimum fuel advisory does not imply a need for traffic priority."

The NTSB report said, "After the flight discontinued its approach to [John F. Kennedy International Airport (JFK), New York, New York, U.S.,] ... the captain advised the first officer, 'tell them we are in emergency.' However, the first officer acknowledged an ATC altitude and heading instruction to the JFK tower controller, adding ' ... we're running out of fuel.' He did not use the word 'emergency,' as instructed by the captain, and therefore did not communicate the urgency of the situation. Thus, the controller was not alerted to the severity of the problem."

McCarthy said that when an airline pilot declares an emergency, most often the situation involves one of three things: a problem with the aircraft, low fuel or the need to deviate around weather at a time when the controller cannot give this clearance because of other traffic. Airlines' standard operating procedures (SOPs) and emergency training cover most situations that could be anticipated and the corresponding decision-making processes. (See "Reports Show Various Circumstances for Declaring an Emergency" on page 6.)

McCarthy cited one possible source of misconceptions about adverse consequences for an airline captain after declaring an emergency. If a mechanical anomaly were to occur — such as a malfunction of flaps — and emergency procedures were followed to land the aircraft safely, the decision to declare an emergency would not be questioned. After landing, even if the pilot could move flaps to the commanded position and then cycle the flaps normally, this fact would not indicate that the pilot's declaration of an emergency was unwarranted, he said. Nevertheless, if the captain failed to make the appropriate logbook entries to document an anomaly that the flight crew experienced, the result could be regulatory enforcement action or enforcement of policy by the company.

"If you declare an emergency for a malfunction and you do not log [the malfunction], you have breached your obligation as a pilot," said McCarthy.

Regional Airline Safety Manager Finds ATC Proactive in Emergencies

Capt. Deborah Lawrie, flight safety manager of KLM Cityhopper and chairwoman of the European Regions Airline Association's Air Safety Work Group, said that in general, unless pilots in Europe declare pan pan or mayday, they will not be given priority handling or emergency assistance. Lawrie said that sometimes air traffic controllers recognize that an emergency situation exists, request clarification and begin appropriate procedures before the flight crew declares an emergency. Flight crews should not assume or expect that controllers will interpret the aircraft's situation correctly; therefore, flight crews should declare an emergency promptly, she said.[18]

"Certainly you need to register the aircraft's distress status or urgency status with ATC to receive the correct priority," Lawrie said. "If an aircraft crew has been conducting communications about a developing problem, then it is probable that ATC will treat the situation as an emergency even before an official declaration of an emergency has been made by the flight crew."

Lawrie said that controllers in most parts of Europe commonly ask flight crews "if operations are normal," when the crew is unable to comply with ATC instructions or requests clearance to return to the departure airport or to divert. In these situations, ATC may not know whether an emergency situation exists, she said.

"It is my experience that ATC inquires about emergency status rather than requesting that pilots declare an emergency or urgency status," said Lawrie. "In some cases, the pilot simply may have overlooked the formality of declaring mayday or pan pan."

Reports Show Various Circumstances for Declaring an Emergency

[FSF editorial note: The following excerpts from incident reports and accident reports in the United States describe circumstances in which airline flight crews and air traffic controllers declared an emergency or an urgency condition. The reports have been edited for clarity.]

- "After an engine was shut down due to an engine low-pressure light, we declared an emergency and requested the emergency equipment to stand by for landing at [Viracopos Airport, Sao Paulo, Brazil]. [The] Curitiba [Center] controller had difficulty understanding our request due to the language barrier between us. In addition, he did not realize that we were declaring an emergency. He asked us if it was a red, yellow or green emergency. We did not know what this meant. This resulted in my decision to dump fuel without notifying air traffic control (ATC). I also failed to set the transponder to 7700. Not being able to communicate adequately with ATC greatly increased our workload. (Callback conversation with [the captain who filed the report] revealed the following information: [the captain] expresses concern primarily over the fact that the Curitiba Center controller did not understand the meaning of the word 'emergency.' This captain stated 'emergency' many times, and it was not until another aircraft interrupted the communications, about five minutes after the first emergency declaration, that [the captain's] words were translated into Portuguese for the controller. It was then that the controller asked if this was a 'red, green or yellow' emergency. [The captain] replied, 'red,' as he believes that anyone would. ... He now believes that the problem was purely related to the controller's failure to understand 'emergency.' ... In hindsight, the captain states that he should have communicated the fuel dumping to ATC and set 7700 in the transponder. He also might have tried 'mayday' and ['pan pan.'] [The captain] has questioned his own actions in this emergency, [and] he states that everything was so confusing as a result of the conversation that transpired."[1]

- "On May 7, 1998, about 1920 eastern daylight time, a Douglas DC-9-32, N948VV, registered to and operated by AirTran Airlines as Flight 426, [U.S. Federal Aviation Regulations (FARs)] Part 121 scheduled domestic passenger service from Atlanta, Georgia, to Chicago, Illinois, encountered turbulence and hail near Calhoun, Georgia, while climbing through 20,000 feet, after departure from Atlanta. Instrument meteorological conditions (IMC) prevailed at the time, and an instrument flight rules (IFR) flight plan was filed. The aircraft received substantial damage. One flight attendant received serious injuries, and one passenger received minor injuries. The airline-transport-rated captain, first officer, two flight attendants, one jump seat rider and 80 passengers were not injured. The flight originated from Atlanta, Georgia, the same day, about 1905. The flight crew stated that while at a position about 50 miles north of Atlanta, they asked for and received permission from the [U.S. Federal Aviation Administration (FAA)] air traffic controller to fly a heading of 330 degrees to go around weather. This would take them between two weather returns and also allow them to follow another aircraft ahead of them. They had not given the flight attendants permission to leave their seats, and the captain again called them and asked them to remain seated. While climbing through 20,000 feet, they encountered severe hail, which lasted about five seconds, and moderate turbulence which lasted about 30 seconds. The three front windshields shattered and the radome separated from the aircraft. The captain's [airspeed indicator] and first officer's airspeed indicator became inoperative, and it became very noisy in the cockpit. They declared an emergency with the FAA air traffic controller and asked for directions to the nearest airport. An approach to landing was made to Lovell Field, Chattanooga, Tennessee, with FAA air traffic controllers reporting the aircraft's groundspeed about every 10 [seconds to] 15 seconds. A landing was made at 1940, and, after inspection of the aircraft by fire-department personnel, the aircraft was taxied to a gate."[2]

- "Over the Atlantic [Ocean] at Flight Level (FL) 320, the first officer came into the cabin to tell me that I should come back into the cockpit. I was on my break. Arriving in the cockpit, the first officer and international-relief first officer briefed me on the loss of engine oil in [the] no. 2 engine. The quantity showed one quart, the engine temperature was slightly higher than the left engine, and the oil pressure was about 26 pounds per square inch (psi) [1.84 kilograms per square centimeter] with some dips to below 25 psi [1.76 kilograms per square centimeter] showing an intermittent amber exceedance. Following the procedures, we increased the left engine to maximum continuous power and brought [the] no. 2 [engine] to idle. A [satellite communication (SATCOM)] call was placed to dispatch and patched into maintenance. Maintenance advised against running [the] engine in [the] amber zone for long. At idle, [the] engine still went into amber. I made the decision to shut down [the] engine, clear the North Atlantic Tracks track, descend to FL 240 and [divert to Bermuda International Airport, St. George's, Bermuda]. New York [FAA flight service station] was notified via a high-frequency [declaration of pan pan] and an emergency was declared. We were about two hours [from landing at the airport,] so the passengers were not informed of the situation until one hour out and were given an excellent briefing by the purser. We briefed a full emergency landing and the evacuation procedure, but passengers were given all assurances that the landing would be normal. [The flight crew] restarted [the]

engine 20 miles [(37 kilometers) from the airport] and kept it in reserve … only adding minimal power on short final. No red exceedances were noted. Landing was not overweight and was normal in all respects. [The flight crew] terminated [the] emergency with [the airport] tower."[3]

- "Deviating around [thunderstorms] (approximately 40 [nautical] miles [74 kilometers]) south and roughly paralleling [the] wind, while in cloud with light-to-moderate turbulence, [the aircraft] encountered [an] extremely strong updraft that forced auto-disconnect of [the] autopilot and [an] approximately 2,000-foot altitude excursion prior to manually stabilizing [the] aircraft. No traffic conflict occurred and no injuries or damage [were] sustained, but [a] significant clearance deviation occurred. [The captain who filed the report] broadcast a [pan pan] message on [the] center frequency and [ATC] immediately recleared [the aircraft for] 'block FL 370–410.' [The aircraft] returned to FL 370 within approximately two minutes after [the] event. Turbulence never [was] greater than 'moderate' even though [an] updraft of approximately 5,000 feet [1,524 meters] per minute [was] experienced. After situation assessment and contact with both ATC and company, [the] flight proceeded with normal operations to [the] destination."[4]

- "On Aug. 9, 1998, about 1253 eastern daylight time, an Embraer EMB-120RT, N225AS, landed with smoke trailing from the right engine at the Atlanta Hartsfield International Airport, Atlanta, Georgia. The airplane was operated by Atlantic Southeast Airlines as Flight 735, under the provisions of [FARs] Part 121 and IFR. Visual meteorological conditions (VMC) prevailed, and an IFR flight plan was filed. The airline transport pilot, copilot, one flight attendant and 23 passengers were not injured, and the airplane was not damaged. The flight originated at the Meridian, Mississippi, airport, at 1212. According to the FAA, while the aircraft was on final approach, air traffic controllers observed smoke trailing from the right engine. They notified the pilot [and aircraft] rescue and fire fighting (ARFF) and declared an emergency. The airplane landed on Runway 27L without incident and evacuated passengers via the stairs. There was no fire."[5]

- "On Feb. 16, 1999, at 1602 eastern standard time, an Airbus A320-231, N628AW, operated by America West Airlines as Flight 2811, received minor damage when it landed at Port Columbus International Airport, Columbus, Ohio. There were no injuries to the two certificated pilots, three flight attendants and 26 passengers. [VMC] prevailed for the scheduled passenger flight which had departed from Newark, New Jersey, about 1404. Flight 2811 was operated on an IFR flight plan under [FARs] Part 121. According to statements from the flight crew, Flight 2811 was uneventful until the landing gear was lowered prior to landing at [the airport]. The flight crew received multiple faults and elected to enter a holding pattern at the outer marker. The flight crew contacted maintenance control for assistance and was unsuccessful in clearing the faults. The flight crew then decided to perform a landing at [the airport], with the knowledge that the thrust reversers and nosewheel steering would be inoperative. On short final, the flight crew asked the control tower for a visual check of the nose landing gear, and was informed that the nosewheel was cocked. A go-around was initiated, and then another flyby was made. The nosewheel was reported to be turned 90 degrees. The cabin crew was notified of an impending emergency landing and the cabin and passengers were prepared for the landing. The captain declared an emergency and initiated the approach. Touchdown was described as soft, and the airplane stopped on the 10,250-foot-long [3,124-meter-long] runway with about 2,500 feet [762 meters] of runway remaining. Damage was limited to the nose landing gear tires and rims. The captain noticed that smoke was drifting up on the right side of the airplane. … All passengers were evacuated via the overwing exits."[6]♦

References

1. U.S. National Aeronautics and Space Administration (NASA). Aviation Safety Reporting System (ASRS). Report no. 342790. July 1996. ASRS is a confidential incident-reporting system. ASRS acknowledges that its data have certain limitations. ASRS *Directline* (December 1998) said, "Reporters to ASRS may introduce biases that result from a greater tendency to report serious events than minor ones; from organizational and geographic influences; and from many other factors. All of these potential influences reduce the confidence that can be attached to statistical findings based on ASRS data. However, the proportions of consistently reported incidents to ASRS, such as altitude deviations, have been remarkably stable over many years. Therefore, users of ASRS may presume that incident reports drawn from a time interval of several or more years will reflect patterns that are broadly representative of the total universe of aviation-safety incidents of that type."
2. U.S. National Transportation Safety Board (NTSB). *NTSB Aviation Accident/Incident Database Report.* Report no. DCA98MA045.
3. NASA ASRS Report no. 425407. January 1999.
4. NASA ASRS Report no. 180941. June 1991.
5. NTSB. *NTSB Aviation Accident/Incident Database Report.* Report no. ATL98SA109.
6. NTSB. *NTSB Aviation Accident/Incident Database Report.* Report no. NYC99IA062.

She said that one misconception among some pilots is the difference between declaring mayday and pan pan.

"I have observed many cases where a mayday is given when pan pan should be sufficient," Lawrie said. "Many pilots do not realize that this distinction is ATC's way of prioritizing two or more aircraft with an emergency at the same time."

She said that from a flight crew's perspective, the following factors are *most important* in deciding to declare an emergency:

- Is the aircraft in immediate danger?
- Does the aircraft require immediate assistance?
- Will the aircraft need priority handling during the approach or during any other phase of flight?
- Will the aircraft need special assistance on the ground?
- Does the crew need any assistance from other parties?

Lawrie said that the following factors are the *least important* in deciding whether to declare an emergency:

- Will declaring an emergency inconvenience other traffic?
- Will declaring an emergency involve extra expense?
- Will declaring an emergency cause extra paperwork or other problems afterward?
- Will declaring an emergency cause inconvenience or interrupt the aircraft's planned schedule?

"Questions often arise as to whether a situation warrants distress or urgency communication," said Lawrie. "Often times — or at least in our company documentation — it is stated clearly when and which specific conditions require such communications. For situations not covered in company documentation, the decision often depends upon the pilot's own training or experience as to whether or not he adequately recognizes an emergency situation."

Airlines' Standard Operating Procedures Affect Pilot Decisions in Emergencies

Capt. Ashok Poduval, director of flight operations and safety services for the International Air Transport Association, said that the SOPs for handling aircraft emergencies are similar among airlines, but vary enough that describing universal practices is difficult. For example, different companies would have separate procedures on how and when flight crews should call for company assistance in an emergency, he said.[19]

Flight crews typically decide when to declare an emergency based on their assessment of all available information about the situation, applying memorized checklists for time-critical and safety-critical sequential actions, conducting challenge-and-response checklists for many specific types of emergencies and following expanded post-emergency drills, he said.

Poduval said, "These are all covered in company SOPs. What should be done [to obtain maximum ATC assistance is to follow] the ICAO procedures for emergency communication. As part of crew resource management, the flight crew also may be aided by dispatchers, such as in the selection of a diversion airport and in determining various sources of assistance." A dispatcher may have very little involvement or considerable involvement in handling an emergency, depending on airline policy, SOPs and related training.

"Pilots appear to have moved away from the strict use of ICAO phraseology," Poduval said. "For example, in the United States, although pilots and air traffic controllers speak English, it is often spoken very rapidly and there is considerable use of colloquialisms and American expressions that are often not understood by international operators within the airspace."

Current Procedures Remain Satisfactory

Boquist said that, historically, some airline captains have not declared an emergency at the earliest possible time.[20] He said that this sometimes has occurred because of human factors — especially initial psychological resistance to admitting the seriousness of an unexpected turn of events — and sometimes because of cultural factors.

Boquist said that if a flight crew does not use the correct phraseology for communicating an emergency, this omission can result in miscommunication, which is undesirable in an emergency. For example, some pilots continue to make vague requests for "priority" from ATC when they are short of fuel, said Boquist.

"Controllers should recognize that an aircraft in that situation needs priority handling, but there is no provision in ICAO phraseology and procedures — other than declaring mayday — to ensure priority handling and maximum assistance from ATC," he said. The term "minimum fuel" — in phraseology recommended by ICAO after the Avianca Flight 052 accident — means "a situation in which an aircraft's fuel supply has reached a state where little or no delay can be accepted." A note that accompanies this definition said, "This is not an emergency situation but merely indicates that an emergency situation is possible, should any undue delay occur."[21]

Boquist said, "No changes were made to mayday and pan pan phraseology or procedures after the accident because the [Avianca] accident flight crew did not use the language that was available."

Global phraseology — including pilot-controller emergency communications — may be enhanced within a few years by several international initiatives, however, said Boquist.

"The ICAO Secretariat has submitted a new proposal to the Air Navigation Commission to have a new part of the ICAO *Procedures for Air Navigation Services (PANS)* assigned completely to emergencies and contingencies (such as short-term conflict alert, blocked frequencies and minimum safe altitude warnings)," he said. "This will be reviewed by the commission in March 2000, then sent to ICAO member states for comments. This is part of updating the provisions in *Rules of the Air and Air Traffic Services (PANS-RAC)*."

ICAO also has been involved recently in several initiatives on worldwide pilot-controller communication. A coordinating group has presented to the ICAO Secretariat an amendment proposal to change phraseology in ICAO annexes and in the ICAO *PANS-RAC*, he said.

The Multi-agency Air Traffic Services Procedures Coordination Group recently compared FAA phraseology and ICAO phraseology, he said, and generated a working paper to be presented to the Air Navigation Commission session in May 2000.

"We have added some phraseology and adopted some FAA phraseology. Eurocontrol, NavCanada and FAA have worked on it and will present a revised phraseology for global application; some of it is emergency communications," Boquist said.

One objective is to reduce air traffic controllers' use of non-ICAO phraseology in normal operations throughout the world, he said.

"There should be no problem for a controller to understand a pilot who uses standard ICAO phraseology, and I cannot believe that a pilot would misunderstand ICAO phraseology," said Boquist.

He said that, typically, the English phraseology used by pilots worldwide is not significantly different, but controllers may use some localized phraseology that is unfamiliar to pilots who are accustomed to standard ICAO terms. Nevertheless, this practice affects routine operations but is unlikely to cause problems in declaring mayday or pan pan, Boquist said.

"We also have started technical work on a task called *Radiotelephony Speech for International Aviation*," he said. "The intent is to develop and establish proficiency requirements, review everything in present provisions and look at minimum skill levels for the use of common English. It is something we have never done before.

In an emergency situation after declaring an emergency, people may not be able to use a standardized English phraseology for all situations. We are looking for controllers and pilots in the future to have a common level of English knowledge for routine and emergency aviation communications."

Boquist said that most of the world's ATC facilities are sensitive to flight crews' requests for assistance and that most countries have worked to improve controllers' ability to recognize signs of aircraft emergencies and impending emergencies.

"What we are saying is that if [ATC] believes there to be a state of emergency, the emergency aircraft shall be given priority handling over other aircraft," said Boquist.

An air traffic controller's ability to recognize signs of an aircraft emergency and to request nonroutine information in English from flight crews may be impeded by limited English (or any nonnative language) proficiency of the controller or the flight crew. For example, in the American Airlines Flight 965 accident near Gali, Colombia, the official accident report of the Aeronautica Civil of the Republic of Colombia said, "When asked a specific question regarding his opinion about the effects the difference in native languages between the accident flight crew and approach control may have had, [the controller] stated that he would have asked the pilots of [Flight] 965 more detailed questions regarding the routing and the approach if the pilots had spoken Spanish. He stated that he believed that his comprehension of the pilot's transmission was satisfactory, and that the pilot also understood him. ... The air traffic controller also stated that the request from the flight to fly direct to the TULUA VOR, when the flight was [38 nautical miles] north of Cali [and already had flown past the TULUA VOR], made no sense to him. He said that his fluency in nonaviation English was limited, and he could not ask them to elaborate on the request."[22]

Timely communication of an emergency by flight crews is paramount and must be unambiguous, said Boquist.

"The authority of the pilot-in-command is a universal rule of aviation," he said. "There is no requirement for a controller to question a crew's decision to declare an emergency. It is up to the civil aviation authority to decide the policy. The emergency declaration does not imply use of PIC authority to depart from rules of the air."[23]

U.S. Controllers Focus on Assistance, Not Enforcement, in Handling Emergencies

Maureen Woods, deputy director, Air Traffic Services, FAA, said that in the United States, regulations and ATC procedures have been designed to enable pilots and controllers to respond safely to an almost infinite variety of aircraft emergencies.[24] (See "U.S. Federal Aviation Administration Summarizes Mayday System" on page 12.)

Global phraseology — including pilot-controller emergency communications — may be enhanced within a few years by several international initiatives, however, said Boquist.

"The ICAO Secretariat has submitted a new proposal to the Air Navigation Commission to have a new part of the ICAO *Procedures for Air Navigation Services (PANS)* assigned completely to emergencies and contingencies (such as short-term conflict alert, blocked frequencies and minimum safe altitude warnings)," he said. "This will be reviewed by the commission in March 2000, then sent to ICAO member states for comments. This is part of updating the provisions in *Rules of the Air and Air Traffic Services (PANS-RAC)*."

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The Multi-agency Air Traffic Services Procedures Coordination Group recently compared FAA phraseology and ICAO phraseology, he said, and generated a working paper to be presented to the Air Navigation Commission session in May 2000.

"We have added some phraseology and adopted some FAA phraseology. Eurocontrol, NavCanada and FAA have worked on it and will present a revised phraseology for global application; some of it is emergency communications," Boquist said.

One objective is to reduce air traffic controllers' use of non-ICAO phraseology in normal operations throughout the world, he said.

"There should be no problem for a controller to understand a pilot who uses standard ICAO phraseology, and I cannot believe that a pilot would misunderstand ICAO phraseology," said Boquist.

He said that, typically, the English phraseology used by pilots worldwide is not significantly different, but controllers may use some localized phraseology that is unfamiliar to pilots who are accustomed to standard ICAO terms. Nevertheless, this practice affects routine operations but is unlikely to cause problems in declaring mayday or pan pan, Boquist said.

"We also have started technical work on a task called *Radiotelephony Speech for International Aviation*," he said. "The intent is to develop and establish proficiency requirements, review everything in present provisions and look at minimum skill levels for the use of common English. It is something we have never done before.

In an emergency situation after declaring an emergency, people may not be able to use a standardized English phraseology for all situations. We are looking for controllers and pilots in the future to have a common level of English knowledge for routine and emergency aviation communications."

Boquist said that most of the world's ATC facilities are sensitive to flight crews' requests for assistance and that most countries have worked to improve controllers' ability to recognize signs of aircraft emergencies and impending emergencies.

"What we are saying is that if [ATC] believes there to be a state of emergency, the emergency aircraft shall be given priority handling over other aircraft," said Boquist.

An air traffic controller's ability to recognize signs of an aircraft emergency and to request nonroutine information in English from flight crews may be impeded by limited English (or any nonnative language) proficiency of the controller or the flight crew. For example, in the American Airlines Flight 965 accident near Gali, Colombia, the official accident report of the Aeronautica Civil of the Republic of Colombia said, "When asked a specific question regarding his opinion about the effects the difference in native languages between the accident flight crew and approach control may have had, [the controller] stated that he would have asked the pilots of [Flight] 965 more detailed questions regarding the routing and the approach if the pilots had spoken Spanish. He stated that he believed that his comprehension of the pilot's transmission was satisfactory, and that the pilot also understood him. ... The air traffic controller also stated that the request from the flight to fly direct to the TULUA VOR, when the flight was [38 nautical miles] north of Cali [and already had flown past the TULUA VOR], made no sense to him. He said that his fluency in nonaviation English was limited, and he could not ask them to elaborate on the request."[22]

Timely communication of an emergency by flight crews is paramount and must be unambiguous, said Boquist.

"The authority of the pilot-in-command is a universal rule of aviation," he said. "There is no requirement for a controller to question a crew's decision to declare an emergency. It is up to the civil aviation authority to decide the policy. The emergency declaration does not imply use of PIC authority to depart from rules of the air."[23]

U.S. Controllers Focus on Assistance, Not Enforcement, in Handling Emergencies

Maureen Woods, deputy director, Air Traffic Services, FAA, said that in the United States, regulations and ATC procedures have been designed to enable pilots and controllers to respond safely to an almost infinite variety of aircraft emergencies.[24] (See "U.S. Federal Aviation Administration Summarizes Mayday System" on page 12.)

of the emergency within 48 hours to the ATC facility, *if requested by ATC* [emphasis added by FAA];

- "The pilot declaring an emergency can file a report with the [U.S. National Aeronautics and Space Administration (NASA)] Aviation Safety Reporting System (ASRS) and receive limited immunity from enforcement action if noncompliance was involved. Declaring an emergency is not automatically considered noncompliance, but many pilots file this ASRS report after declaring an emergency. We support that. Most pilot-employee groups recommend that after declaring an emergency, the pilot fill out an ASRS report 'just in case' of some violations;[25]

- "The act of declaring an emergency does not necessarily initiate an enforcement investigation because [FARs] 91.3(b) allows the pilot to deviate from any rule to the extent needed to address the emergency. The pilot does not really gain anything by not declaring an emergency. In a lot of cases, the emergency would be declared and there would not be any subsequent investigation based on the type of communication that took place. ... However, if an accident or incident results and, as part of that investigation, the FAA determines that noncompliance occurred and led to the need for declaring an emergency, the airman could be subject to an enforcement investigation for noncompliance;

- "The intent of the written report requirement is to assure that pilots use their emergency authority only in emergency situations and do not attempt to cover up or elude investigation for noncompliance; for example, descending below minimums during an approach, then declaring an emergency to avoid responsibility for deviating from a clearance or regulation. There is an [enforcement] element to keeping the system — the whole process — honest ... we want to avoid abuse of the privilege of declaring an emergency. We [would not want a system in which] by declaring an emergency, the [circumstances] never would be looked at subsequently. A report of pilot incapacitation, for example, will trigger an investigation whether or not an emergency was declared. A series of [aircraft emergency] events also would attract an investigation;

- "FAA inspectors are expected to investigate all possible safety violations any time the inspector has reason to question compliance. An investigation does not automatically happen because of a declaration of an emergency. However, if, in the process of reviewing a report sent to the [FAA] administrator by the pilot or the pilot's company, a violation becomes obvious, that inspector is mandated to take appropriate action;

- "At the time of the emergency, the situation will be treated as an emergency in accordance with the responsibility of the PIC. If we find out otherwise, we would take [enforcement] action — but those [cases] would be extremely rare. If there was a deviation from ATC instructions, obviously we would look at that [and ask if the deviation] occurred before the emergency declaration. [FSF editorial note: In the United States, for example, FARs Part 91.123(c): "Each pilot-in-command who, in an emergency, or in response to a traffic-alert and collision avoidance system resolution advisory, deviates from an ATC clearance or instruction shall notify ATC of that deviation as soon as possible."];

- "After the fact, [responsibility for any] investigation would come back to Flight Service. What we are really trying to do is capture what happened — to track back to the root cause, such as a fire or lack of pressurization. We want an open investigative process in terms of what did occur. We are not necessarily looking to take action against the individual pilot because a regulation was overlooked; [and,]

- "If the declaration of an emergency or an urgency situation is part of an overall accident/incident or compliance investigation, there would be a reference in the accident/incident report or investigative report that becomes part of the airman's record. However, the FAA does not track how many times a pilot declares an emergency and does not place such information in the airman's permanent record as a specific entry. When Flight Standards does investigate, we [use the findings to] make recommendations to the company."[26]

Company Philosophies Influence Pilots During Emergencies In Eurocontrol Area

Gilles Le Galo, air traffic management expert in the Safety-Quality and Standardization Unit of Eurocontrol, said that the 38 countries in the European Civil Aviation Conference (ECAC) have different legislation, rules, habits and ways of doing things in some aspects of aviation. Nevertheless, ICAO procedures and phraseology for communicating an aircraft emergency transcend these differences. Le Galo said that company philosophies and expectations can vary significantly, and may affect pilot decision making.[27]

Another factor that might affect a flight crew's decision to declare an emergency is a punitive culture of either an airline or a civil aviation authority.

If a flight crew was hesitant or reluctant to declare an emergency, one likely cause would be human factors, he said.

"People may express themselves in a way that they believe will be interpreted as emergency communication," he said.

U.S. Federal Aviation Administration Summarizes Mayday System

[FSF editorial note: The U.S. Federal Aviation Administration (FAA) — through Nicholas Lacey, director, Flight Standards Service, and Maureen Woods, deputy director, FAA Air Traffic Services — provided the following summary of FAA policies and procedures related to pilot-controller emergency communications during airline operations in U.S. airspace:]

- U.S. Federal Aviation Regulations (FARs) Part 91.3(a) said that the pilot-in-command (PIC) of an aircraft is "responsible for and the final authority as to the safe operation of that aircraft;"

- FARs Part 91.123(a), *Compliance with ATC [Air Traffic Control] Clearances and Instructions*, said that a PIC cannot deviate from a clearance except when an amended clearance is obtained, in response to an emergency or in response to a traffic-alert and collision avoidance system (TCAS) advisory;

- The FAA *Aeronautical Information Manual (AIM)* said that pilots in urgency situations should request assistance before the situation becomes a distress situation. *AIM* 6-1-2(b) said, "Pilots who become apprehensive for their safety for any reason should *request assistance immediately* [emphasis in original];"

- If the pilot uses appropriate phraseology — such as "mayday" — to communicate the nature of the emergency, or if the pilot clearly communicates a problem before a distress situation develops, the controller will have an unmistakable concept of the pilot's situation and what needs to be done. This enhances safety by assuring that the flight crew receives the appropriate ATC assistance for the situation;

- When a pilot declares an emergency, the controller will try to determine the nature of the emergency and the pilot's intentions. Priority handling by ATC will continue as long as required to resolve an emergency situation. ATC assistance may include, for example, communication with the pilot, coordination with other sectors and facilities, and communication with other pilots to assist the flight crew. Supervisory personnel also would be notified to handle coordination and resource management;

- The PIC does not need to declare an emergency to take action using emergency authority, but after an emergency has been declared, the pilot is considered by FAA to be operating under emergency authority.[1] The pilot has the final authority regarding the operation of the aircraft; if unable to comply with ATC clearances, the pilot has the authority to deviate from the clearance. By communicating the nature of the emergency and the pilot's course of action, both the flight crew and the controller understand what can be accomplished and what cannot be accomplished. Air traffic controllers will accommodate whatever actions the pilot deems most appropriate whenever a pilot exercises emergency authority. This may result in the re-routing or delay of other aircraft;

- When a pilot reports a malfunction or other unusual situation, an air traffic controller may ask if the flight crew is declaring an emergency. Based on information received from the flight crew, air traffic controllers may consider that an emergency exists and handle the flight accordingly. Unless there is some indication that an emergency might occur, ATC normally would not take action prior to declaration of an emergency by the PIC. If there is some indication of an emergency, the controller will try to find out as much information as possible to assist the flight crew;

- FARs Part 121.557, *Emergencies: Domestic and Flag Operations*, said that the PIC may take any action considered necessary under the circumstances and in the interest of safety, and that airline dispatchers may declare an emergency if they are unable to communicate with the PIC. On the ground, the dispatcher and PIC share authority for the flight and both sign the dispatch release; during flight, the PIC is the final authority for the conduct and safety of the flight. If an emergency situation requires a decision by the PIC, the airline dispatcher must advise the PIC, ascertain the decision of the PIC and record the pilot's decision. If the dispatcher cannot communicate with the PIC, the dispatcher must declare an emergency, take any action necessary, advise the appropriate ATC and dispatch facilities, and send a written report to the FAA administrator within 10 days. When a controller declares an emergency, dispatchers normally are not notified by ATC. (Requirements for supplemental operations under FARs Part 121.559 are similar, but the regulation said that airline management, not a dispatcher, has the responsibility in flight following to declare an emergency on behalf of the PIC.);

- When an emergency occurs, FAA ATC facilities compile and record the information in their daily record of facility operations, and prepare a miscellaneous incident report form that is forwarded to the appropriate FAA Flight Standards District Office. No data are collected by air traffic controllers concerning the incidence of pilots declaring an emergency or the number of emergencies that are reported;

- FAA analyzes events for trends after reviewing pilots' written reports of deviations, after counseling pilots

or after investigations of accidents or incidents. This can result in changes to regulations, to the *AIM*, to training requirements and to other documents. FAA looks for general trends to improve safety, but does *not study the history of declarations of an* emergency by any specific pilot or compare pilots who, over their careers, may have declared an emergency several times; and,

- If a pilot questions the ATC handling received after declaring an emergency or after requesting assistance, the ATC facility may review the tapes of the exchange. As a result, FAA procedures or phraseology may be changed. Similarly, if a review of the tapes by the FAA Flight Standards Service indicates some anomaly in training or other certification standards, those areas could be reviewed or changed.♦

— U.S. Federal Aviation Administration and FSF Editorial Staff

Reference

1. The U.S. Federal Aviation Administration (FAA) cited U.S. Federal Aviation Regulations (FARs) Parts 91.3(a), 91.3(b), 91.123(a), 121.557(a) and 121.559(a).

"There could be conscious reluctance and unconscious reluctance. Anyone is sometimes reluctant to admit a difficult situation; there is a tendency to underestimate what is happening to you. This pushes people to not really declare what they have experienced. There also can be a problem of flight crews or controllers not really knowing the ICAO provisions … they really do not know exactly when to declare what; it is more ignorance than reluctance."

Apparent delay in declaring an emergency, however, also may indicate that the flight crew is conducting crew resource management procedures that involve a delay before the flight crew declares an emergency, Le Galo said.

Le Galo said that there is a possibility in some states that an air traffic controller might disregard a pilot's request for priority handling if specific ICAO phraseology is not used to declare an emergency, he said.

"No special service would be provided in some parts of Europe unless very specific words are used to declare an emergency," said Le Galo. "In other areas, the situation would be treated as an emergency by ATC just as if the pilot had declared the emergency."

Typically, there is no systematic way to determine whether declaring an emergency was warranted by the circumstances.

"I have not really seen an example of second-guessing a pilot's decision to declare an emergency," he said. "If there is not a big problem for ATC, nothing will happen. If traffic was really disturbed and subsequent handling by controllers created a difficult situation to handle with a lot of traffic around — combined with suspicion that the flight crew overstated the situation — the occurrence would be subject to inquiry by the state. I have not heard recently of any case like that, but before Eurocontrol traffic flow management, general aviation pilots sometimes made inappropriate requests for ATC priority."

Eurocontrol has no authority to request that a member country's civil aviation authority investigate an aircraft emergency, however, Le Galo said.

"As far as I know, there would be no automatic review by air traffic management [ATM] providers if a pilot declared an emergency; what would occur really depends on the outcome of the flight," he said. "If the aircraft lands safely, then, from the ATM side, nothing will happen. It will be left to the airline to decide what the pilot must do. Since Jan. 1, 2000, Eurocontrol has been requesting occurrence data only to monitor safety levels and to identify safety trends from an ATM perspective."

The training of air traffic controllers for positions in Eurocontrol's Maastricht Upper Area Control Center — which provides air traffic services in the upper airspace of Belgium, Luxembourg, the Netherlands and part of Germany — includes an *ab initio* course that "follows as closely as possible ICAO procedures for handling an aircraft in distress or urgency," said Le Galo. "Before going to the center for live traffic training, controllers take a three-week course on handling of all kinds of emergencies using procedures derived from and closely aligned with the ICAO provisions."

There have been a variety of situations that show different levels of preparedness among ATC facilities in various European states, he said.

"Some states of Europe have had aircraft emergencies where handling by ATC has not been what would have been expected," said Le Galo. "This is an issue here that we are addressing. We would like to encourage other states to follow the example of five or six countries in controller training for emergencies. One of the big issues is how to assess whether someone handled an aircraft in distress appropriately. One of the aviation myths to kill in Europe is that you cannot train controllers effectively on aircraft emergencies … because emergencies never will be the same thing twice and you cannot say what will happen."

By studying incident reports from pilots, airlines and ATC, civil aviation authorities understand better the circumstances of occurrences in which flight crews declare an emergency. Current ICAO phraseology for pilot-controller emergency communication works well and enhances safety when used properly.

Notes and References

1. U.S. National Transportation Safety Board (NTSB). *Aircraft Accident Report NTSB/AAR-91/04. Avianca, The Airline of Colombia, Boeing 707-321B, HK 2016, Fuel Exhaustion, Cove Neck, New York, January 25, 1990.* Avianca Airlines Flight 052, a Boeing 707-321B, struck terrain in Cove Neck, Long Island, New York, U.S., during a scheduled international passenger flight from Bogota, Colombia, to John F. Kennedy International Airport, New York, with an intermediate stop at Jose Maria Cordova Airport near Medellin, Colombia. Seventy-three of 156 people on the flight were fatally injured, and the aircraft was destroyed. NTSB, in its final report on the accident, said that the probable causes were "the failure of the flight crew to adequately manage the airplane's fuel load, and their failure to communicate an emergency fuel situation to air traffic control before fuel exhaustion occurred." Contributing to the accident was "the flight crew's failure to use an airline operational control dispatch system to assist them during the international flight into a high-density airport in poor weather." Also contributing to the accident was "inadequate traffic flow management by the [U.S.] Federal Aviation Administration and the lack of standardized understandable terminology for pilots and controllers for minimum and emergency fuel states." NTSB said "windshear, crew fatigue and stress were factors that led to the unsuccessful completion of the first approach and thus contributed to the accident." NTSB said that among safety issues raised in the report was "pilot-to-controller communications regarding the terminology to convey fuel status and the need for special handling."

2. The term "declaring an emergency" — while not part of the official phraseology of the International Civil Aviation Organization (ICAO) — is widely understood to mean that a pilot (or air traffic controller or aircraft operator) is formally notifying air traffic control that an aircraft is in distress. "Distress" in ICAO phraseology means "a condition of being threatened by serious and/or imminent danger and of requiring immediate assistance." In addition to the word "mayday" in voice radio communication, the letter group "SOS" telegraphed in Morse code, rockets or shells throwing red lights (fired one at a time at short intervals) or a parachute flare showing a red light communicate distress in ICAO procedures. "Urgency" in ICAO phraseology means "a condition concerning the safety of an aircraft or other vehicle, or of some person on board or within sight, but which does not require immediate assistance." (*ICAO Annex 10, Aeronautical Telecommunications*, Volume 2, 5.3.1.1) ICAO also said that an urgency signal will "mean that an aircraft wishes to give notice of difficulties which compel it to land without requiring immediate assistance." (*ICAO Annex 2, Rules of the Air*, Appendix 1, 1.2.1) In addition to the word "pan pan" in voice radio communication, repeated switching on and off of the landing lights or repeated switching on and off of navigation lights (in such manner as to be distinct from flashing navigation lights) communicates urgency in ICAO procedures.

3. Canoles, David. Interview by Rosenkrans, Wayne. Alexandria, Virginia, U.S., March 15, 2000. Flight Safety Foundation, Alexandria, Virginia.

4. Boquist, Cay. Interview by Rosenkrans, Wayne. Alexandria, Virginia, U.S., March 15, 2000. Flight Safety Foundation, Alexandria, Virginia.

5. ICAO. *Rules of the Air and Air Traffic Services (PANS-RAC Doc 4444)* 16.2.1.

6. ICAO *PANS-RAC* 12.1.1.

7. ICAO *PANS-RAC* 16.1.1.

8. In the United States, U.S. Federal Aviation Administration (FAA) Order 7110.65L *Air Traffic Control* 10-1-3 (the handbook for U.S. air traffic controllers) said, "Provide maximum assistance to an aircraft in distress. Enlist the services of available radar facilities, the military services and the Federal Communications Commission, as well as other emergency services and facilities, when the pilot requests or when you deem necessary." *Air Traffic Control* 10-1-1 c. said, "If the words 'mayday' or 'pan pan' are not used and you are in doubt that a situation constitutes an emergency or potential emergency, handle it as though it were an emergency."

9. ICAO. *Annex 2, Rules of the Air*, Appendix 1 Signals, 1.1 Distress Signals.

10. ICAO. *Annex 10, Aeronautical Telecommunications*, Volume 2, 5.3.2.1 and 5.3.3.1.

11. ICAO. *Annex 10, Aeronautical Telecommunications*, Volume 2, 5.3.2.1.

12. ICAO. *Annex 10, Aeronautical Telecommunications*, Volume 2, 5.3.2.2 through 5.3.2.5.3.

13. ICAO. *Annex 10, Aeronautical Telecommunications*, Volume 2, Attachment B, "Development of Radiotelephony Speech for International Aviation," 1.2 and 1.4. The document said that ICAO believes that the current recommended practice on language has many limitations and that the process of developing a universal language for aviation must continue to enhance safety. ICAO said, "In attacking the problem with the sole objective of obtaining the highest efficiency in air-ground communication, the cooperation of all states may be expected and the burden now largely carried by non-English-speaking countries will be more equitably

shared; for the extent of the new language having to be acquired by non-English-speaking personnel will be reduced, while the English-speaking states will at the same time accept the obligation of training their personnel to keep within the agreed limits in the use of their own language." (2.6)

14. ICAO. *Annex 10, Aeronautical Telecommunications*, Volume 2, Attachment B, 1.4.

15. Cushing, Steven. "Pilot-Air Traffic Control Communications: It's Not (Only) What You Say, It's How You Say It." *Flight Safety Digest* Volume 14 (July 1995). Airclaims said that on March 27, 1977, a KLM Royal Dutch Airlines Boeing 747-200B during takeoff struck a taxiing Pan American Boeing 747 at Los Rodeos Airport, Tenerife, Canary Islands, Spain. All 14 crewmembers and 234 passengers on the KLM aircraft were killed. On the Pan American aircraft, nine crewmembers and 326 passengers were killed, seven crewmembers and 52 passengers were seriously injured; and two passengers received minor injuries or no injuries. Both aircraft were destroyed. Visibility at the time of the accident was poor with fog and light rain. The Subsecretaria de Aviacion Civil of Spain said that the cause of the accident was that the KLM captain conducted the takeoff without clearance, did not obey a "standby for takeoff" instruction from the control tower, and did not reject the takeoff when the Pan American flight crew said that their aircraft was still on the runway. Misunderstanding of orders, instructions, and low ceiling and fog were contributing factors.

16. NTSB. Aircraft Accident Report NTSB/AAR-91/04, 64–65.

17. McCarthy, Paul. Interview by Rosenkrans, Wayne. Alexandria, Virginia, U.S., Feb. 17, 2000. Flight Safety Foundation, Alexandria, Virginia.

18. Lawrie, Deborah. Interview by Rosenkrans, Wayne, and personal communication. Alexandria, Virginia, U.S., Feb. 24, 2000. Flight Safety Foundation, Alexandria, Virginia.

19. Poduval, Ashok. Interview by Rosenkrans, Wayne. Alexandria, Virginia, U.S., Feb. 24, 2000. Flight Safety Foundation, Alexandria, Virginia.

20. Boquist, Cay. Interview by Rosenkrans, Wayne. Alexandria, Virginia, U.S., Feb. 17, 2000. Flight Safety Foundation, Alexandria, Virginia.

21. ICAO. *Rules of the Air and Air Traffic Services (PANS-RAC Doc 4444)* 1–8.

22. Aeronautica Civil of the Republic of Colombia. *Controlled Flight into Terrain, American Airlines Flight 965, Boeing 757-223, N651AA, near Cali, Colombia, December 20, 1995*. The official report of the Aeronautica Civil of the Republic of Colombia said that American Airlines Flight 965, a Boeing 757-223, was transitioning from cruise flight to a very high frequency omnidirectional range (VOR)/distance measuring equipment (DME) instrument approach to Runway 19 at the Alfonso Bonilla Aragon International Airport (SKCL), Cali, Colombia, when the aircraft collided with a mountain 53 kilometers (33 miles) northeast of the CALI VOR. Two flight crew members, six cabin crew members and 151 passengers were killed. Five passengers survived the Dec. 20, 1995 accident, but one of them later died as a result of injuries sustained in the accident. The aircraft was destroyed. The accident occurred at night in visual meteorological conditions. The report said that "the probable causes of this accident were: (1) the flight crew's failure to adequately plan and execute the approach to Runway 19 at SKCL, and their inadequate use of automation; (2) failure of the flight crew to discontinue the approach into CALI, despite numerous cues alerting them of the inadvisability of continuing the approach; (3) the lack of situational awareness of the flight crew regarding vertical navigation, proximity to terrain and the relative location of critical radio aids; [and] (4) failure of the flight crew to revert to basic radio navigation at the time when the FMS [flight management system]-assisted navigation became confusing and demanded an excessive workload in a critical phase of the flight." The report also said that "contributing to the cause of the accident were: (1) the flight crew's ongoing efforts to expedite their approach and landing in order to avoid potential delays; (2) the flight crew's execution of the GPWS [ground-proximity warning system] escape maneuver while the speedbrakes remained deployed; (3) FMS logic that dropped all intermediate fixes from the display(s) in the event of execution of a direct routing; [and] (4) FMS-generated navigational information that used a different naming convention from that published in navigational charts."

23. ICAO *Annex 2, Rules of the Air*, said, "The pilot-in-command of an aircraft shall, whether manipulating the controls or not, be responsible for the operation of the aircraft in accordance with the rules of the air, except that the pilot-in-command may depart from these rules in circumstances that render such departure absolutely necessary in the interests of safety." (2.3.1) The same document said, "The pilot-in-command of an aircraft shall have the final authority as to the disposition of the aircraft while in command." (2.4)

24. Woods, Maureen, and Lacey, Nicholas. Interview by Rosenkrans, Wayne. Alexandria, Virginia, U.S., Feb. 22, 2000. Flight Safety Foundation, Alexandria, Virginia.

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航空器重大意外事件調查報告

中華民國 89 年 5 月 8 日中華航空公司 CI-681 班機 AIRBUS A300-600R 型機，國籍登記號碼 B-18503 於中正機場飛胡志明市，經 PARPA 轉向 KAPLI 機長於飛航中失能

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