Managing Service Demands – Infertility Services

Infertility Services at Hospital Authority – its Scope and Limits

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Outline

- Fertility trend and fertility problems in Hong Kong
- An overview of infertility and assisted reproductive technology (ART) services in Hong Kong
- An overview of infertility and assisted reproductive technology (ART) services provided by Hospital Authority (HA), its obstacles and challenges ahead, and to explore potential solutions

The Fertility Trend in Hong Kong

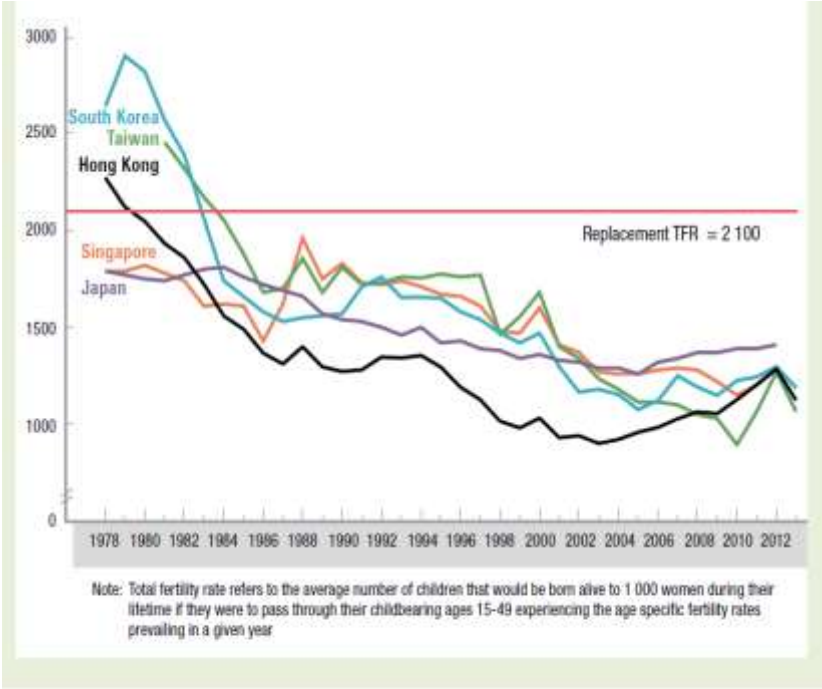
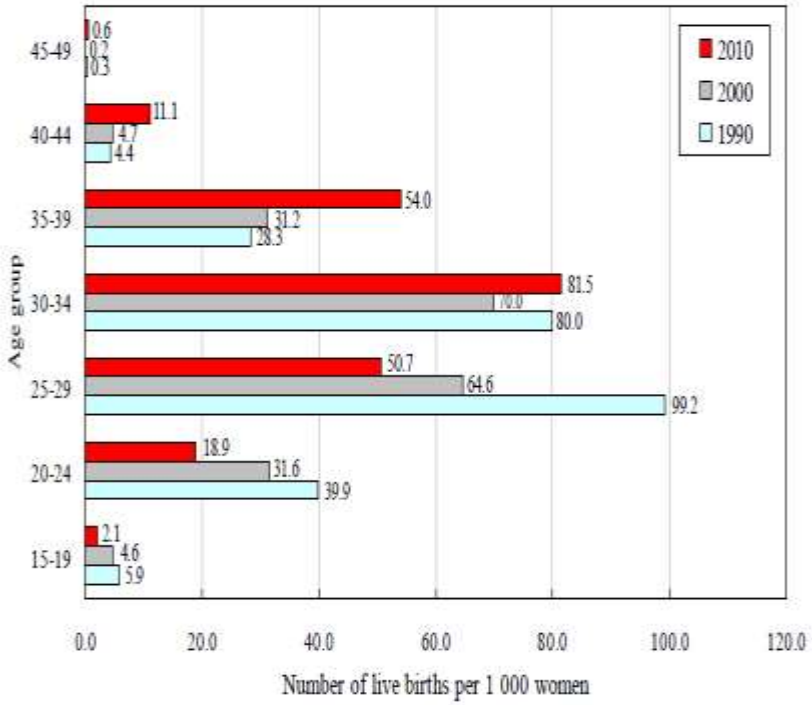


Diagram 10: Decreasing marriage rate and delayed marriage and childbearing are the main causes of low fertility

Total Fertility Rate in HK

among the lowest in developed economics and well below the replacement levels



Sources : Census and Statistics Department, Department of Health, Immigration Department.

Age Specific Fertility Rate (AFR) in HK

- Year 1990, 2000 and 2010

AFR declined in the young age group

Women's postponing marriage & parenthood

Ageing Population threatens Hong Kong

What measures would be effective in helping people form and raise families? How should the cost of such measures be met among taxpayers, employers and employees?

How to help young couples overcome the major hurdles of affordable housing, education and childcare?

Fertility Problems in Hong Kong

YWCA Perception Study on Infertility in Hong Kong carried out in 2002:

- Telephone survey: random selection households
- 16% (1173/7208) polled claimed to be infertile
- only 50% know the reason for their infertility
- only 22% have received or under treatment
- half of them are associated with psychological and social disturbances

香港基督教女青年會
Hong Kong Young Women's Christian Association

SOUTH CHINA MORNING POST THURSDAY, NOVEMBER 17, 2005

Ignorance of fertility problems costing HK

Barclay Crawford

Hong Kong could double its birth-rate – the lowest in the developed world – if couples were more aware of fertility treatments and sought help before it was too late.

A survey by the Hong Kong Society of Reproductive Medicine has revealed only 28 per cent of couples realise they are considered infertile if they have not conceived a child after one year of trying, and less than a third actively seek help immediately to remedy the problem.

The society is urging couples to realise the importance of age in fertility and calling for an education campaign to try to halt the slumping birthrate.

Clement Ho Wing-chiu said the figures were particularly worrying because couples were marrying later and usually trying for children in their 30s – but not realising that this is a time when natural fertility drops off and there is little room for error.

For those couples over the age of 36, the success of treatment falls to just 12.3 per cent for every attempt, with half of them overestimating their chances of success, figures from the society show.

"If all those people [who do not actively seek fertility treatment] were to do it, we could see the Hong Kong birthrate double," Dr Ho said.

"Most people don't realise they are infertile and delay treatment and then they may want to pursue their career and it falls by the wayside."

Dr Ho said he was not surprised by the lack of public awareness found in the telephone survey conducted by Chinese University because doctors were seeing ignorance about fertility issues everyday in clinics.

"We urge people who are experiencing problems to do some research, see a doctor or do some research on the internet."

Hong Kong's birth rate fell from 1.4 per cent in 1988 to just 0.93 per cent in 2004 – a drop of 34 per cent in 16 years, according to the State of Population Report 2005, giving the city the lowest birthrate in the world.

Ken Dychtwald, who recently completed a study on the future of retirement globally for HSBC, said there could be some correlation between the low birthrate and the fact that Hong Kong also has the oldest citizens.

The study found the city's population had a particularly strong work ethic and overwhelming desire to retire wealthy and healthy – far exceeding the rest of the world – which could have a bearing on the fertility rate.

"This is going on across the world but Hong Kong has really become a model for the 21st century," Mr Dychtwald said. "If nothing is done the burden of the ageing society has the potential to crush the world of the young."

Mr Dychtwald said there needed to be more incentives for families to reverse the decline in fertility. But he said Hong Kong was better placed than other countries with low birth rates, such as Japan, because there was a ready supply of immigrants from China on the doorstep.

Infertility Services in Hong Kong

- Common misconception: Infertility = IVF
- In reality, Infertility ≠ IVF, and there are different levels of Infertility services:

Different Levels of Infertility Services

Level 1 - infertility investigation & management provided within a primary care setting.

Level 2 - infertility investigation & management provided by gynaecologists in a setting which has services of endocrine consultation, ultrasound investigation and laparoscopic surgery.

Level 3 - infertility investigation & management provided by gynaecologists with expertise in ART. There should be a special unit equipped with a Human Embryology Laboratory with facilities for in-vitro fertilization (IVF), intracytoplasmic sperm injection (ICSI) and cryopreservation of gametes and embryos is implied.

- Examples of infertility treatments: medical, surgical, different kinds of assisted conception procedures e.g. IUI, IVF or other related procedures
- Infertility service providers: private, public, Family Planning Association.

Different levels of infertility treatment:

Infertility causes	Level 1 services	Level 2 services	Level 3 services
Sexual Dysfunction		IUI	IVF (for patients with repeated IUI failure)
Ovulatory Problem	Medical	▪ OI ▪ Therapeutic Surgery (for PCOS)	IVF (for patients with repeated OI failure)
Tubo-peritoneal factor	-	Therapeutic Surgery (for mild disease)	IVF
Endometriosis or ovarian endometrioma	-	▪ Therapeutic Surgery ▪ Stimulated IUI (for mild disease)	IVF
Uterine Factor		Therapeutic Surgery	
Male Factor	-	IUI (for mild male factor)	IVF ± ICSI (for severe male factor)
Unexplained Infertility	-	Stimulated IUI (at doctor discretion)	IVF (at doctor discretion or when failure in other treatment)

Abbreviation: *OI= ovarian stimulation with gonadotropins; IUI= intrauterine insemination; IVF= in-vitro fertilization; ICSI= intracytoplasmic sperm injection*

HA Infertility management guideline 2013

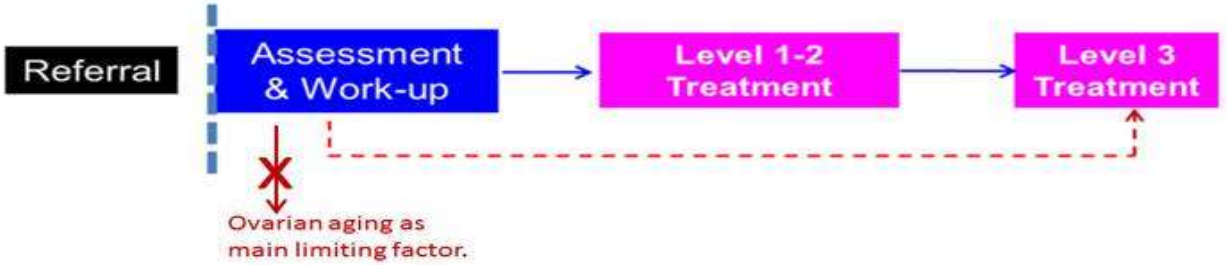
Public Infertility Services at Hospital Authority

Different levels of services centres at HA:

- Most HA hospitals with gynecology specialty (total 9) can offer level 1-2 services
- Only 3 HA Hospitals can offer level 3 services (advanced assisted reproductive technology services)

Annex I – Infertility Treatment Services Provided in HA

	Service \ Hospital	PWH	QMH	KWH	PMH	PYH	QEH	TMH	UCH/ TKOH
Level 2	Therapeutic Surgery	Y	Y	Y	Y	Y	Y	Y	Y
	OI	Y	Y	Y	Y	Y	Y	Y	Y
	IUI	Y	Y	Y	Y	Y	Y	Y	Y
Level 3	IVF-ET	Y	Y	Y	N	N	N	N	N
	IVF-ICSI	Y	Y	Y	N	N	N	N	N
	Frozen thawed ET	Y	Y	Y	N	N	N	N	N
	MESA	Y	Y	N	N	N	N	N	N
	TESE	Y	Y	N	N	N	N	N	N



Assisted Reproductive Technology (ART) Services in Hong Kong

Definition of ART :

- All treatments or procedures that include the *in vitro* handling of human gametes or embryos for the purpose of establishing a pregnancy, e.g. in-vitro fertilization **(IVF)**, intracytoplasmic sperm injection **(ICSI)**.
- In HK, intrauterine insemination **(IUI)** is also considered as a variant of ART under regulation of the Council of Human Reproductive Technology in HK.

Financing of ART Services in Hong Kong:

- Private self-financing treatment
- Public subsidized treatment

  Service rationalization at Hospital Authority:

  1) defined as **non-core services**
  2) **partially subsidized services** to only **eligible couple** but long waiting list due to out-of-proportion demand

Different service providers:

Provision of Assisted Reproductive Technology (ART) in Hong Kong

Public sector

At present, the Hospital Authority provides infertility treatment services at nine public hospitals to legally married couples aged under 40, mainly Artificial Insemination by Husband (AIH) and In-vitro fertilization (IVF). IVF treatment is available in three ART centres, namely Kwong Wah Hospital, Prince of Wales Hospital (PWH) and Queen Mary Hospital (QMH). The current subsidised charges for each IVF cycle range from $4,000 to $12,000. Self-financing patients can receive services offered by the two Universities at PWH and QMH, with shorter waiting times but at higher charges.

Private sector

Of the existing 41 private licensed ART centres, 30 provide AIH treatment and 11 offer services such as sperm washing, IVF and embryo transfers. The estimated charges for one cycle of AIH range from $8,000 to $16,000 and packages for IVF procedures cost from $65,000 to $100,000.

Hong Kong Family Planning Association (FPAHK)

FPAHK provides clinical assessment, investigation and appropriate treatment for infertile couples. In early 2013, FPAHK started to offer AIH treatment to couples on a self-financing basis.

ART Statistics in HK and HA

(based on the information collected by the Council of Human Reproductive Technology in HK)

ART Statistics for All Centres in Hong Kong (2011-2013)

Types of RT	2011		2012		2013	
	No. of Patients	No. of Treatment Cycles	No. of Patients	No. of Treatment Cycles	No. of Patients	No. of Treatment Cycles
IVF-ET	772	771	832	890	918	956
IVF-ICSI	3313	4153	3547	4299	3258	3904
Frozen-thawed ET (IVF)	2401	3115	2703	3562	2536	3298
AIH (IUI)	3956	5771	3739	5316	3162	4573

Statistics on ART Treatments Provided in HA in 2012

In 2012	Government-subsidized Service		Private Service*	
Types of ART	No. of Patients	No. of Treatment Cycles	No. of Patients	No. of Treatment Cycles
IVF-ET	425	454	422	447
IVF-ICSI	241	255	345	380
Frozen-thawed ET (IVF)	348	441	440	616
IUI	331	482	206	384

* Private service is offered by the two Universities at PWH and QMH only

There were round 5000 cycles of IVF + ICSI carried out in all HK centres, most of these cycles were from the private ART centres

Lately HA Hospitals contributed approx. 1/4 of IVF + ICSI cycles (including ~700 public + ~800 private cycles) among all HK centres

Provision of ART Services at Hospital Authority

Extent of publicly subsidized infertility services at the HA hospitals

- **Level 1 and level 2 infertility services** will be provided with full subsidy in public hospitals. However, OI (gonadotropins) ± IUI cycles will only be offered to patients who are considered suitable for this treatment and the number of publicly-funded cycles will be limited to 3 within all HA hospitals.
- **Level 3 infertility services** will be partially subsidized in eligible patients. Each eligible couple will only be entitled to a maximum of 3 partially subsidized public IVF ± ICSI cycles within all HA hospitals.

As level 3 infertility services such as IVF and ICSI are costly and potential risky treatments, they should only be offered to couples who satisfy all of the following criteria:

i. Couples with proven or probable medical cause of infertility

ii. Couples not suitable or with failure of level 1-2 treatments

iii. IVF should not be provided in circumstances where the likely success rate is too low to outweigh its risk

Patient eligibility for publicly-funded OI / IUI in Hospital Authority

The following guidelines regarding the eligibility for publicly-funded OI ± IUI cycles within Hospital Authority are endorsed by COC (O&G) in March 06:-

1. The couples must be adequately investigated and OI ± IUI should be considered as an effective and appropriate treatment before it is offered.
2. The female client must not be more than 40 years of age at the time of the procedure is initiated.
3. The couples must be *legally married. Priority will be given to couples who can demonstrate preparedness, including whether there is any living children within the current marriage.

Patient eligibility for partially subsidized public IVF in Hospital Authority

The following guidelines regarding the eligibility for publicly subsidized IVF cycles within Hospital Authority are issued by HAHO in January 2001:-

1. The female client must not be more than 40 years of age at the time of the procedure is initiated.
2. The couples must be *legally married. Priority will be given to couples who can demonstrate preparedness, including whether there is any living children within the current marriage.
3. Clients with decreased ovarian reserve as indicated by screening test(s) will be excluded.
4. The couples must not have contraindications for pregnancy in terms of medical, physical and mental conditions.
5. The couples must be adequately investigated and IVF is the most appropriate treatment.
6. On top of the above, the individual professional team will consider other relevant factors where appropriate e.g. the underlying cause of infertility, the duration of infertility and the pregnancy history.

Infertility Services at HA

Existing Service & Service Gap

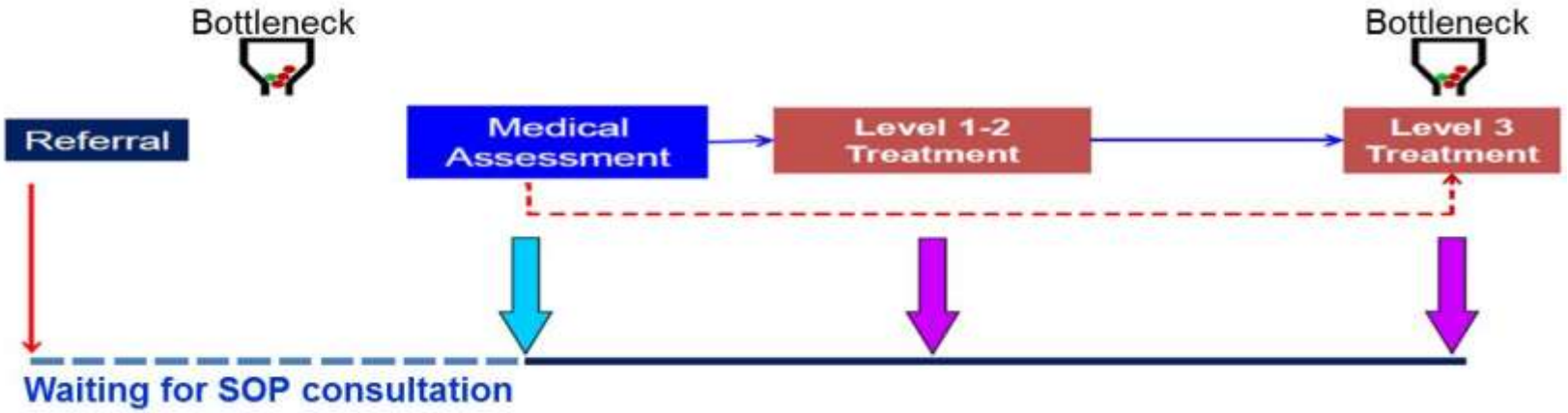
- High demand in infertility services
- Long waiting time for both infertility assessment and treatment at HA
- Caseload concentration mainly in level 3 service units at HA
- **Two bottlenecks of infertility service provision:**

(i) long waiting time for infertility clinic referral (levels 1 & 2 services)

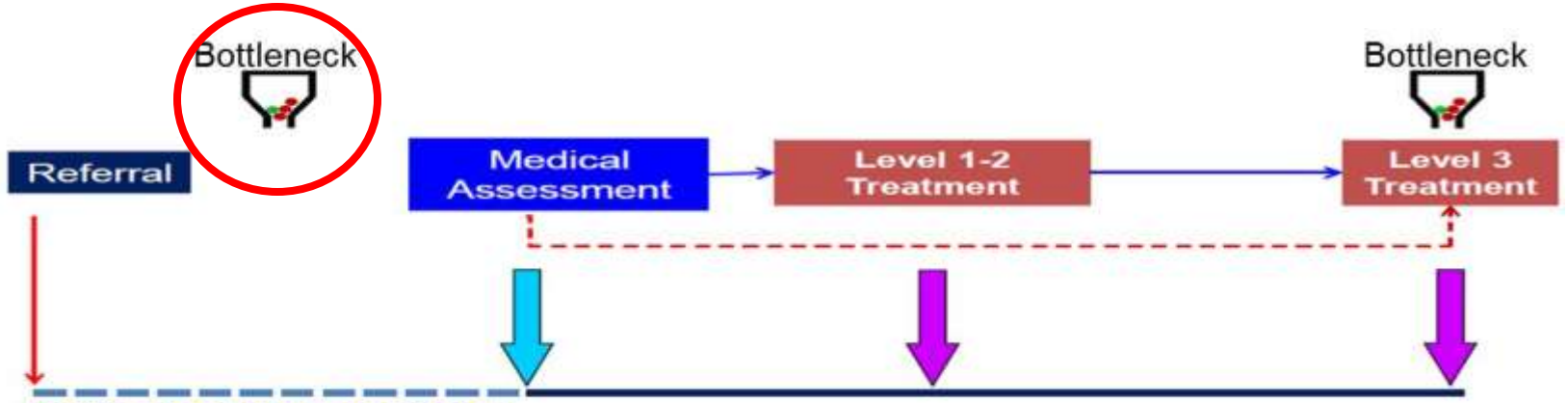
- *Waiting times for the first assessment of infertility patients are very long, ranging from 24 to 94 weeks in the Gynaecology SOPC at hospitals providing level 2 infertility services, and 110 to 156 weeks in the infertility clinics at the level 3 infertility service centres (based on the 90th percentile waiting time as of 30 June 2013)*

(ii) long waiting time for public IVF services (level 3 services)

- *Waiting times for the first public IVF cycle require another 8 to 18 months from booking to treatment*



Impact of long waiting time for new infertility clinic referral on GYN SOPD Waiting Time



Waiting Time for Stable New Case Booking for Specialist Out-patient Services

2014年4月1日 至 2015年3月31日　1 April 2014 – 31 March 2015　(資料只供參考 For reference only)

	醫院聯網 Hospital Clusters						
	港島東 HK East	港島西 HK West	九龍中 Kowloon Central	九龍東 Kowloon East	九龍西 Kowloon West	新界東 NT East	新界西 NT West
婦科 Gynaecology	36 星期/weeks	124 星期/weeks	34 星期/weeks	83 星期/weeks	53 星期/weeks	99 星期/weeks	68 星期/weeks

- Currently patients with fertility problems are referred to:
  - Gynaecology SOPC (in most HA hospitals)
  - Designated infertility clinic (in PWH/NT East & QMH/HK West)
- New case waiting times for infertility clinic assessment are very long in both PWH & QMH and estimated to be ~ 2-3 years

Cross Cluster Infertility Assessment Pilot Program
(April 13 – Mar 14)

- Initiative from HAHO with pilot program started from April 2013
- Cross Cluster referral (PWH / NT East → PYNH / HK East) of infertility new cases
- PWH:
  - Screen suitable new cases out from the waiting list of **PWH FERT** specialty clinic based on referral letters
  - Voluntary participation by patient after briefing in the FERT New Talk by nurse
  - Under this program, patients are reassured that if they are referred back to PWH from PYNH, they will get an appointment in PWH not later than the previous cancelled appointment.
- PYNH:
  - 2 cases special quota per week in PYNH GYN clinic

Performance review of Cross Cluster Infertility Assessment Pilot Program (April 13 – Mar 14)

- Only 20 cases recruited in 1 year

  Analysis:

  (i) inadequate information from referral letters to screen for appropriate level of care

  (ii) voluntary referral

  ' Patient reluctance- PYNH not the final destination, still may need to refer back to PWH. '

- There are at least 3 spontaneous pregnancies , including one patient with abnormal semen analysis in PYNH judged to need referral back for IVF but then spontaneous pregnancy

  Analysis:

  (i) cases waiting in PWH infertility clinics are heterogeneous not only in terms of the investigations & treatments received but also the prognosis

  (ii) the standard of semen analysis in most if not all non-ART centres is very poor

- PYNH – limited scope of therapeutic surgery (some cases referred back to PWH with only diagnostic but no therapeutic surgery)

  Analysis:

  (i) lack of reproductive surgery expertise

Cross Cluster Infertility Assessment Pilot Program

- Infertility ≠ IVF
- 9 HA hospitals (level 1-2 services) versus 3 HA hospitals (level 3 services)
- Burden more evenly distributed to different service centres based on the services they can provide

BUT

Poor Planning & Performance

Poor Triage System

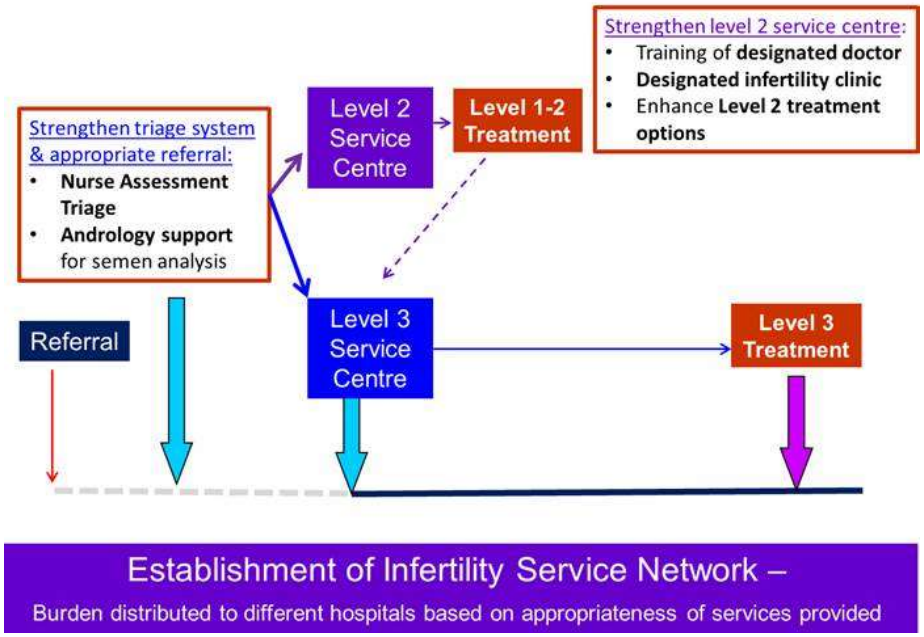
Deficiency in some level 2 treatment options e.g. reproductive surgery

Reasons for long waiting time for new infertility clinic referral

- **Caseload concentration mainly in level 3 service centres** at HA
- Lack of a reliable **triage** system and coordination of **referral** procedure
  - Good quality semen analysis (SA) is needed in triaging the level of infertility services required, however, there are variable standards of SA at hospital pathology laboratories which generally perform a small number of SA
  - **Unclear delineation of the roles of different infertility service centres** at HA and **variable standards of diagnostic tests (particularly semen analysis)** resulted in inappropriate referral and work duplication among different centres
- **Deficiency in some level 2 treatment options**:
  - Reproductive surgery is a treatment option for infertility but is under-developed in many HA hospitals due to deficiency in training and expertise
- **Over-reliance on IVF**:
  - Long waiting time for public IVF resulting from the enormous demand lead to earlier referral to level 3 units for IVF instead of considering viable alternative options.

Proposals to improve the model

An improved two-way model:



1) Concept of **Infertility Service Network** comprising of service centres offering different levels of infertility treatment
2) Strengthen triage system and appropriate referral
   - require better triage system – **triage clinic by trained nurses**
   - strengthen diagnostic tests for triage: Central Andrology Laboratory to provide **quality semen analysis with improved diagnostic and prognostic accuracy** to all infertility new cases booking in the network hospitals to assist in proper triage
3) Strengthen Level 2 Service Centres
   - Training of designated doctor with special interest
   - Designated infertility clinic
   - Enhance **Reproductive Surgery Training**
   - Laboratory support in sperm preparation for **intra-uterine insemination**
4) Explore the expansion of Level 3 / IVF services

Strengthen Level 2 Service Centres

Level 2 infertility Services at HA: -

- Therapeutic surgery or/and OI/COH ± IUI
- Readily available in most public hospitals :
  - can appropriately be provided by gynaecologists who have trained in endocrine/ ultrasound monitoring and laparoscopic / reproductive surgery
- Cost issue not create too much financial difficulty:
  - Concurrent diagnostic and therapeutic surgeries at the same setting
  - Bear in mind that OI/COH ± IUI treatment are still expensive treatment but only $^{1}/_{6}$ to $^{1}/_{5}$ of the cost of IVF
- Proper patient selection for appropriate treatment important
  - Reproductive therapeutic surgery can serve as an alternative / complementary infertility treatment option to reduce the public IVF needs if proper patient selection and appropriate skills
  - Offer OI /COH ± IUI only to patients who are considered suitable for this treatment, avoid offer inefficient treatment because of inaccessibility of IVF services - false hope and risk to patient and wastage of recourses.

Treatment Modality

- Role of Reproductive surgery

Is there any evidence ?

Therapeutic surgery Laparoscopic surgery for Tubo-peritoneal problems	Cumulative Pregnancy Rate (12-24 months)	Ectopic pregnancy rate
Pelvic		
Adhesiolysis	Up to 70% (extensive dense adhesion: PR <20%)	
Endometriosis	Mild / minimal: OR 1.66, 95% CI (1.09-2.51) NNT 8 (95% CI 5-32) to have 1 additional ongoing pregnancy Ovarian cystectomy suggested for endometrioma Moderate / Severe: less data	
Ovarian drilling	CPR 50-60% ; Ovulation rate 70-80%	
Tubal		
Re-anastomosis after tubal sterilization	60-80% (depends on women age, type of sterilization, length of tube post-Tx, location of anastomosis)	2-10%
Proximal tubal cannulation	Up to 60% (some data suggest reduced to 30% if proximal tubal fibrosis)	
Fimbrioplasty	Up to 60%	6%
Salpingostomy	30% (Mild: 81%; moderate: 31%; severe: 16%)	4-10%
Salpingectomy / tubal occlusion for hydrosalpinx (Adjuvant of IVF)	NNT: 6 to have 1 additional ongoing pregnancy after IVF	

- Doneskv BW, Adashi EY. Surgical ovulation induction: the role of ovarian diathermy in polycystic ovary syndrome. Baillieres Clin Endocrinol Metab. 1996 Apr;10(2):293-309
- Kodaman et al., Evidence-based diagnosis and management of tubal factor infertility. Curr Opin O&G 2004
- Geoggrey DA et al., The modern role of reproductive surgery. Clinical Obs and Gynae, Vol 54, No. 4, 2011
- Togas Tulandi et al., Role of reproductive surgery in the era of ART. Best practice & research clinical obs and Gynae 2012

Therapeutic Surgery Hysterscopic Surgery for Uterine Pathology	Cumulative Pregnancy Rate (12-24 months)
IUI after Polypectomy Vs IUI (n=215) (Perez-Medina et al. Hum Reprod 2005)	63% vs 28% (RR: 2.3; 95% CI 1.6-3.2) NNT: 3 (irrespective polyp size; mean 1.6 cm)
Hysteroscopic myomectomy Vs control (for submucosal fibroids or IM fibroids with submucosal component) (n=215) (Shokeir T et al. Fertil Steril 2010)	63% vs 28% (RR 2.1; 95% CI 1.5-2.9, RCT)
Hysteroscopic Adhesiolysis No RCT; Observational studies only (N= 89) (Roy K et al. Arch Gynecol Obstet 2010)	LBR: 33% (severe adhesion) ; 58% (mild adhesion) (Mean conception time after OT: 12.8 months)
Septum resection	More data for treatment of recurrent miscarriage Less data for treatment of infertility

The Practice Committee of the American Society for Reproductive Medicine.

Optimal evaluation of the infertile female. Fertil Steril. 2006

- Reproductive surgery, especially operative laparoscopy, is clearly indicated for Dx and Tx in selected infertile patients
- All available methods of evaluation of tubal factor have technical limitations so complementary tests are frequently needed, with laparoscopy being the gold standard
- Laparoscopy is indicated if:
  - evidence or strong suspicion of endometriosis, pelvic/adnexal adhesions, or significant tubal disease
  - should be seriously considered before applying aggressive empirical treatments involving significant cost and/or potential risks

Bear in mind that reproductive surgery can also be an interim treatment while waiting for public IVF in Hong Kong which has very long waiting list .

Treatment Modality

- Role of Intrauterine Insemination (IUI)

Is there any evidence ?

Summary of Evidence

- IUI with or without ovarian stimulation in couple with:
  - Coital Problem (+ve evidence)
  - Male infertility (less severe case) (evidence still limited since no large trial)
  - Minimal / Mild Endometriosis (+ve evidence for stimulated IUI)
  - Unexplained infertility (+ve evidence for stimulated IUI in poor prognostic group)

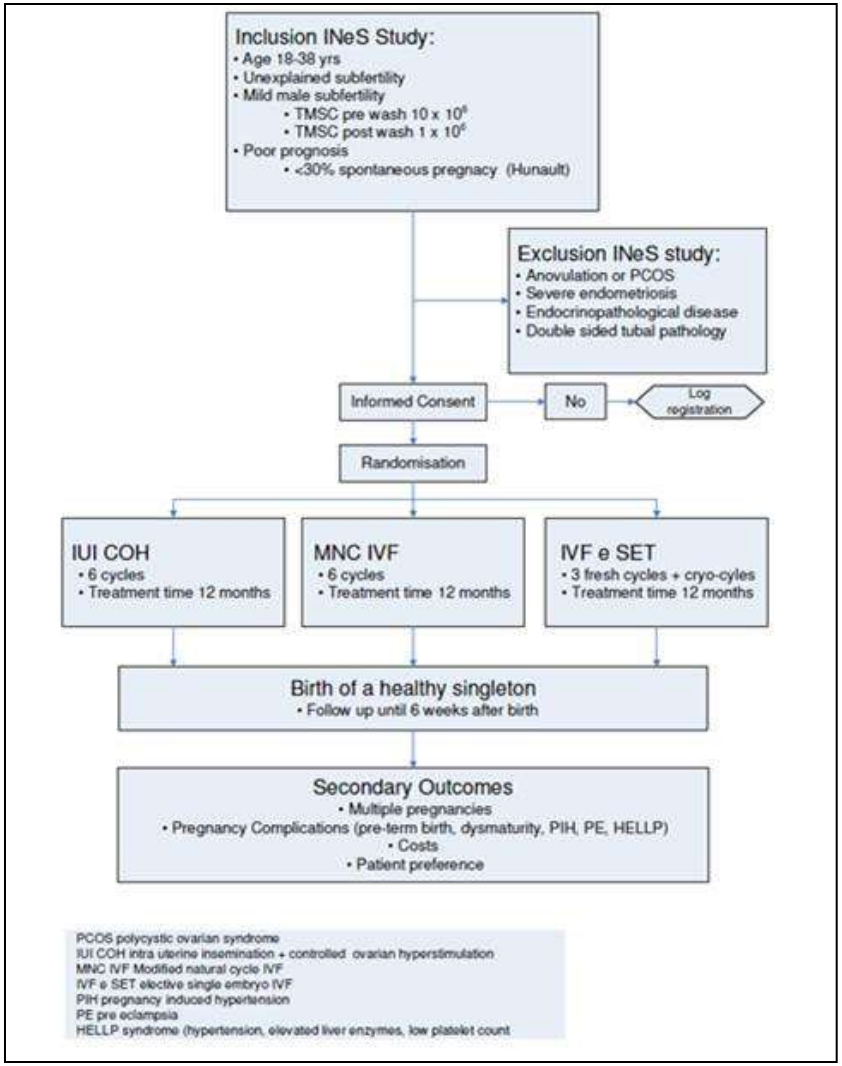
The update on Mx of Infertility - HA Infertility Guideline (2013)

Infertility causes	Level 1 services	Level 2 services	Level 3 services
Male factor	--	**IUI +/- ovarian stimulation** (if total motile sperm: ? >1 M and N form ≥4%)	IVF+/-ICSI (if N form <4%)
Ovulatory problem	WHO II: • Clomid PCOS: • Clomid • Metformin	WHO I & II: • OI (Gonadotrophin) PCOS: • Clomid + Metformin (if clomid resistance / metabolic risks) • Lap ovarian drilling • OI (Gonadotrophin)	IVF (only if repeated OI failure)
Tubo-peritoneal factor	--	Therapeutic surgery (for mild disease)	IVF
Endometriosis or ovarian endometrioma	--	• Therapeutic surgery (irrespective for severity of endometriosis and cystectomy if ovarian endometrioma) • **Stimulated IUI for minimal/mild endometriosis**	IVF
Uterine factor		Therapeutic surgery	
Unexplained infertility **(conservative treatment in good prognostic group)**	--	**IUI with ovarian stimulation offer in poor prognostic group** *(Some controversies on the cost effectiveness and some authors advocated direct IVF)*	IVF (with doctor discretion or if repeated failure in other treatment)
Coital problem	Sexual rehabilitation	IUI alone	IVF (only if repeated IUI failure)

Unexplained or Mild Male Subfertility – INeS Trial

- Multicentre RCT involving 605 infertile couples with female age 18-38
- Unexplained or mild male subfertility
- Unfavorable prognosis
- Randomized to:
  - IVF (single embryo transfer) x 3 fresh cycles + cryo-cycles
  - IVF (modified natural cycle or MNC) x 6 cycles
  - IUI with Controlled Ovarian Hyper-stimulation x 6 cycles
- Time frame: 12 months

Bensdorp et al, 2013 ESHRE abstract



Cost Effectiveness of IVF-SET, MNC & IUI

	IVF-SET (n= 203)	IVF-MNC (n= 195)	IUI-COH (n= 207)
Ongoing pregnancy	57%	49%	54%
Mean direct cost per women	€3,270	€4,787	€2,108
Mean direct cost for ongoing pregnancy	€5,723	€9,838	€3,925

Mean direct cost for ongoing pregnancy lowest in the IUI-COH group
- the most cost-effective group

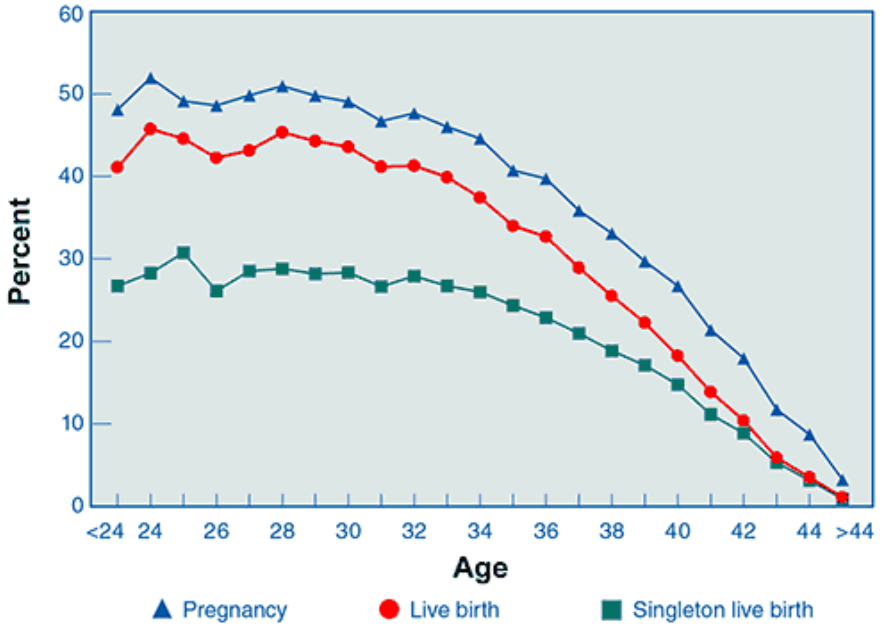
Tjon-Kon-FAT et al, 2013 ESHRE abstract

Level 3 infertility Services at HA

- Level 3 ART procedures such as IVF, ICSI, MESA/TESE, frozen-thawed embryo replacement
- An effective, or sometimes the only method, by which a couple can successfully conceive
- But potential **risky** and **ovarian aging as main limiting factor**
- **Expansive procedures** involving specialized expertise and sophisticated laboratory facilities
- Enormous demand, long waiting list
- A long waiting list will undesirably reduce the treatment success as **success rates decrease with female age**.
- Under supply of public IVF services at HA due to the limited service capacity and lack of funding
  - Limited skill personnel and manpower drainage to private market
  - Expansive running and maintenance cost (the continued technology advancement will further increase the costs)
  - Lack of recurrent funding and threats of financial sustainability

Female Age as a limiting factor for IVF

US national average data on success rates per IVF cycle by female age for 2010



- The chart shows falling success rates of IVF with increasing female age starting at early 30's
- The decline is more substantial in the late 30's and early 40's
- Using own eggs over age 44 with IVF the chance to have a baby is only about 1% per try

IVF as indispensable treatment for infertility but should not be overused

BMJ

BMJ 2014;348:g252 doi: 10.1136/bmj.g252 (Published 28 January 2014) Page 1 of 5

ANALYSIS

Are we overusing IVF?

The indications for IVF have expanded from tubal disorders to many causes of subfertility, including unexplained. But with limited evidence underpinning its extended remit **Esme Kamphuis and colleagues** explain how the risks could outweigh the benefits

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Since the birth of the first baby by in vitro fertilisation (IVF) in 1978, the technique has earned its reputation as a major medical breakthrough of the 20th century. IVF was developed for women with tubal disease,[1] but its indications soon began to grow. In the 1990s intracytoplasmic sperm injection was developed to treat couples in which the man has poor semen quality,[2] which like tubal infertility prevents sperm from coming into close proximity with an egg. In recent years, however, IVF has been applied to other types of subfertility such as mild male subfertility, endometriosis, and unexplained subfertility. The birth of many healthy children has enhanced provider and patient confidence in the safety of IVF. But does applying IVF to wider forms of infertility result in overtreatment of couples who had a reasonable chance of conceiving naturally? Is it equally effective in these conditions? And, as more is understood about the adverse health outcomes in IVF children can the risks of IVF be justified for these more liberal applications?

Rising rates of IVF

One million babies were born in the first 25 years of IVF between 1978 and 2003. It took only two more years for the tally to reach two million in 2005, with over five million estimated to have been born by the end of 2013.[3] In developed countries with public health systems 2-3% of the births each year are through IVF, rising as high as 5% in Denmark and Belgium.[4] This is despite the fact that an observational study showed that 95% of 350 couples planning a first pregnancy conceive within 24 months.[5]

The reasons for the rise in IVF are complex. Women may plan to have children later and some are choosing to freeze their eggs.[6] A lack of confidence, among both subfertile couples and their doctors, that conception will eventually occur naturally can lead to access to IVF within two to three years of trying to conceive, and the lure of new technology and access to more patient friendly IVF programmes make it more appealing.[7]

Evidence has also undermined alternatives to IVF such as clomifene citrate.[8] Another factor is that procedures are increasingly performed in private health systems, where the focus on commercial returns has resulted in less academic oversight of who receives treatment and when.[9] Amid this the indications for IVF have been expanded to include mild male subfertility, the effect of ageing on ovarian function, and unexplained subfertility where no absolute barrier to conception can be proved (table 1⇓). And it is in these groups, that use of IVF is expanding the most.

In the United States, the number of IVF cycles offered annually increased from 90 000 in 2000 to 150 000 in 2010, but the proportion with tubal problems as an indication fell from 25% to 16%.[10] In the UK the proportion of IVF cycles for tubal problems fell from 19% to 12% between 2000 and 2011, although the number of cycles remained at around 7000 (table 1⇓).[11] The figures for unexplained subfertility tripled from 6204 to 19 552 cycles. Similar shifts have been reported in the Netherlands.[12]

IVF and unexplained infertility

The value of IVF for tubal blockage and severe male factor infertility, where a live birth rate of 20-30% per cycle offers the only chance of conception, is not in dispute. However, the evidence for newer indications such as unexplained subfertility is less clear. Unexplained subfertility accounts for 25% to 30% of all couples presenting for IVF, many of whom will conceive before treatment.[13 14 15] In a cohort of 500 Dutch subfertile couples with on average almost two years of unexplained subfertility, 60% conceived naturally after the initial assessment in the fertility clinic.[16] Other observational studies have confirmed natural conceptions in couples with subfertility for two to three years.[16 17]

Key messages

- The scope of IVF has expanded in the last two decades to embrace a wider range of indications, including unexplained subfertility
- The evidence underpinning the use of IVF for some of these newer indications is weak
- Outcomes in children conceived through IVF seem to be poorer than in those conceived naturally
- We need to evaluate which couples have a reasonable chance of natural conception
- For those needing help, the effectiveness and safety of IVF should be investigated afresh

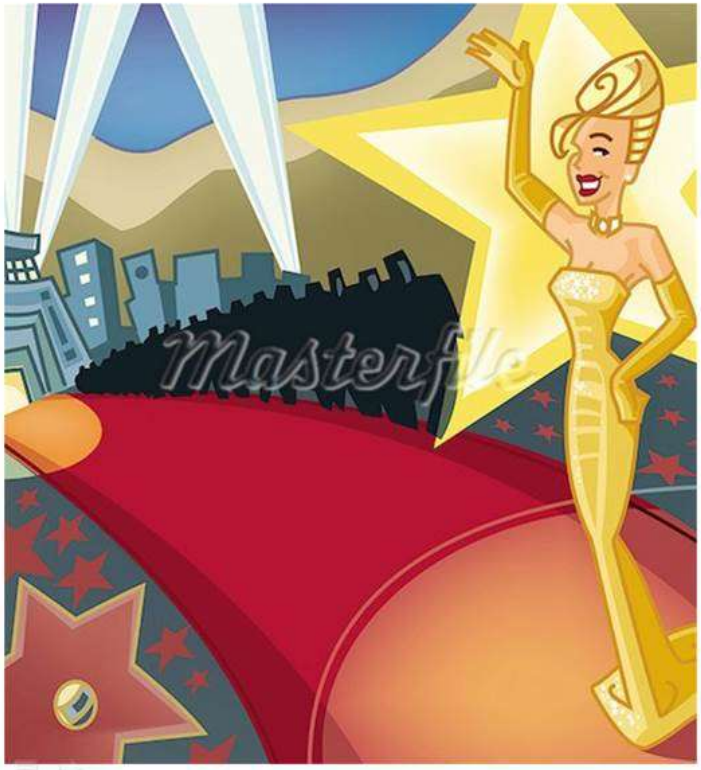
Recognize the Myths & Risks of IVF

快樂孕記：人工授孕唔包生仔

明報 – 2011年12月28日星期三上午8:47

【明報專訊】「某某明星40歲後，為何人工授孕成功？」、「試管嬰兒不是一定包生仔生女嗎？」雖然香港的人工輔助生育科技發展多年，但很多夫婦仍有不少誤解，甚至以為它「包生仔」。需明白各種技術，都有不同的風險及成效，而成效通常和女性年齡成反比，故夫婦應正視不育問題，及早治療，才可增加成孕機會。

名人效應　人工受孕趨增
專家：年逾40成功率僅一成



港聞 > 港聞

人工受孕增孖胎 NICU迫爆
屯醫調查：四成孖胎屬人工受孕

【明報專訊】醫院管理局數字顯示，近年在公立醫院誕生的雙胞胎有上升趨勢，由2005年的465宗，升至2009年的699宗，增長五成，產科醫生表示，多胞胎增加與更多婦女採用人工輔助生育有關。屯門醫院和廣華醫院都發現，在雙胞胎個案中，約四成個案屬人工受孕，由於多胞胎嬰孩有更高機率要進入初生嬰兒深切治療部（NICU），大大加重公立醫院婦產科和NICU的壓力，屯門醫院NICU內11張病□，就曾經被分別兩組共6個三胞胎嬰兒，佔用了逾半病□。

多胞胎很大可能早產，屯門醫院今年處理過3宗3胞胎，全部不足月，要入住初生嬰兒深切治療部（NICU，圖），大大增加NICU壓力。（葉漢華攝）

屯醫3宗3胞胎 早產入NICU

屯門醫院今年罕有碰到3宗3胞胎，其中一組來自人工受孕，全部出生時都不足月，嬰兒體重介乎1.2至2.4公斤，需要進入NICU觀察。新界西醫院聯網婦產科部門主管歐陽錦全醫生說，其中兩宗同時在6月出世，NICU內11張病□，被6名早產嬰佔了逾一半。

回顧2007年，屯門醫院只有47對雙胞胎，但至2011年已增至共68對雙胞胎和三胞胎，婦產科於是在今年向懷有雙胞胎的孕婦做調查，截至本月12日，47宗雙胞胎中，發現有21宗透過人工受孕成孕，佔總數44.6%。

廣華醫院婦產科部門主管梁永昌醫生表示，該院回顧2006至09年的資料並撰成文獻，發現這3年內共有207名懷有孖胎的孕婦，當中有84人為人工受孕，佔總數40.6%，文獻將於香港婦產助產科雜誌發表。

醫管局的數據亦顯示雙胞胎個案有上升趨勢，2005年每千個孕婦有11.73宗雙胞胎，但到2009年升至每千個孕婦有17.5宗，增幅達50%。

雙胞胎4年增五成

歐陽錦全與梁永昌均表示，自然雙胞胎的機會很低，平均每100人只有1人誕下雙胞胎或多胞胎，相信近年婦女求助人工輔助生育科技增多，是導致多胞胎增加之主要原因。歐陽錦全說，多胞胎對孕婦和胎兒都有很高風險，不值得高興。多胞胎孕婦易有高血壓、糖尿

公立醫院產婦生育數字

年份	一胎	雙胞胎	三胞胎	四胎或以上	總數
2009	39,883	699	13	0	40,575
2008	40,370	646	15	0	41,040
2007	38,535	626	14	1	39,200
2006	39,551	509	14	0	40,074
2005	40,436	465	15	0	40,916

資料來源：醫管局

屯門醫院近年產婦誕多胞胎數字

年份	雙胞胎	三胞胎
2011#	95	3
2010	62	1
2009	61	0
2008	74	2
2007	47	0
2006	57	0

#至11月30日數字

屯門醫院向雙胞胎婦調查受孕方法*

*2011年1月至12月12日
資料來源：屯門醫院婦產科

Summary – Public Infertility Services at HA

- Common misconception: Infertility = IVF
- Different levels of Infertility service: 1-3 (primary, secondary, territory)
- Two bottlenecks of infertility service provision at HA:

  1) long waiting time for infertility clinic referral (levels 1 & 2 services), and

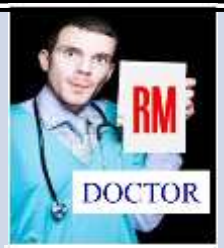
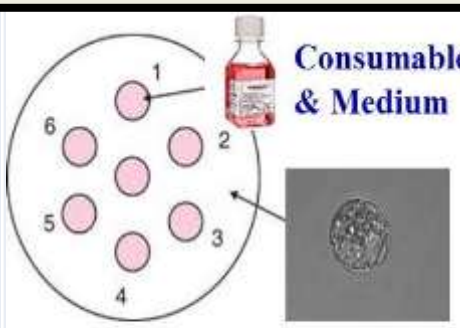
  2) long waiting time for public IVF services (level 3 services)

- Infertility services are low focus among the many gynaecological services at HA and the running costs of public infertility / ART services are subsumed under individual O&G Department budget with no extra funding.

Summary - Potential Solutions

Medical assessment	Level 1 – 2 treatment	Level 3 treatment
• Infertility Service Network • Strengthen triage system & appropriate referral ❑ Nurse Triage Clinic ❑ Strengthen diagnostic tests for triage (semen analysis)	• Strengthen level 2 service center ❑ Training of designated doctor ❑ Enhance Reproductive Surgery ❑ Laboratory support in sperm washing for intra-uterine insemination	• Capacity expansion of IVF service

IVF - Potential for Capacity Expansion ?

	Personnel	Set-up & Facilities	Procedures
CLINICAL	 	 Clinic Space  Operation Suite	
	Besides all these, the need for consistent **financial resources and recurrent funding.**		
LABORATORY	  EMBRYOLOGIST		 Gamete Handling & Embryo Culture

HA public IVF cycles contribute ~15% of total IVF cycles in HK
(only tip of the iceberg)

Expanding private market – attracting trained doctors & embryologists to leave HA

Public Infertility Services at Hospital Authority

Should have an overall objective to improve the **effectiveness** and **equity** of services within the **available resources !!**