Intrauterina preventivmetoder
– ett alternativ för alla åldrar

Kristina Gemzell, MD, PhD
WHO-centre
Department of Women´s and Children´s Health
Karolinska University Hospital/ Karolinska Institutet
Stockholm/Sweden
www.reproductivehealthresearch.org
Disclosures;
Gemzell-Danielsson has been ad hoc advisory board member or invited to give presentations for Merck (MSD), Bayer, Exelgyn, Actavis, Gedeon Richter, Mithra, Exeltis, Ferring, Natural Cycles, Gynuity, and HRA-Pharma
The link between contraceptive prevalence and abortion

Levels of use of modern contraception and abortion rates countries with total fertility rate between 1.7 and 2.2.

WHO; Progress in Reproductive Health, 2003
## Effectiveness of female contraceptive options

<table>
<thead>
<tr>
<th>Method</th>
<th>% of women experiencing an unintended pregnancy within the first year of use</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Typical use*</td>
</tr>
<tr>
<td>No method‡</td>
<td>85</td>
</tr>
<tr>
<td>Female condom§</td>
<td>21</td>
</tr>
<tr>
<td>Diaphragm‖</td>
<td>12</td>
</tr>
<tr>
<td>Oral contraceptives: COC/POP</td>
<td>9</td>
</tr>
<tr>
<td>Transdermal patch</td>
<td>9</td>
</tr>
<tr>
<td>Vaginal ring</td>
<td>9</td>
</tr>
<tr>
<td>Injectable</td>
<td>6</td>
</tr>
<tr>
<td>Cu-IUD</td>
<td>0.8</td>
</tr>
<tr>
<td>Female sterilization</td>
<td>0.5</td>
</tr>
<tr>
<td>LNG-IUS: Mirena®</td>
<td>0.2</td>
</tr>
<tr>
<td>Subdermal implant</td>
<td>0.05</td>
</tr>
</tbody>
</table>

* Typical use: includes both incorrect and inconsistent use  
† Perfect use: correct and consistent use  
‡ without spermicides  
§ with spermicidal cream or jelly  

Trussell J. Contraception 2011; 83(5): 397–404
LARC
“forgettable contraception”
that can be ignored for years....
Millenium development goals, MDG 5 Target:
To reduce by three quarters, 1990 -2015, the MMR

The Bellagio statement on LARC, 2008

Goal 5
Improve maternal health

TARGET
Reduce by three quarters, between 1990 and 2015, the maternal mortality ratio

Achieving good maternal health requires quality reproductive health services and a series of well-timed interventions to ensure a women’s safe passage to motherhood. Failure to provide these results in hundreds of thousands of needless deaths each year—a sad reminder of the low status accorded to women in many societies.
IUD Usage Among Contraceptive Users

Data from 2006 except for the US, which is from 2009. Source: Guttmacher Institute

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Contraception, Sweden

Pills – the most common method

Kopp-Kallner et al., PlosOne 2015
The Contraceptive CHOICE Project in the United States¹,²

Objective  To decrease unintended pregnancy by promoting the use of long-acting reversible contraception (LARC) in St. Louis, USA

Methods  Recruited sexually active women who wanted to avoid pregnancy but were not currently using a contraceptive or wanted to start a new reversible method. Counseling was provided to increase awareness of LARC methods. Each participant was provided her contraceptive method of choice at no cost for 3 years.

Data Analyses  Continuation and satisfaction rates for the different methods; pregnancy rates for LARCs vs shorter-acting agents

The CHOICE-study; choice of method when all methods are free (2007-2011, St Louis, USA)

Andel kvinnor (%)

80 70 60 50 40 30 20 10 0

LARC* (n=6942) Depo (n=648) COC, patch, ring (n=1666)

75 7 18

*Long-acting reversible contraceptives


K.Gemzell Danielsson
CHOICE USA: Less failures with LARCs

LARC*  Depo  Pill, Patch, Ring (PPR)  *p=0.001 vs PPR

*LARC, Long acting reversible contraceptive

Many births to teenagers/adolescents are unintended.

Intendedness of births by mother's age at conception, USA, 2006-2010

- 15-19 years: 22.8% Intended, 77.2% Unintended
- 20-24 years: 49.9% Intended, 50.1% Unintended
- 25-44 years: 74.6% Intended, 25.4% Unintended

### Effektivitet vid typisk användning

<table>
<thead>
<tr>
<th>Produkt</th>
<th>Metod – maximal användning</th>
<th>PI typisk användning 1a året</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nexplanon</td>
<td>Stav – 3 år</td>
<td>0.05</td>
</tr>
<tr>
<td>Mirena</td>
<td>Spiral – 5 år (7år)</td>
<td>0.2</td>
</tr>
<tr>
<td>Kayleena</td>
<td>Spiral – 5 år</td>
<td>0.29</td>
</tr>
<tr>
<td>Jaydess</td>
<td>Spiral – 3 år</td>
<td>0.33</td>
</tr>
<tr>
<td>Kopparspiral</td>
<td>Spiral -5 el 10 år</td>
<td>0.8</td>
</tr>
<tr>
<td>Depo-Provera</td>
<td>Injektion – 3 mån</td>
<td>6</td>
</tr>
</tbody>
</table>
In the CHOICE-study highest satisfaction reported with LARCs evaluation at 12 months FU

Development of intrauterine contraception

EFFICACY IMPROVEMENT

Pearl Index

- Metal rings (1920): 8-10
- Plastic devices (1950): 3-5
- Copper added (1970): 1.5-4
- Expanded Cu (1980): 1-1.5
- Frameless Cu (1990): 1-1.5
- Progestagen (1990): 0.5-1
IUD use

160 miljoner spiralbärare!
Efter sterilisering den mest använda preventivmetoden globalt 15% av fertila kvinnor
Vanligast i Asien
Används av 14-20% sexuellt aktiva kvinnor i Norden
USA 8%
Den mest kostnadseffektiva preventivmetoden
MECHANISM OF ACTION
Copper IUD

Spermatotoxic
Local reaction in the endometrium

PREVENTION OF FERTILISATION
Cu-IUD

A prototype of “forgettable contraception” that can be ignored for years...

Modern Cu-IUDs with $>300 \text{ mm}^2$ and with good documentation regarding efficacy and usage (in utero) should be chosen

Approved for 5 (or 10 years)

Failure rate of 1% up to 10 years
**Fördelar Cu IUD**

Effektiv

Icke hormonell metod

Långverkande

Snabb återgång till fertilitet

Ej korrelerat till samlag

Hög compliance

Skydd mot endometrie-, tubar- o cervixcancer

(Cochrane)
Nackdelar

Dysmenorrre
Ökad blödning (50-75%)
Utstötning
Ger ej skydd mot STI
(Ej ökad virusutsöndring vid HIV)
Ökad frekvens vaginos
Insättning kräver träning, kan vara smärtsam
Mirena

Mirena (Leiras Oy, Turku, Finland)
Invented by T Lukkainen. Developed by the Population Council in collaboration with Leiras

• Releasing 20 mcg LNG daily
• Length 32mm
• Total width of horizontal arms 32mm

Medication with progestagen
originally to prevent expulsion

PI 0.22, multinational, prospective, non-interventional study (EURAS) including over 41,000 women, PI 0.06 95%[CI]: 0.04–0.09)
LNG IUS: Mechanism of Action
Prevention of fertilisation

Fertilization inhibition:
- Cervical mucus thickened
- Sperm motility and function inhibited

Endometrium suppressed
- Weak foreign body reaction induced

Minor effects on ovarian function

Videla-Rivero et al. Contraception 1987;36:217
Continuous drug delivery ➔ Mirena® does not cause ‘peaks’ and ‘troughs’, as with oral progesterone

Nilsson et al., 1982
LNG concentrations

Endometrium  470-1500 ng/g

Myometrium  1.8-2.4 ng/g

Plasma  0.1-0.2 ng/ml

Nilsson et al. Tissue concentration of LNG in women using LNG-releasing IUD. Contraception 1982
Return of fertility after removal of Mirena®

- Cyclic ovarian function is immediately restored
- The endometrium recovers quickly and normal menstruation is established within 30 days
- Overall fertility is unaffected
- Cumulative conception rate after removal:
  - 79 - 96 % after 24 months
- Pregnancies progress as normal

Rybo et al., Ann Med 1993
Andersson K. et al, Contraception 1992; 45: 575-584
Belhajd H. et al, Contraception 1986; 34: 261-7
**Tolerability and safety of Mirena®**

- Side effects are rare and reversible
- Transient hormone-related side effects can occur in first months of use:
  - e.g. headache, breast tenderness, acne, and mood lability
- Enlarged ovarian follicles may occur (as with other progesterone-only methods) (<8%)

- No clinically significant changes in serum lipid profile, haemostasis or carbohydrate metabolism
- No effects on blood pressure and body weight

- Mirena® improves serum haemoglobin and serum ferritin levels through reduced menstruation

For further information pls. see the product prescribing information.
LNG IUS: Persistent Follicles

As with other progestin-only methods, persistent follicles can occur (in less than 8% of women).

They do not require treatment!!

## Side effects of Mirena

<table>
<thead>
<tr>
<th>Side Effect</th>
<th>3 months(%)</th>
<th>5 år(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower abdominal pain</td>
<td>10.5</td>
<td>3.1</td>
</tr>
<tr>
<td>Acne, skin problems</td>
<td>3.5</td>
<td>1.2</td>
</tr>
<tr>
<td>Back pain</td>
<td>3.1</td>
<td>1.0</td>
</tr>
<tr>
<td>Mastalgia</td>
<td>3.1</td>
<td>1.0</td>
</tr>
<tr>
<td>Headache</td>
<td>3.8</td>
<td>1.6</td>
</tr>
<tr>
<td>Vaginal discharge</td>
<td>2.7</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Mood changes</td>
<td>2.5</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Nausea</td>
<td>2.4</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Edema</td>
<td>1.1</td>
<td>&lt;1</td>
</tr>
</tbody>
</table>

*(Andersson et al 1994)*

IUD/IUS, K.Gemzell
Cu vs LNG IUC: Mean Weight Change After 5 Years

Andersson et al. Contraception 1994;49:56
Endometrial effects with Mirena®
**Bleeding with Mirena®**

Endometrial growth is reduced or blocked

Oligo- or amenorrhea in most patients

Inform patients about positive impact of reduced menstruation or amenorrhoea

Remember: irregular bleeding or spotting occurs during the first months!
Number of Bleeding Days: Cu vs LNG

Luukkanen and Toivonen. 1992;90
Menstrual blood loss

A limitation with Cu-IUD in young nulliparous women is increased menstrual flow (Milsom et al., 1989)

- Older large inert IUDs: +100%
- Modern copper-IUDs: +50-75%
- LNG-IUS: -60-90%
Byte direkt från en Mirena till nästa efter 5 års användning ger minskad blödning!

Gemzell Danielsson et al., 2010,
Rönnerdag & Odlind, 1999
Satisfaction with Amenorrhea

All women who did not experience bleeding while using Mirena® were satisfied with it.

- 97.7% Definitely agree
- 2.3% Definitely disagree

Options:
- Definitely agree
- Somewhat agree
- Not sure
- Somewhat disagree
- Definitely disagree
### IUS/IUD and young nulliparous women

**Myth:** Nulliparas cannot use

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Concerns/ Barriers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highly effective</td>
<td>IUD and risk for PID</td>
</tr>
<tr>
<td>Reduce menstrual blood loss</td>
<td>Ectopics</td>
</tr>
<tr>
<td>Reduce menstrual pain</td>
<td>Infertility</td>
</tr>
<tr>
<td>Long term contraceptive</td>
<td>Less accepted than COC ?</td>
</tr>
<tr>
<td>Immediate return of fertility after removal</td>
<td></td>
</tr>
</tbody>
</table>

IUD/IUS, K.Gemzell
IUD highly effective contraceptive method also in young or nulliparous women

WHO 1987
Adolescents and nulliparous

Women <21 years of age using pills, patch, or ring had almost twice the risk of unintended pregnancy as older women (hazard ratio 1.9; 95% CI 1.2–2.8; p=0.02)

LARC, long-acting reversible contraceptive; PPR, pill patch or ring; 95% CI, 95% confidence interval

CHOICE: LARCs associated with improved continuation rates & reduced teenage pregnancies/abortions

Continuation rates with LARC greater than with non-LARC method at 12 and 24 months, in both 14-19 year and 20-45 year age groups

75% reduction in teen pregnancy, birth and abortion for each during CHOICE vs. national rates

K.Gemzell Danielsson
Does an IUD cause PID?

PID is caused by bacteria

- which are transmitted sexually
- or introduced from the cervix at IUD insertion
Does an IUD cause PID?

Number of PID cases per 1000 woman years after insertion of Cu-IUD

Modified after Farley et al, Lancet 1992;i:785-788
### Pelvic Inflammatory Disease

#### 5-year cumulative gross termination rates

<table>
<thead>
<tr>
<th>Age</th>
<th>Nova T</th>
<th>Mirena</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 25</td>
<td>5.6</td>
<td>0.3*</td>
</tr>
<tr>
<td>26–30</td>
<td>3.0</td>
<td>1.4</td>
</tr>
<tr>
<td>31–35</td>
<td>1.4</td>
<td>0.7</td>
</tr>
<tr>
<td>≥ 36</td>
<td>0</td>
<td>0.3</td>
</tr>
<tr>
<td>Total</td>
<td>2.2</td>
<td>0.8*</td>
</tr>
</tbody>
</table>

*Mirena® reduces the rate of PID*

*Andersson, Odlind, Rybo Contraception 1994*
IUD use in nulliparous women and tubal infertility

Odds ratio of tubal infertility in nulliparous women after previous use of a copper IUD:

\[ \text{OR} \ 1,0 \ (0,6, \ 1,7) \]

# IUD and ectopic pregnancy

<table>
<thead>
<tr>
<th>Type of device</th>
<th>Woman years</th>
<th>Pregnancies per 1000</th>
<th>Ectopics per 1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-medicated</td>
<td>4,600</td>
<td>19.0</td>
<td>0.87</td>
</tr>
<tr>
<td>T Cu&lt;200 mm²</td>
<td>21,200</td>
<td>20.8</td>
<td>0.75</td>
</tr>
<tr>
<td>T Cu&gt;200 mm²</td>
<td>39,200</td>
<td>7.3</td>
<td>0.23</td>
</tr>
<tr>
<td>LNG-IUS</td>
<td>5,600</td>
<td>0.9</td>
<td>0.20</td>
</tr>
</tbody>
</table>

Mirena protects against ectopic pregnancies

Sivin, Obstet Gynecol 1991
When to insert after post-partum

- Mirena® can be inserted immediately after placenta expulsion or after the uterus is fully involuted
- WHO medical eligibility criteria supports fitting of IUDs after 6 weeks post-partum
  - uterus fully involuted
  - reduced risk of infection
  - Higher risk for perforation (reduced pain)

Kennedy et al. Contraception 1997
Clinical Effectiveness Unit, J Fam Plann Reprod Health Care, 2004
Mirena® and the treatment of HMB

- Background
  - HMB is a common complaint: one third of fertile women complain about heavy menstrual bleeding at some point of their life
  - HMB has a significant impact on the quality of life of women with a decrease comparable to the chronically ill
  - HMB requires resources and money
Menstrual blood loss in menorrhagic women before and after Mirena® insertion

Mirena® effectively reduces menstrual blood loss (MBL) significantly during the first year ($P < 0.001$)

Andersson & Rybo, 1990
Mirena® is significantly more effective than flurbiprofen or tranexamic acid in reducing MBL.

Number of hysterectomies for menorrhagia from 1989/90-2002/3 in NHS in England
Reid & Mukri  BMJ 330 938-9, 2005
Timing of insertion of IUD/ IUS

Insertion can be done at any time during the cycle

General consideration:

- Not pregnant
- Cervix open (Reduced pain and risk of perforation)
- Nullipara more pain if inserted during menses
Insertion/Removal

• Failed insertion, complications and side effects more common among women with no previous vaginal delivery (Wildemeersch et al., 2003)

• Fear of painful insertion may make women hesitate to use an IUD

• Cervical priming using misoprostol PGE1 analogue:
  • Widely used for cervical priming
  • Effect dependent on dose, route and duration
  • Effective also in non-pregnant women (Ngai et al., 1997, Thomas et al., 2002)
  • May make insertion easier (Sääv et al., 2007)
Myth: It takes time to explain
The importance of counselling
KISS

• Reduced bleeding/amenorrhoea: Take time to explain the advantages and to correct wrong fantasies
• Explain about the spotting which will decrease with time (Sex and tampons possible)
• Inform about the size of the IUD and explain the size of the inserter
Insertion/Removal

- motivation!
- Fear of painful insertion may make women hesitate to use an IUD
- Verbal anesthesia
- Hot water bottle
- PCB
- Cervical priming using misoprostol:
  - 2 table sublingualt 1h innan alt vaginalt/oralt 3h innan
- Teknik, klotång, sond
- NSAID
Spiral och graviditet

Extraktion om möjligt snarast
Ökad risk för missfall, prematur förlossning
Ingen ökad risk för fosterskada
WHO recommendations for IUD use

MENSTRUAL ABNORMALITIES, light bleeding/spotting
Spotting during first 3-6 months is common – No action

NSAID may be given during days of light bleeding

If bleeding persists – pathology must be ruled out

If bleeding persists and no pathology can be identified – switch to other method

Selected practice recommendations for contraceptive use.

IUD/IUS, K.Gemzell
PELVIC INFLAMMATORY DISEASE:
Treat with antibiotics

There is no need to remove IUD if woman wishes to continue

Remove IUD after treatment has started, if women wishes to remove IUD

If IUD is removed, ECP can be considered

If infection does not clear – always remove IUD

Selected practice recommendations for contraceptive use.
Koppar- och hormonspiral - LV

Kopparspiral med kopparytta >300 mm² samt med god dokumentation avseende effektivitet och användningstid bör väljas godkänd för 5 eller 10 år

Inför insättning bör infektion uteslutas och vid misstanke om infektion skall IUD inte sättas in

Profylaktisk antibiotikabehandling rekommenderas inte inför insättning

Spiral kan rekommenderas oavsett om kvinnan varit gravid eller ej
## LNG-Intrauterine systems (IUS)

<table>
<thead>
<tr>
<th></th>
<th>Jaydesso® (Skyla®)</th>
<th>Kyleena®</th>
<th>Mirena®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total LNG content, mg</td>
<td>13.5(^1)</td>
<td>19.5(^2)</td>
<td>52(^3)</td>
</tr>
<tr>
<td>Average release rate over the first year, (\mu g/24) hours</td>
<td>8(^4)</td>
<td>12(^4)</td>
<td>20(^4)</td>
</tr>
<tr>
<td>T-frame dimensions, mm</td>
<td>28 × 30(^1)</td>
<td>28 × 30(^2)</td>
<td>32 × 32(^3)</td>
</tr>
<tr>
<td>Insertion tube diameter, mm</td>
<td>3.80(^2)</td>
<td>3.80(^2)</td>
<td>4.40(^3)</td>
</tr>
<tr>
<td>Maximum duration of use, years</td>
<td>3(^1)</td>
<td>5(^2)</td>
<td>5(^3)</td>
</tr>
<tr>
<td>Silver ring</td>
<td>Yes(^1)</td>
<td>Yes(^4)</td>
<td>No(^1)</td>
</tr>
<tr>
<td>Pearl index</td>
<td>0.33</td>
<td>0.29</td>
<td>0.2</td>
</tr>
</tbody>
</table>
Mean number of bleeding/spotting days by 90-day reference periods

- Mean number of bleeding/spotting days decreased similarly over time in each of the treatment groups; greatest reduction between first and second 90-day period

- After the second 90-day reference period (month 6), ≥50% of subjects in each subsequent reference period had four or fewer bleeding days
# Incidence of ectopic pregnancy

<table>
<thead>
<tr>
<th></th>
<th>Incidence/100 WY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jaydess (^1)</td>
<td>0.11</td>
</tr>
<tr>
<td>Mirena (^2)</td>
<td>0.10</td>
</tr>
<tr>
<td>Cu-IUD(^3)</td>
<td>0.75-0.23</td>
</tr>
<tr>
<td>Non-hormonal contraception(^4)</td>
<td>1.2-2.6</td>
</tr>
</tbody>
</table>

Ease of placement (physician’s evaluation in phase II trial)

<table>
<thead>
<tr>
<th></th>
<th>LNG-IUS12 (n=239)</th>
<th>LNG-IUS16 (n=245)</th>
<th>Mirena (n=254)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Easy</td>
<td>226 (94.6%)</td>
<td>229 (93.5%)</td>
<td>219 (86.2%)</td>
</tr>
<tr>
<td>Slightly difficult</td>
<td>11 (4.6%)</td>
<td>14 (5.7%)</td>
<td>31 (12.2%)</td>
</tr>
<tr>
<td>Very difficult</td>
<td>2 (0.8%)</td>
<td>2 (0.8%)</td>
<td>4 (1.6%)</td>
</tr>
<tr>
<td>Overall difference vs Mirena</td>
<td>p&lt;0.01</td>
<td>P=0.02</td>
<td></td>
</tr>
</tbody>
</table>

- Diameter of LCS inserter approx 1mm smaller vs. Mirena
- Placement of LNG-IUS12/16 more frequently rated as ‘easy’ vs. Mirena \((P<0.001)\)
- 98.5% of successful placements were achieved at the first attempt
- Cervical dilatation was used more frequently for Mirena vs LNG-US12/16 \((9.4\% \text{ vs } 3.9\%, \ P=0.004)\)
Less pain of placement  
(subject’s evaluation, phase II trial)

<table>
<thead>
<tr>
<th></th>
<th>LNG-IUS12 (n=239)</th>
<th>LNG-IUS16 (n=245)</th>
<th>Mirena (n=254)</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>72 (30.1%)</td>
<td>65 (26.5%)</td>
<td>44 (17.3%)</td>
</tr>
<tr>
<td>Mild</td>
<td>101 (42.3%)</td>
<td>112 (45.7%)</td>
<td>103 (40.6%)</td>
</tr>
<tr>
<td>Moderate</td>
<td>53 (22.2%)</td>
<td>59 (24.1%)</td>
<td>90 (35.4%)</td>
</tr>
<tr>
<td>Severe</td>
<td>12 (5.0%)</td>
<td>9 (3.7%)</td>
<td>17 (6.7%)</td>
</tr>
<tr>
<td>Not placed</td>
<td>1 (0.4%)</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>( P)-value for overall difference vs Mirena</td>
<td>(&lt;0.001)</td>
<td>(&lt;0.001)</td>
<td></td>
</tr>
</tbody>
</table>

- Subjects rated the placement of LNG-IUS12 and LNG-IUS16 as less painful compared with Mirena (\(P<0.001\))
The intrauterine device (IUD)—worth singing about

"When you think of it, the IUD is really an unsung, under-promoted success story."

Overheard during a conversation between two reproductive health experts attending a recent WHO meeting, this statement carries much truth. How a small piece of plastic wrapped in condoms, can perforate the wall of the uterus. On the whole, though, the IUD is one of the safest, best tolerated methods of contraception available.

This issue of Progress is devoted to the IUD. It opens with a historical outline of the development of the latest, most effective versions of the IUD (page 2).