“ELIMINATING THE PUBLIC HEALTH PROBLEM OF HEPATITIS AND C in IR of Iran”

IAGH JULY 2025

Reza malekzadeh M.D
Professor of medicine
DDRI/TUMS

Introduction

- The Global Burden of Hepatitis B and C Virus Infections
- Disease Control, Elimination, and Eradication

Global burden of Viral Hepatitis

Lancet July 2016 online

The global burden of viral hepatitis from 1990 to 2013: findings from the Global Burden of Disease Study 2013

Jeffrey D Stanaway, Abraham D Flaxman, Mohsen Naghavi, Christina Fitzmaurice, Theo Vos, Ibrahim Abubakar, Laith J Abu-Raddad, Reza Assadi, Neeraj Bhala, Benjamin Cowie, Mohammad H Forouzanfour, Justina Groeger, Khayriyyah Mohd Hanafiah, Kathryn H Jacobsen, Spencer L James, Jennifer MacLachlan, Reza Malekzadeh, Natasha K Martin, Ali A Mokdad, Ali H Mokdad, Christopher J L Murray, Dietrich Plass, Saleem Rana, David B Rein, Jan Hendrik Richardus, Juan Sanabria, Mete Saylan, Saeid Shahraz, Samuel So, Vasiliy V Vlassov, Elisabete Weiderpass, Steven T Wiersma, Mustafa Younis, Chuanhua Yu, Maysaa El Sayed Zaki, Graham S Cooke

Summary

Background With recent improvements in vaccines and treatments against viral hepatitis, an improved understanding of the burden of viral hepatitis is needed to inform global intervention strategies. We used data from the Global Burden of Disease (GBD) Study to estimate morbidity and mortality for acute viral hepatitis, and for cirrhosis and liver cancer caused by viral hepatitis, by age, sex, and country from 1990 to 2013.

Methods We estimated mortality using natural history models for acute hepatitis infections and GBD's cause-of-death ensemble model for cirrhosis and liver cancer. We used meta-regression to estimate total cirrhosis and total liver cancer prevalence, as well as the proportion of cirrhosis and liver cancer attributable to each cause. We then estimated cause-specific prevalence as the product of the total prevalence and the proportion attributable to a specific cause. Disability-adjusted life-years (DALYs) were calculated as the sum of years of life lost (YLLs) and years lived with disability (YLDs).

Findings Between 1990 and 2013, global viral hepatitis deaths increased from 0·89 million (95% uncertainty interval [UI] 0·86–0·94) to 1·45 million (1·38–1·54); YLLs from 31·0 million (29·6–32·6) to 41·6 million (39·1–44·7); YLDs from 0·65 million (0·45–0·89) to 0·87 million (0·61–1·18); and DALYs from 31·7 million (30·2–33·3) to 42·5 million (39·9–45·6). In 2013, viral hepatitis was the seventh (95% UI seventh to eighth) leading cause of death worldwide, compared with tenth (tenth to 12th) in 1990.

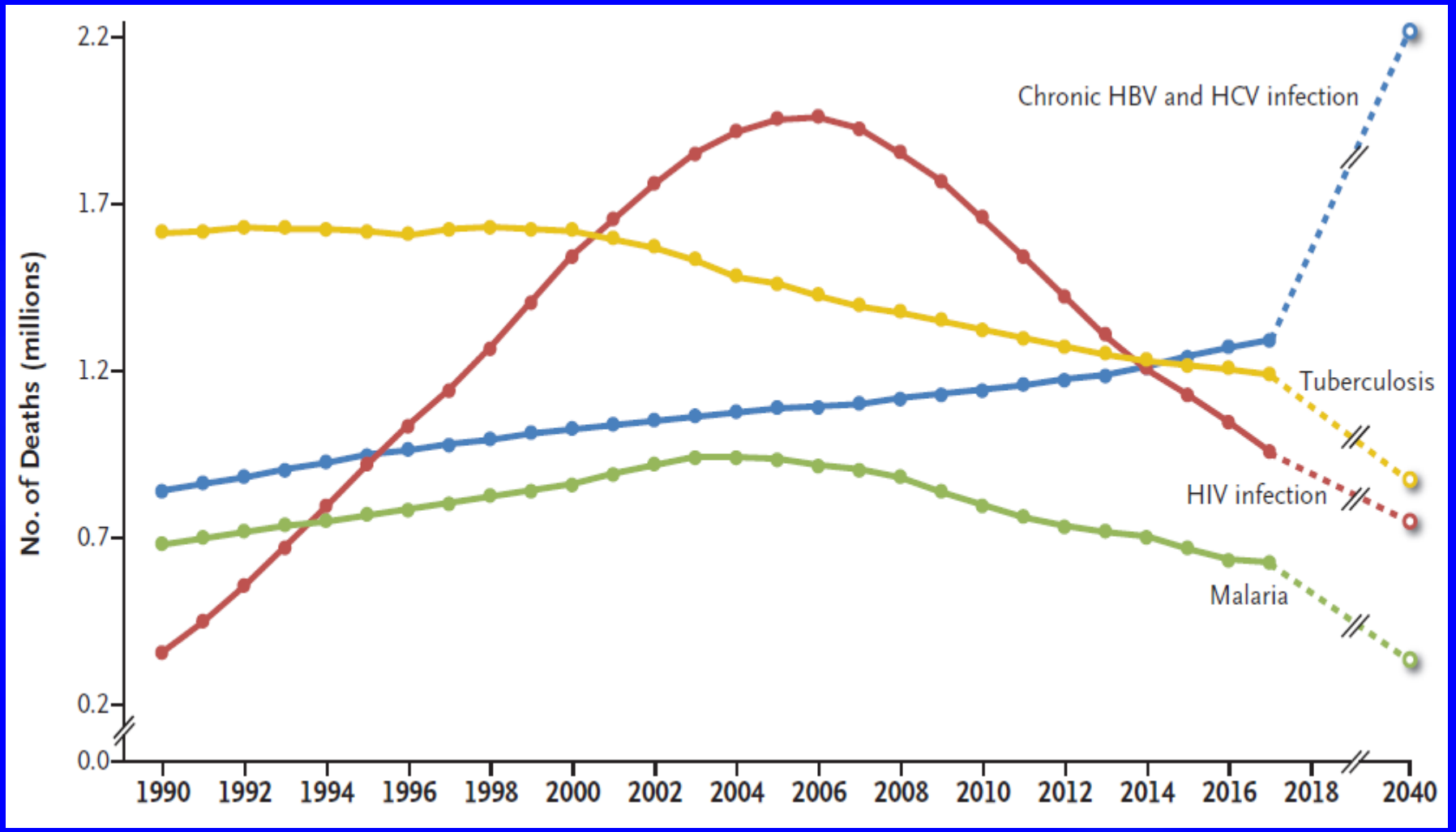
Interpretation Viral hepatitis is a leading cause of death and disability worldwide. Unlike most communicable diseases, the absolute burden and relative rank of viral hepatitis increased between 1990 and 2013. The enormous health loss attributable to viral hepatitis, and the availability of effective vaccines and treatments, suggests an important opportunity to improve public health.

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See Online/Comment
http://dx.doi.org/10.1016/S0140-6736(16)31018-2

Institute for Health Metrics and Evaluation (J D Stanaway PhD, A D Flaxman PhD, Prof M Naghavi PhD, C Fitzmaurice MD, Prof T Vos PhD, M H Forouzanfour PhD, Prof A H Mokdad PhD, Prof C J L Murray DPhil) and Division of Hematology, Department of Medicine (C Fitzmaurice), University of Washington, Seattle, WA, USA; Institute for Global Health, University College London, London, UK (Prof I Abubakar PhD); Infectious Disease Epidemiology Group, Weill

Worldwide Deaths from Chronic Viral Hepatitis as Compared with Deaths from T.B, HIV Infection, and Malaria.

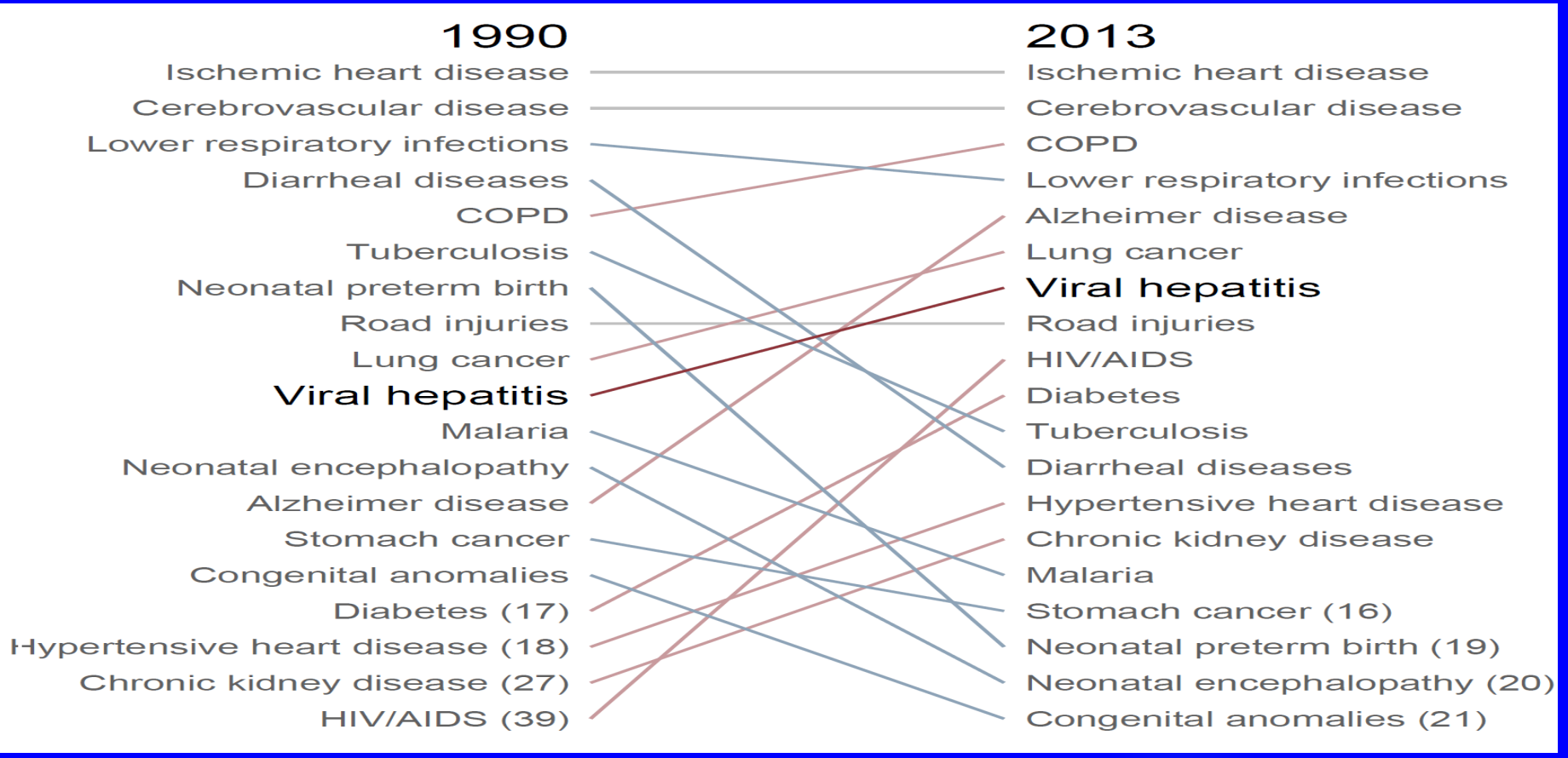


Numbers of deaths and DALYs due to viral hepatitis increased by 62% and 34% Between 1990 and 2020

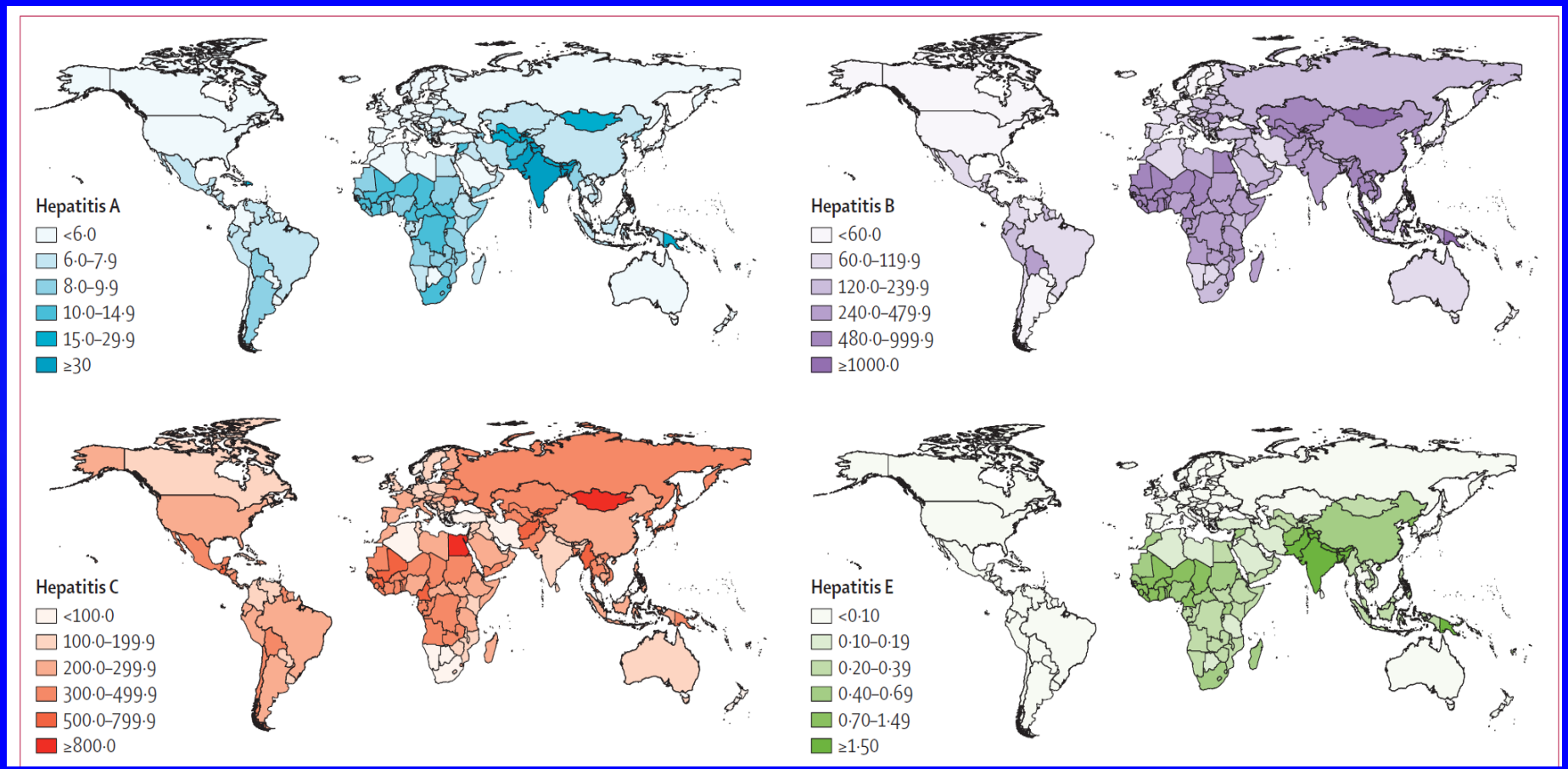
- Between 1990 and 2020, the relative importance of mortality(62%) and DALYs(34%) due to viral hepatitis has risen.

- This contrasts with other major infectious diseases (including diarrhoeal disease, tuberculosis and malaria) whose fall in relative rankings reflects the global transition towards non-communicable diseases.

Among Top 15 causes of mortality for 1990 and 2013 Viral hepatitis is the main infectious disease with Increase Burden



Age-standardised disability-adjusted life-year rates to Hepatitis A, B, C, and E viruses in 2013, by country



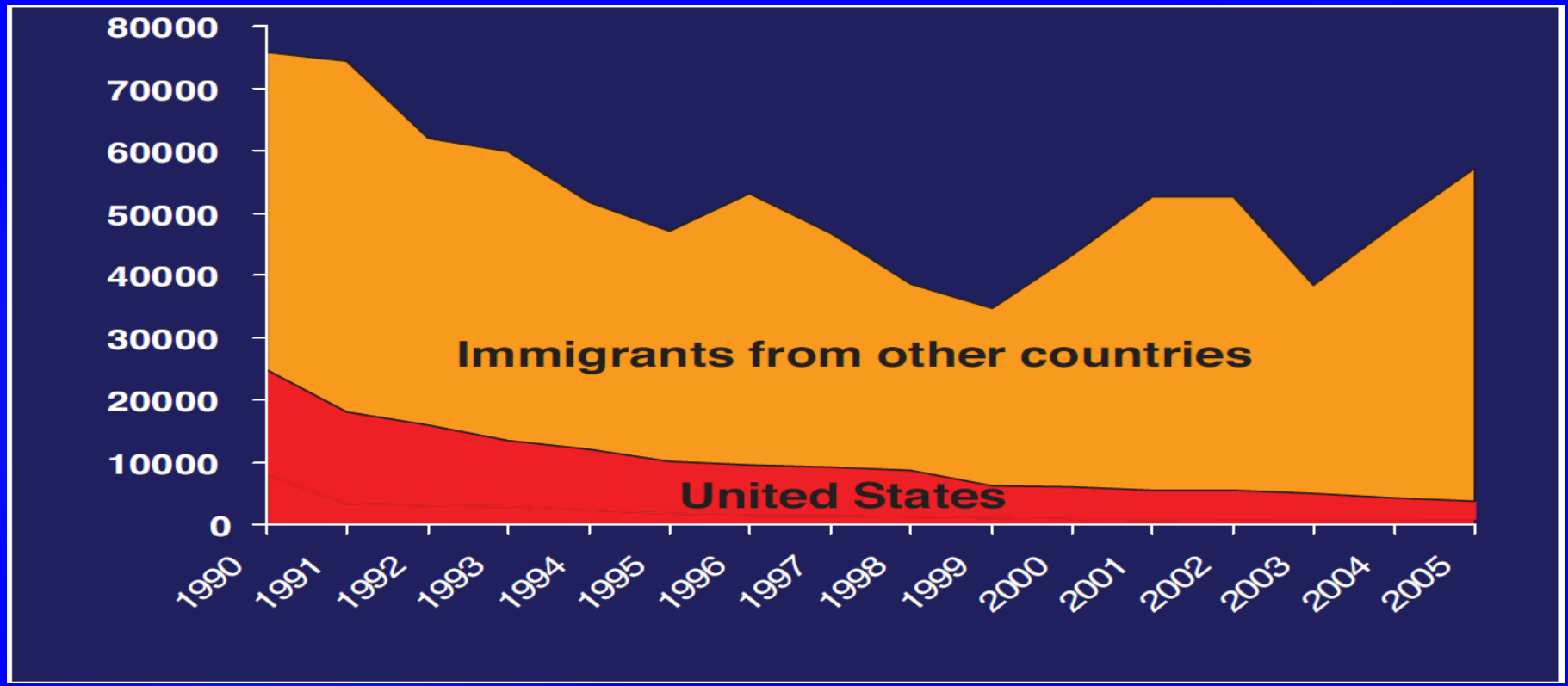
One million global and 6000 Iran premature death from viral hepatitis

- Viral hepatitis is the seventh leading cause of death in the world. Hepatitis B and C cause the majority these deaths.
- The two diseases account for over a million deaths a year, about 6000 of which are in Iran

Hepatitis B and C infections are asymptomatic until the later stages

- About two-thirds and half of people infected with hepatitis B and C respectively do not know of their condition.
- Both infections are common in socially marginalized groups such as people who inject drugs.

Estimated new chronic HBV infections by place of acquisition, United States, 1990-2005.



New developments have encourage international momentum for action against viral hepatitis.

- HBV vaccine conveys 95 percent immunity in three doses
- HBV treatment can cure >90%
- New HCV treatments can cure> 95 percent of infections.

Challenges for elimination of hepatitis B and C

- The elimination of hepatitis B and C poses challenges, both in defining what qualifies as elimination and in monitoring progress toward that goal.

- It is feasible in the relatively short term to control hepatitis B and C—meaning to reduce their incidence and prevalence.

Eliminating the public health problem of hepatitis B and C—meaning

- Eliminating the public health problem of hepatitis B and C—meaning that the diseases may remain but transmission will stop and the most undesirable manifestations prevented completely—is also feasible, but considerable barriers face any elimination program.

WHO Goals for Viral Hepatitis Elimination

WHO. Global health sector strategy on viral hepatitis, 2016-2021.

Eliminate viral hepatitis as a major public health threat by 2030

Prevention targets

- **90% of infants have HBV birth dose vaccination**
- **100% of blood donations screened**
- **90% have access to safe injections**

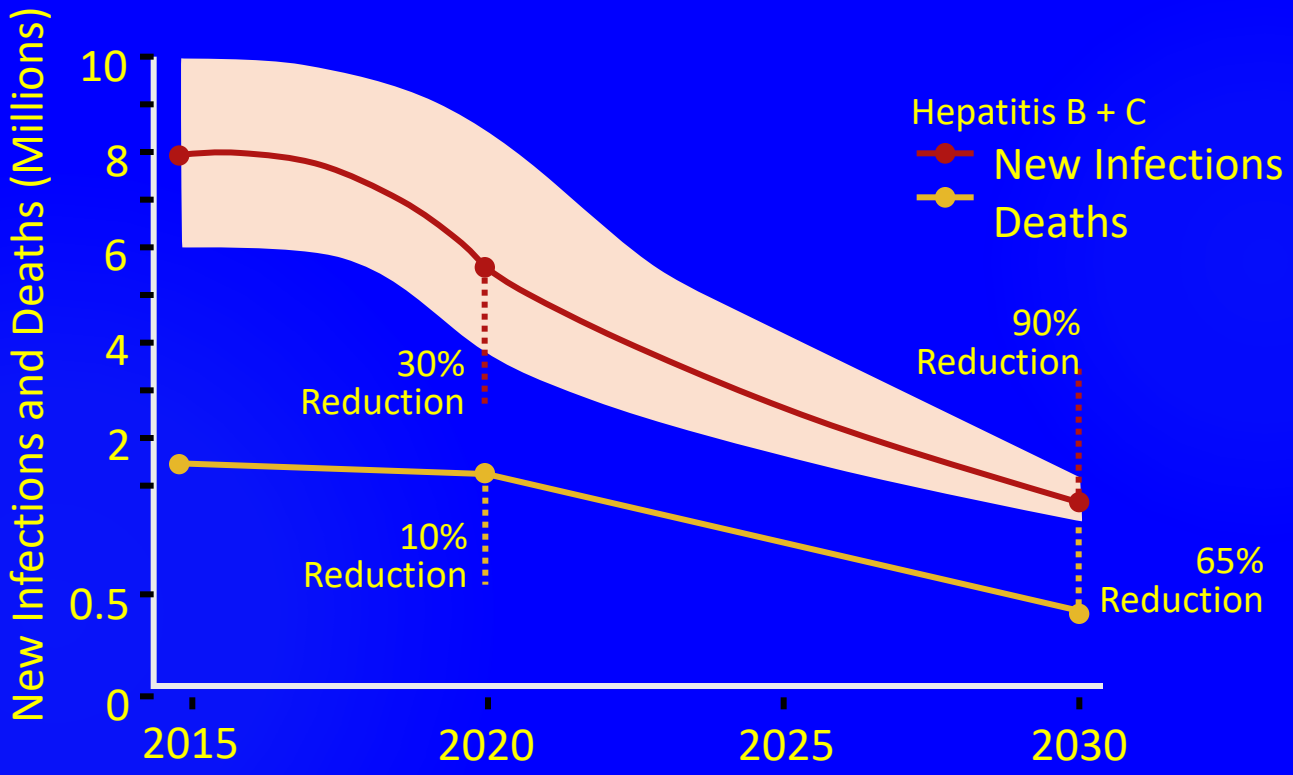
Testing targets

- 90% of people aware of infection

Treatment targets

- **80% of eligible people treated**

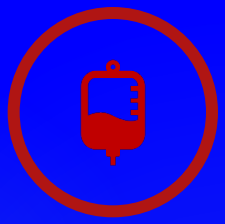
WHO: 2020 and 2030 Impact Targets



WHO. Global health sector strategy on viral hepatitis, 2016-2021.

How Can We Achieve the WHO Elimination Goals?

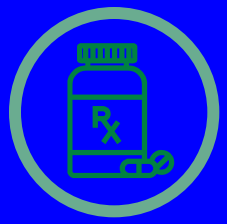
Prevention Measures



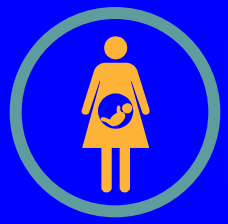
Improve blood safety and infection control



Vaccination

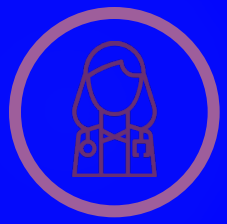


Extend harm reduction measures



Prevent MTCT

Diagnosis and Treatment



Expand testing and treatment for those already infected

WHO. Global health sector strategy on viral hepatitis, 2016-2021.

2019 National Viral Hepatitis Progress Report: HAV

	2020 Goal	2014 Baseline	2016 Result	2017 Result (2017 Target*)	Status
Hepatitis A					
Increase the percentage of children aged 19–35 months who receive ≥2 doses of hepatitis A vaccine	85.0%	57.5%	60.6%	59.7% (71.3%)	✗
Reduce the rate† of reported hepatitis A virus (HAV) infections	0.30	0.39	0.62	1.03 (0.35)	✗
Hepatitis B					
Increase the percentage of infants who receive hepatitis B vaccine within 3 days of birth	85.0%	72.4%	71.1%	73.6% (78.7%)	→
Reduce the rate† of reported acute hepatitis B virus (HBV) infections among persons aged ≥19 years	0.50	1.16	1.31	1.38 (0.83)	✗
Reduce the rate† of hepatitis B-related deaths	0.48	0.50	0.45	0.46 (0.49)	✓
Hepatitis C					
Reduce the rate† of reported acute hepatitis C virus (HCV) infections	0.25	0.73	0.98	1.04 (0.49)	✗
Reduce the rate† of hepatitis C-related deaths	4.17	5.01	4.42	4.13 (4.59)	✓

https://www.cdc.gov/hepatitis/policy/pdfs/NationalProgressReport2019.pdf

Slide credit: clinicaloptions.com

*Target for 2017 assumes a constant (linear) rate of change from the observed baseline (2014) to the 2020 goal.
†Per 100,000 U.S. population

✓ Met or exceeded current annual target

→ Moving ***toward*** annual target, but annual target was not fully met

✗ Annual target was not met and has not changed or moved ***away*** from annual target

Hepatitis A: Who Should Be Vaccinated?

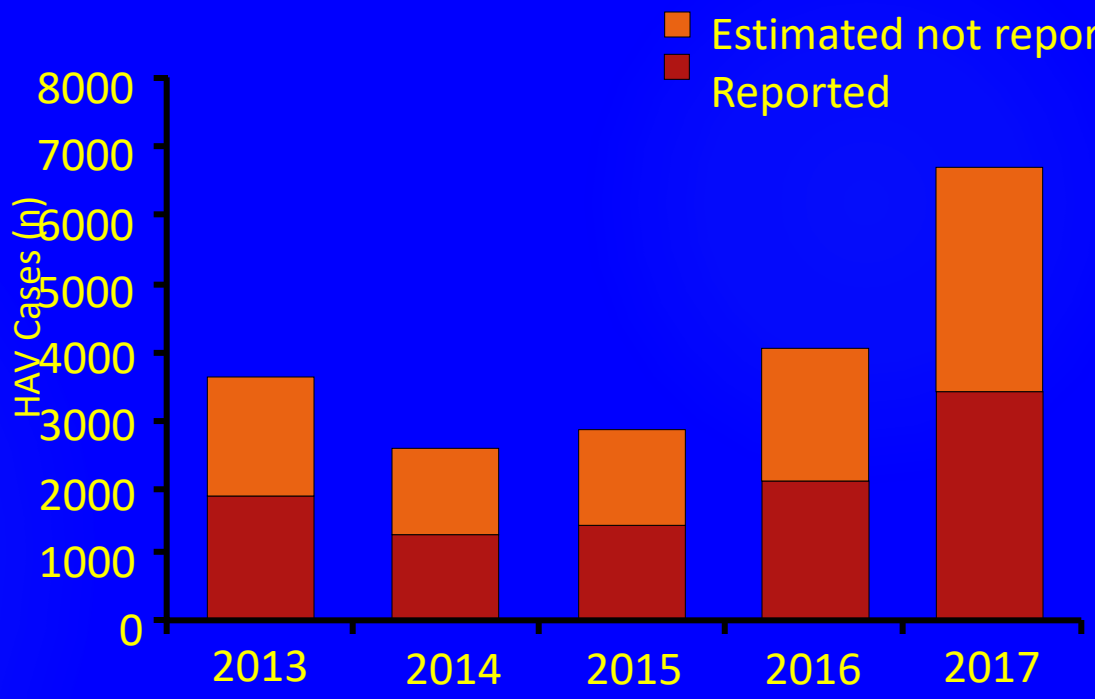
- Vaccine-preventable disease since 1995 with anti-HAV seropositivity rates 94% to 100% post vaccine
  - All children at 1 yr of age
  - People with unstable housing/experiencing homelessness
  - Those at increased risk for infection
    - Visiting country with high/intermediate endemicity, MSM, PWUD, occupational risk or direct contact with HAV-infected persons, persons with clotting disorders or chronic liver disease
  - Persons at increased risk for HAV complications
  - Any person wishing to obtain immunity

https://www.cdc.gov/hepatitis/hav/havfaq.htm#vaccine. ACIP. MMWR Recomm Rep. 2006;55:1.

Slide credit: clinicaloptions.com

US HAV Incidence Increased 140% From 2011 to 2017

- Prior to 2017, occasional outbreaks often linked to imported food[1]
- Starting in 2017, large person-to-person outbreaks primarily among PWID and persons experiencing homelessness[1,2]



1. https://www.cdc.gov/hepatitis/hav/havfaq.htm#vaccine. 2. https://emergency.cdc.gov/han/han00418.asp.

Slide credit: clinicaloptions.com

2019 National Viral Hepatitis Progress Report: HBV

	2020 Goal	2014 Baseline	2016 Result	2017 Result (2017 Target*)	Status
Hepatitis A					
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https://www.cdc.gov/hepatitis/policy/pdfs/NationalProgressReport2019.pdf

Slide credit: clinicaloptions.com

✓ Met or exceeded current annual target

→ Moving ***toward*** annual target, but annual target was not fully met

✗ Annual target was not met and has not changed or moved ***away*** from annual target

The Hepatitis B Vaccine Is the Cornerstone of HBV Infection Prevention



WHO HBV in Europe factsheet. http://www.euro.who.int/__data/assets/pdf_file/0007/377251/Fact-Sheet-Hepatitis-B_2019-ENG.pdf

Vaccination is 95% effective

Next Steps: HAV and HBV

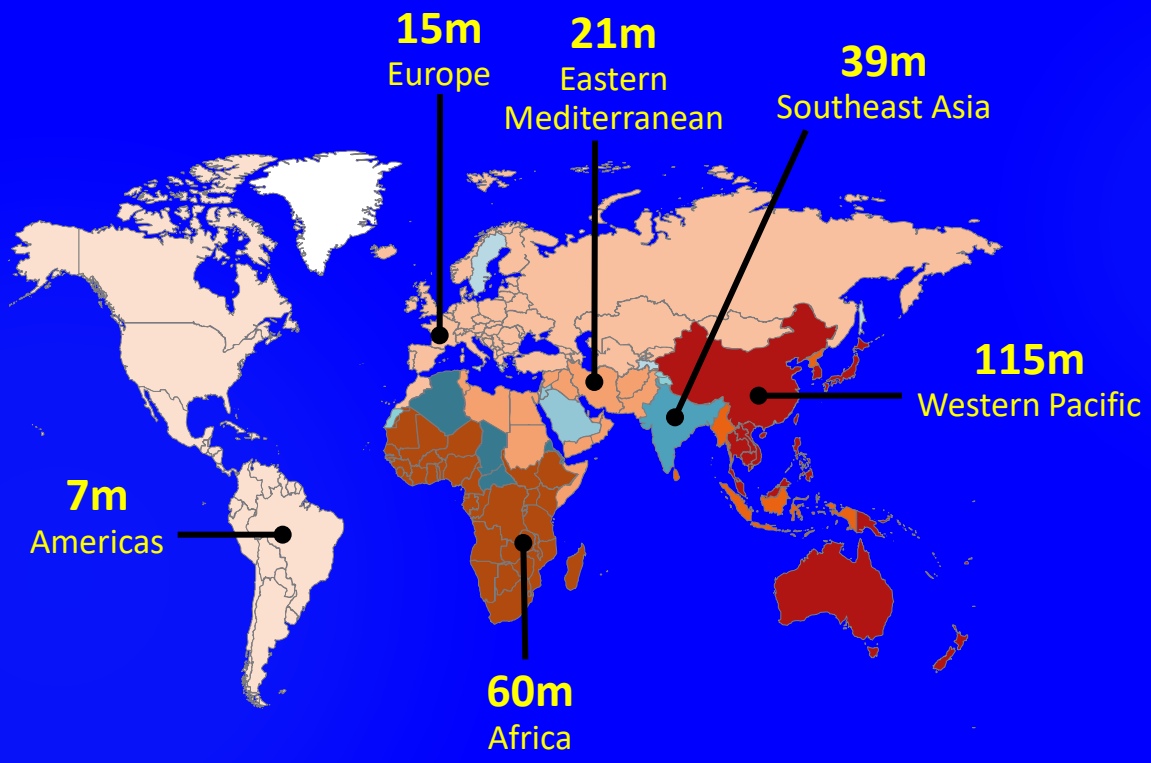
- *"Continue to promote hepatitis A and hepatitis B childhood vaccination schedules and vaccination of at-risk adults according to ACIP vaccine recommendations and guidelines"*
- *"Promote evidence-based strategies to increase hepatitis A and hepatitis B vaccination as recommended by the Community Preventive Services Task Force"*

https://www.cdc.gov/hepatitis/policy/pdfs/NationalProgressReport2019.pdf

HBV In Iran

- Hepatitis B virus (HBV) is the most common cause of chronic hepatitis and HCC in the world and Iran .
- IR of IRAN has made encouraging progress against the infection, but between 1.4 to 1.5 million people have chronic hepatitis B; almost 1,000 new acute infections occur every year.

Estimated Global Prevalence of CHB in 2015: 257 Million



WHO. Global hepatitis report, 2017.

Control of HBV infection is feasible in the relatively short term

- After analyzing the problem of hepatitis B in Iran , we concluded that control is feasible in the relatively short term.

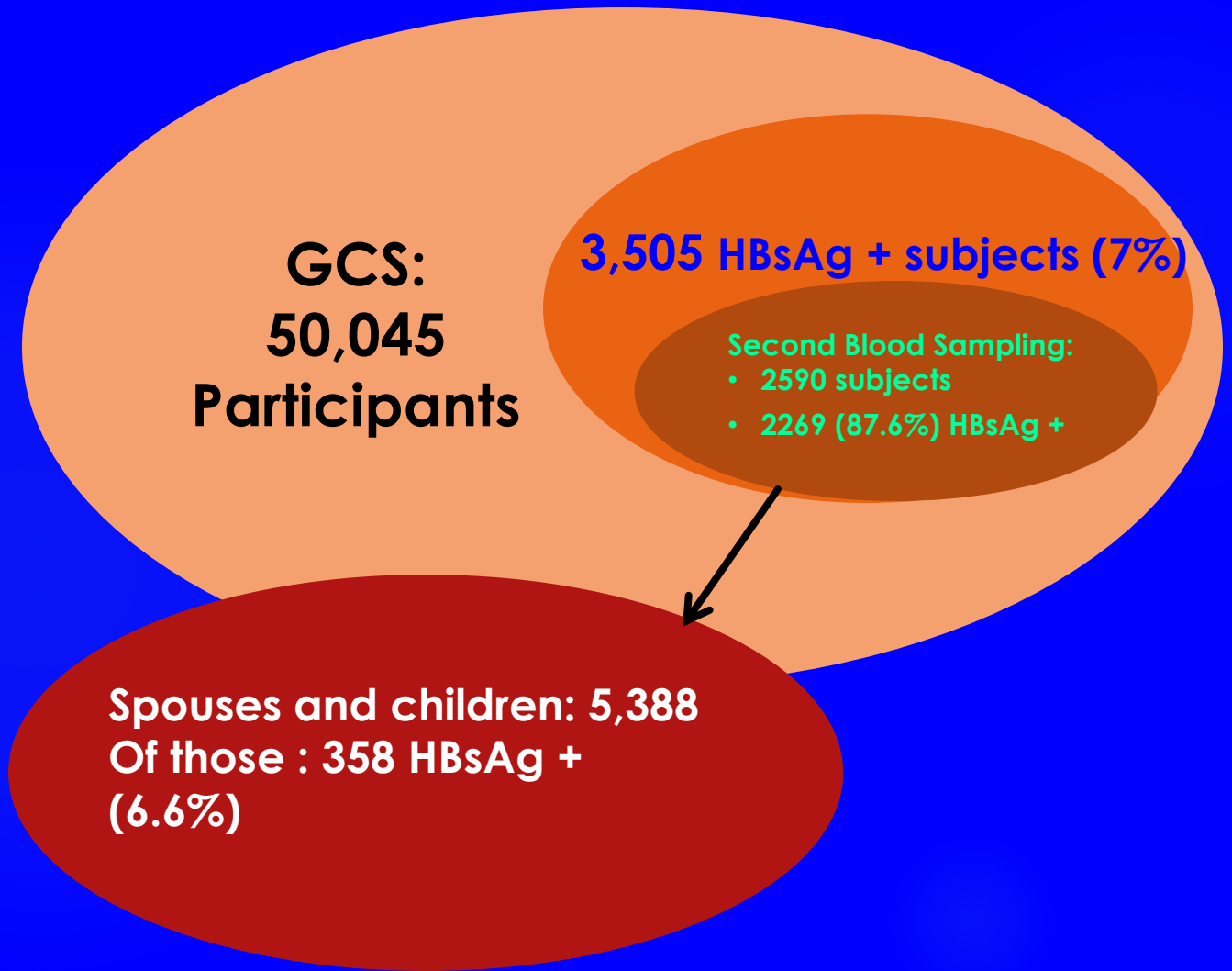
- Eliminating the public health problem of hepatitis B will take more time and require considerable public will, resources, and attention to the barriers mentioned innext slide.

Feasibility of Eliminating Hepatitis B as a Public Health Problem Crosscutting Problems

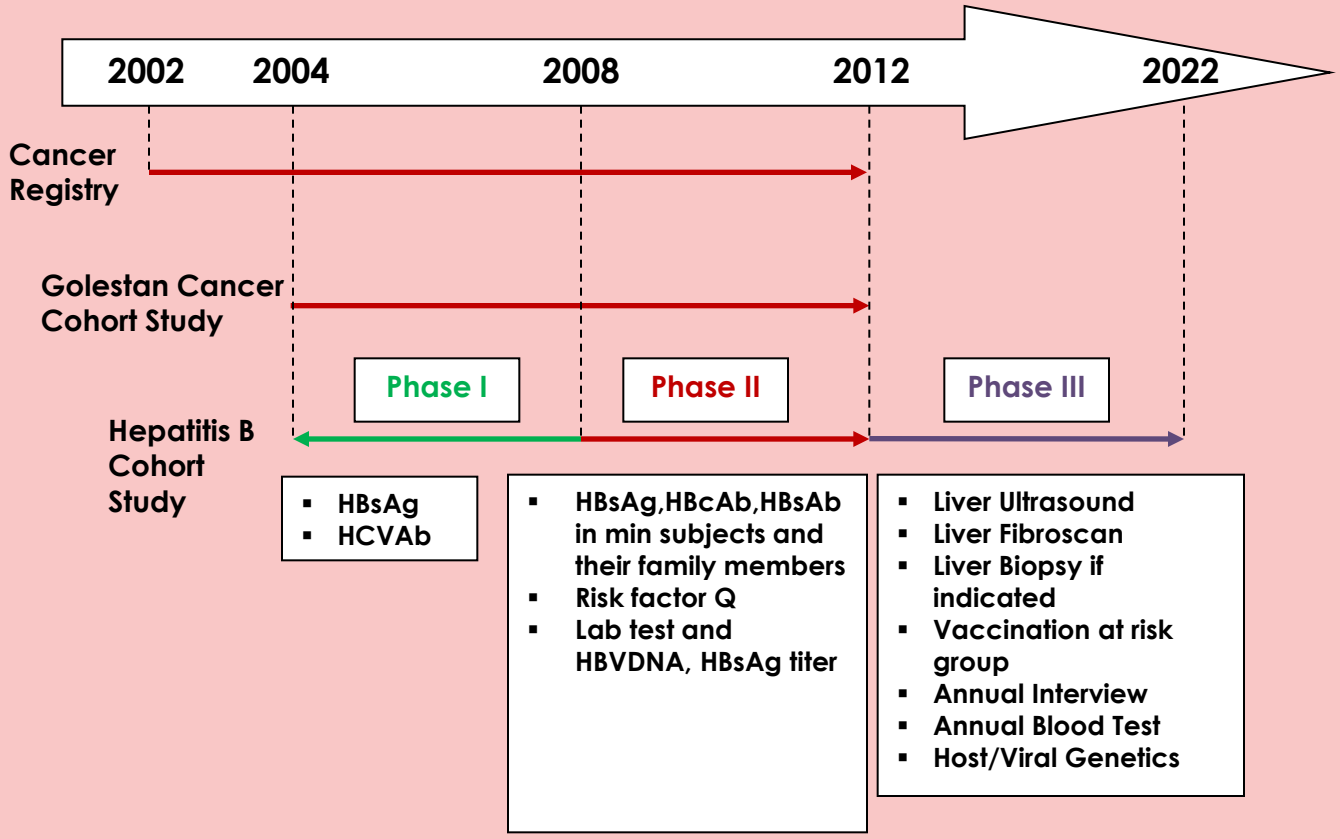
Goal		Feasibility	Critical Factors
Ending Transmission	Perinatal	Highly feasible	• Identifying HBV-infected mothers • Consistent birth dosing with HBV vaccine
	Children	Highly feasible	• Consistent vaccination and attention to catch-up dosing
	Adults	Feasible	• No system for vaccinating adults • Undiagnosed, asymptomatic chronic infections a reservoir for infection
Reducing morbidity and mortality attributable to ongoing infection	Slowing progression to cirrhosis	Feasible	• Need for physicians trained in the management of chronic HBV infection • The threat of reactivation in chronic or resolved infection • No available treatment eliminates cccDNA or cures the disease
	Reducing deaths		

A Case Study on Hepatitis B, and C Elimination in Eastern Golestan

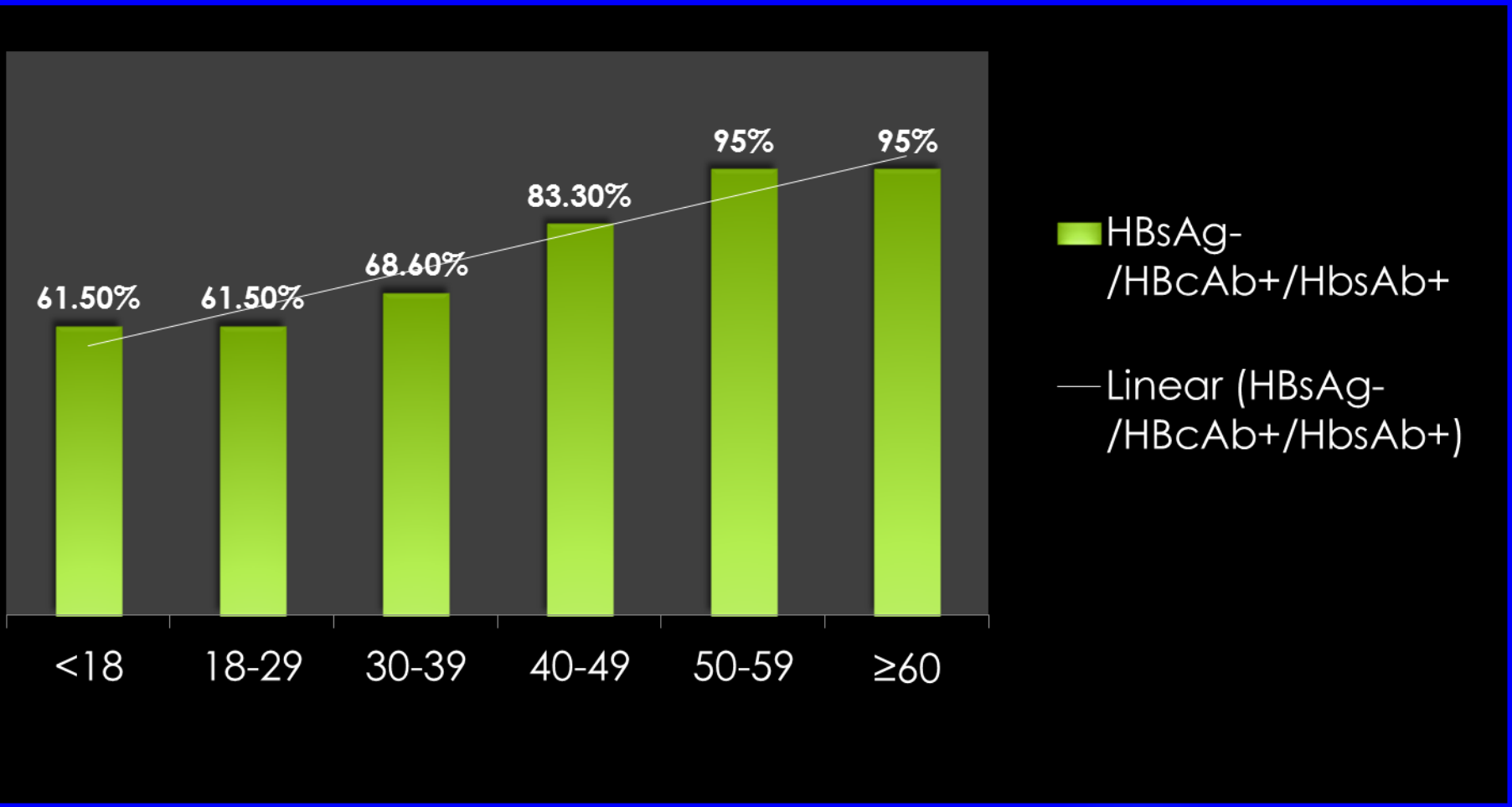
Golestan Hepatitis B Cohort Study (GHBCS) A >3800 HBV infected participant



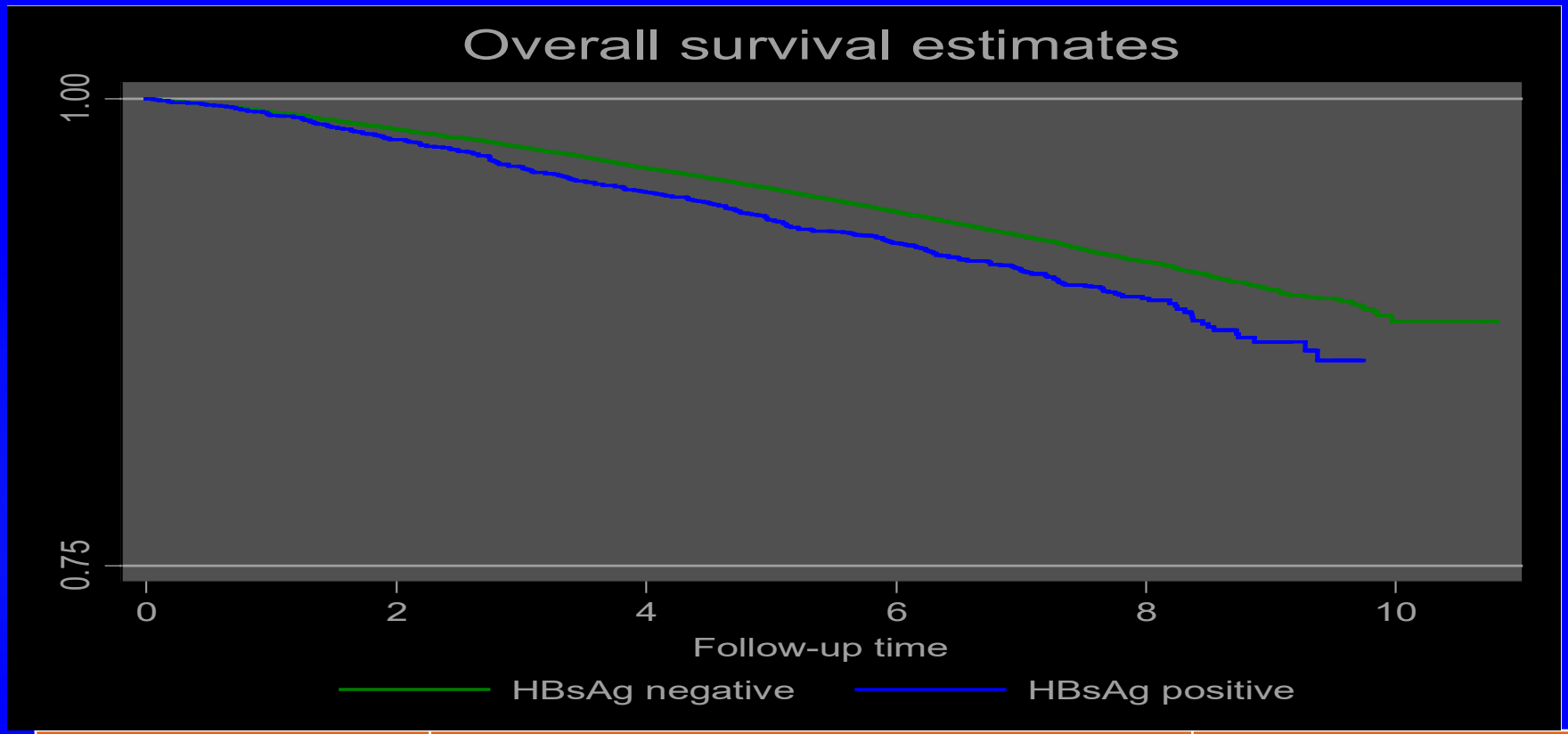
GHBCS Time Plan



Frequency of HBsAg Seroclearance in Spouses and Children



Comparison in Overall Survival of HBsAg+ vs. HBsAg- Individuals



	Overall death	P value
HBV status	1.26 (1.12-1.40)*	<0.001
* Age and sex adjusted HR		

Original Article

Central Obesity and Advanced Liver Stiffness in Hepatitis B: Result from Golestan Hepatitis B Cohort Study

Sima Besharat MD[1,2], Hossein Poustchi MD PhD•[1], Ashraf Mohamadkhani MD[1], Gholamreza Roshandel MD[2,3], Neal D. Freedman MD[4], Shahin Merat MD•[1], Rasoul Sotoudehmanesh MD[1], Reza Malekzadeh MD[3]

Abstract

Background: Chronic infection with the hepatitis B virus and obesity may both contribute synergistically to liver disease, although relatively few studies have investigated this hypothesis. Therefore, in this study, we evaluated the relationship between central obesity and the liver stiffness in the Golestan Hepatitis B cohort study (GHBCS).

Methods: Our study included 304 chronic hepatitis B (CHB) patients enrolled from GHBCS. Liver stiffness measurement (LSM) and laboratory tests were performed after a follow-up of 4 years (2012). The hepatitis B viral load was measured at the baseline and follow-up using the real-time PCR method. Waist circumference ≥ 102 cm in men and ≥ 89 cm in women (central obesity) was considered to be abnormal. Advanced liver stiffness (ALS) was defined as LSM ≥ 8 KPa. Statistical analysis was performed using SPSS-V17. Logistic regression was used to test predictors of advanced liver stiffness (LSM ≥ 8 KPa). Linear regression was used to test the predictive value of variables in ALT (as a continuous variable). *P*-value of less than 0.05 was considered statistically significant.

Results: Among these CHB patients, 19 (7.4%) cases with a mean (±SD) age of 49.5 (±6.3) developed ALS after 4 years of follow-up. Multivariate analysis showed a significant predictive role of central obesity and viral load in ALS.

Conclusions: Central obesity is related to the liver stiffness in chronic hepatitis B patients.

Central obesity could predict further advanced liver stiffness in Hepatitis B: Results fro Golestan Hepatitis B Cohort Study

Table 2: Advanced liver fibrosis (at follow-up) in CHB patients regards to the central obesity at baseline

		Liver Stiffness Measurement (KPa)		Total	P-value
		<8 N (%)	≥8 N (%)		
Waist circumference	Normal	89 (96.7)	3(3.3)	92 (100)	0.048
	Central obesity	142 (90)	16 (10)	158 (100)	
Total		231 (92.4)	19 (7.6)	250 (100)	

DDRI/GUMS HBV Resaerch group in Atrak Clinic Gonbad



DDRI/GUMS HBV Clinic in Atrak Gonbad



Iran HBV vaccination program was very protective in >95%

JOURNAL OF VIRAL HEPATITIS
JVH

Journal of Viral Hepatitis, 2016 doi:10.1111/jvh.12543

Immune responses to hepatitis B immunization 10–18 years after primary vaccination: a population-based cohort study

A. Katoonizadeh,[1] M. Sharafkhah,[1] M. R. Ostovaneh,[1,2] A. Norouzi,[3] N. Khoshbakht,[3] A. Mohamadkhani,[1] L. Eslami,[1] A. Gharravi,[1] A. Shayanrad,[1] M. Khoshnia,[1] S. Esmaili,[1,4] J. George,[4] H. Poustchi[1] and R. Malekzadeh[1] [1]*Liver and Pancreatobiliary Diseases Research Center, Digestive Disease Research Institute, Shariati Hospital, Tehran University of Medical Sciences, Tehran, Iran;* [2]*Division of Gastroenterology and Hepatology, Department of Medicine, Johns Hopkins Medical Institutions, Baltimore, MA, USA;* [3]*Golestan Research Center of Gastroenterology and Hepatology, Golestan University of Medical Sciences, Gorgan, Iran; and* [4]*Storr Liver Centre, Westmead Institute for Medical Research, Westmead Hospital and University of Sydney, Westmead, NSW, Australia*

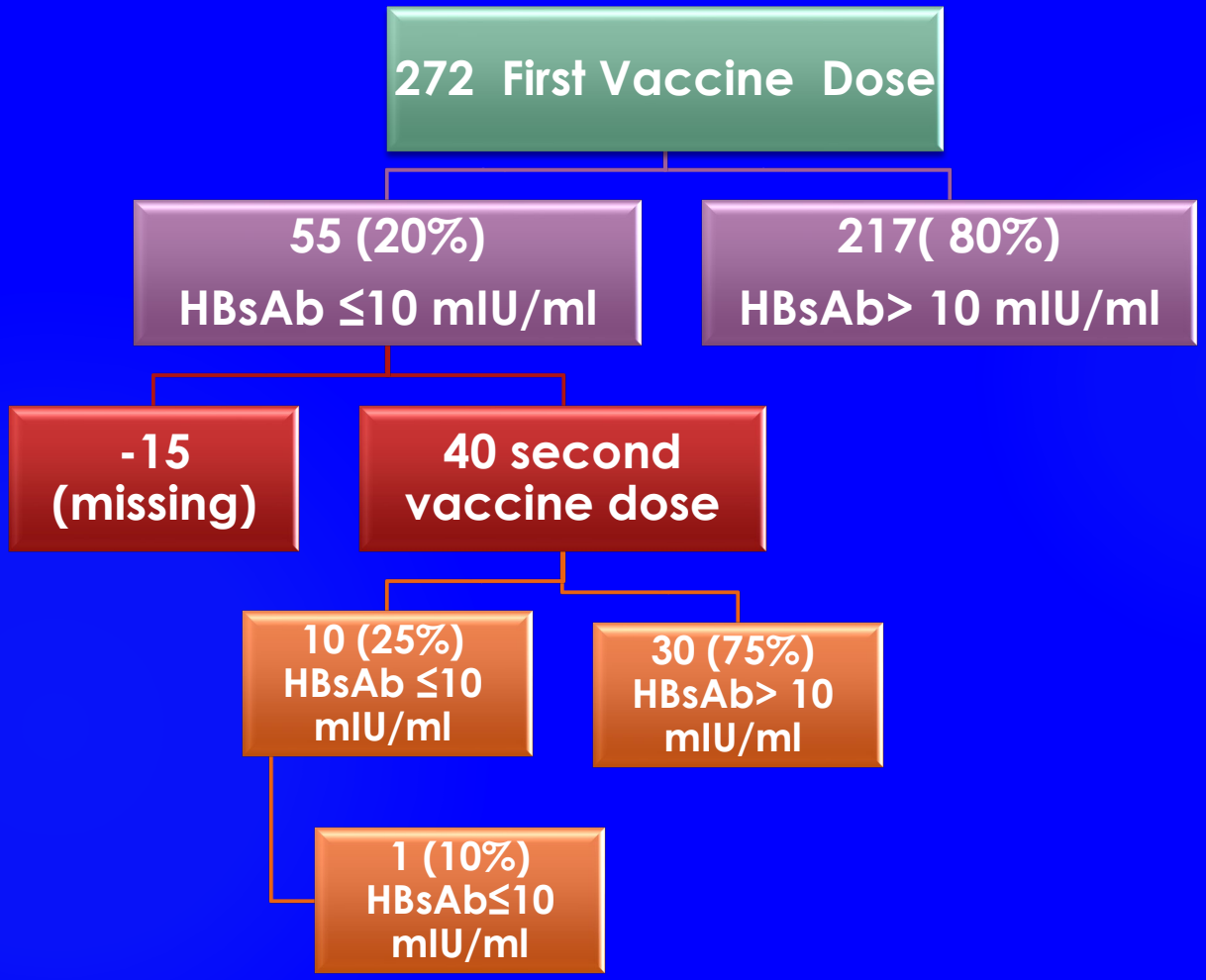
Received January 2016; accepted for publication March 2016

SUMMARY. We evaluated the immune response to neonatal ... an anamnestic immune response in challenge with a booster

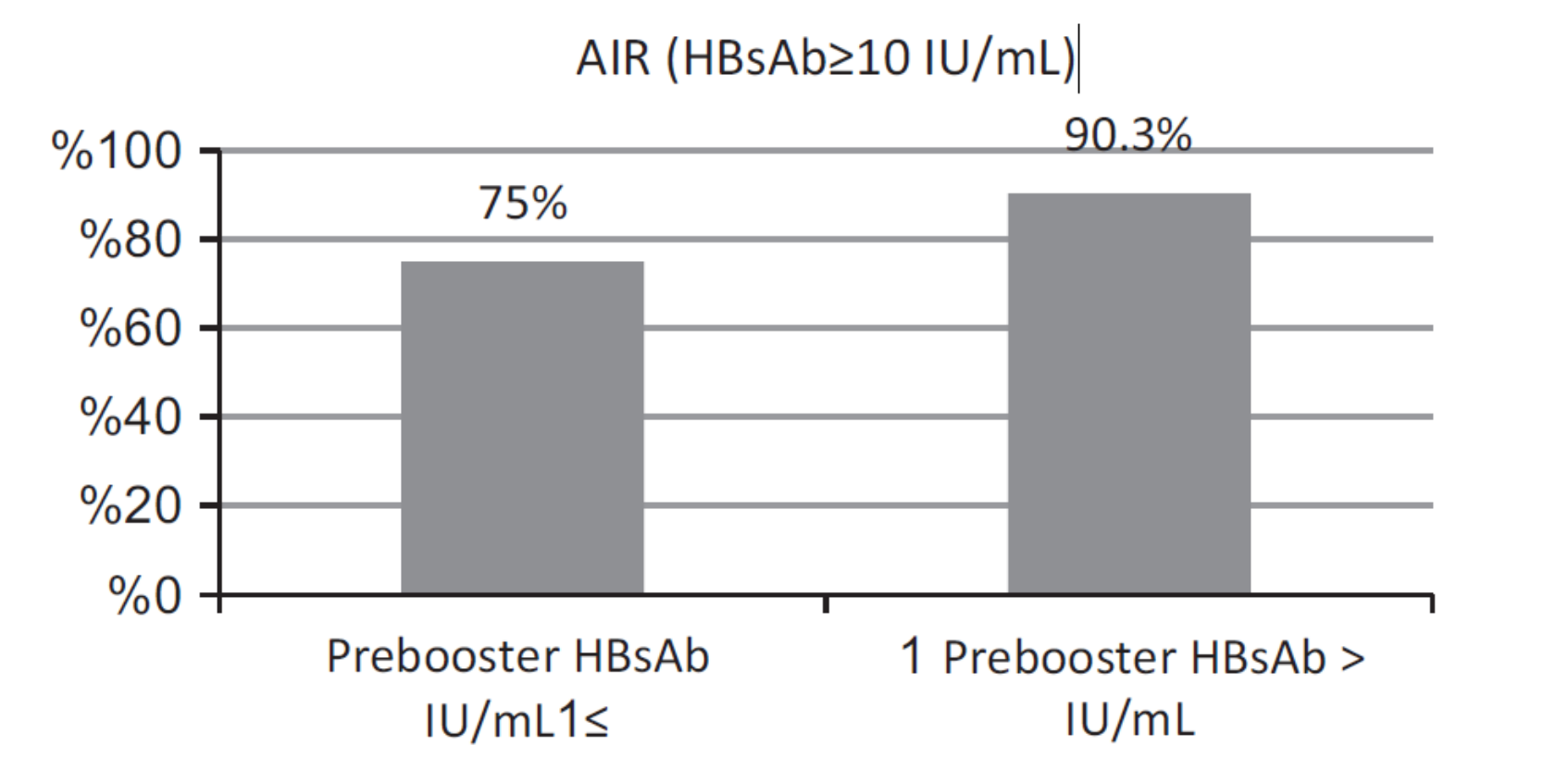
Waning of HBsAb levels in HBV vaccinated subjects over time.

- Overall, the highest seroprotection rate (HBsAb titre of ≥10 IU/mL) of 48% was observed in individuals between 10 and 11 years of age (P = 0.008).
- In those between 12 and 14 and between 15 and 18 years of age, seroprotection rates were 33.5% and 26.5%, respectively (P = 0.5).

Response to HB Booster Vaccine in 272 High Risk Individuals (<18 years) who Received Primary Vaccination



Those with a pre-booster HBsAb level of ≤1 IU/mLwere less likely to mount an adequate AIR* compared with those with a prebooster HBsAb level of >1 IU/mL.

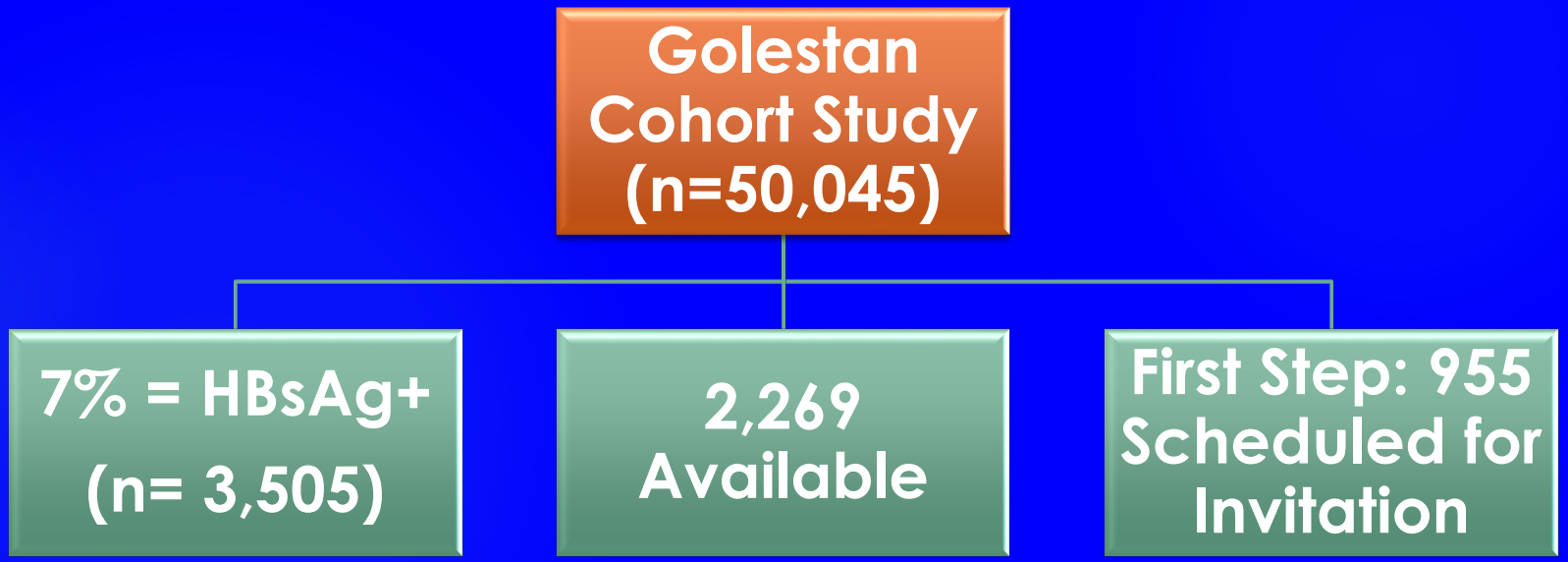


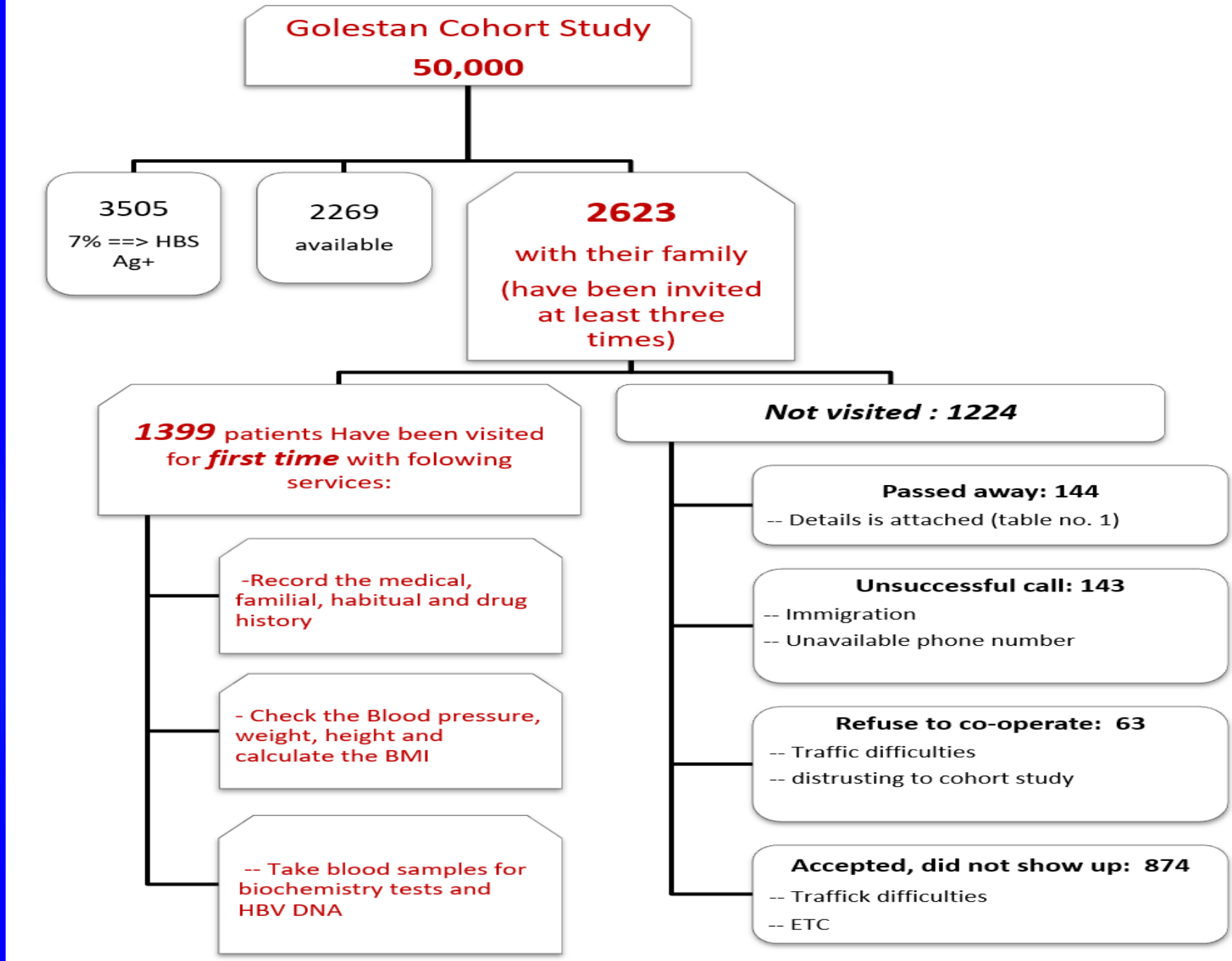
*Anamnestic Immune Response (AIR)

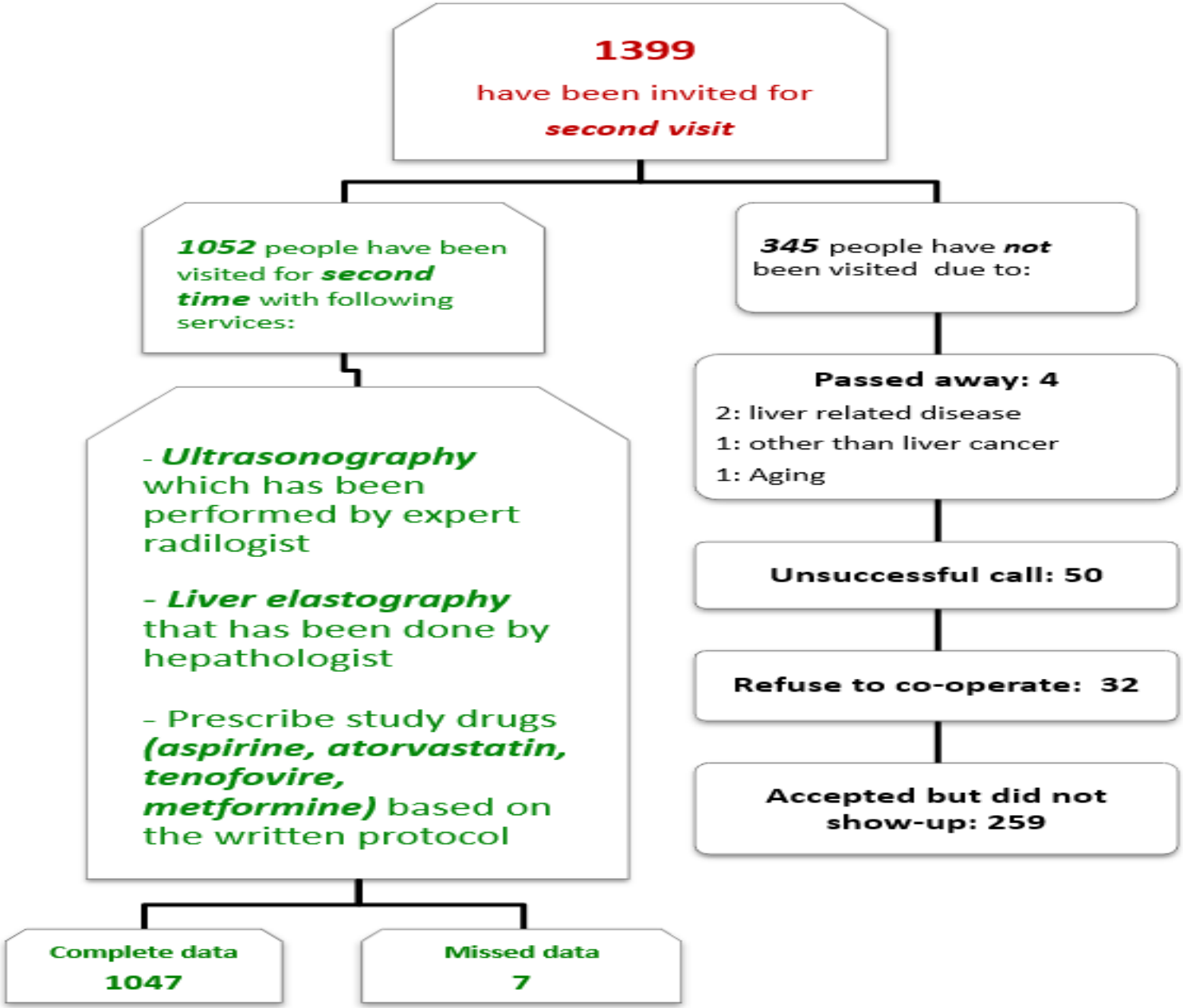
Hepatologist, Radiologist and research team in Gonbad



Golestan Hepatitis B Cohort Study: Intervention and Therapy




Golestan Cohort Study
50,000
3505
7% ==> HBS Ag+
2269
available
2623
with their family
(have been invited at least three times)
1399 patients Have been visited for first time with folowing services:
-Record the medical, familial, habitual and drug history
- Check the Blood pressure, weight, height and calculate the BMI
-- Take blood samples for biochemistry tests and HBV DNA
Not visited : 1224
Passed away: 144
-- Details is attached (table no. 1)
Unsuccessful call: 143
-- Immigration
-- Unavailable phone number
Refuse to co-operate: 63
-- Traffic difficulties
-- distrusting to cohort study
Accepted, did not show up: 874
-- Traffick difficulties
-- ETC


1399
have been invited for
second visit
1052 people have been visited for second time with following services:
345 people have not been visited due to:
- Ultrasonography which has been performed by expert radilogist
- Liver elastography that has been done by hepathologist
- Prescribe study drugs (aspirine, atorvastatin, tenofovire, metformine) based on the written protocol
Passed away: 4
2: liver related disease
1: other than liver cancer
1: Aging
Unsuccessful call: 50
Refuse to co-operate: 32
Accepted but did not show-up: 259
Complete data
1047
Missed data
7

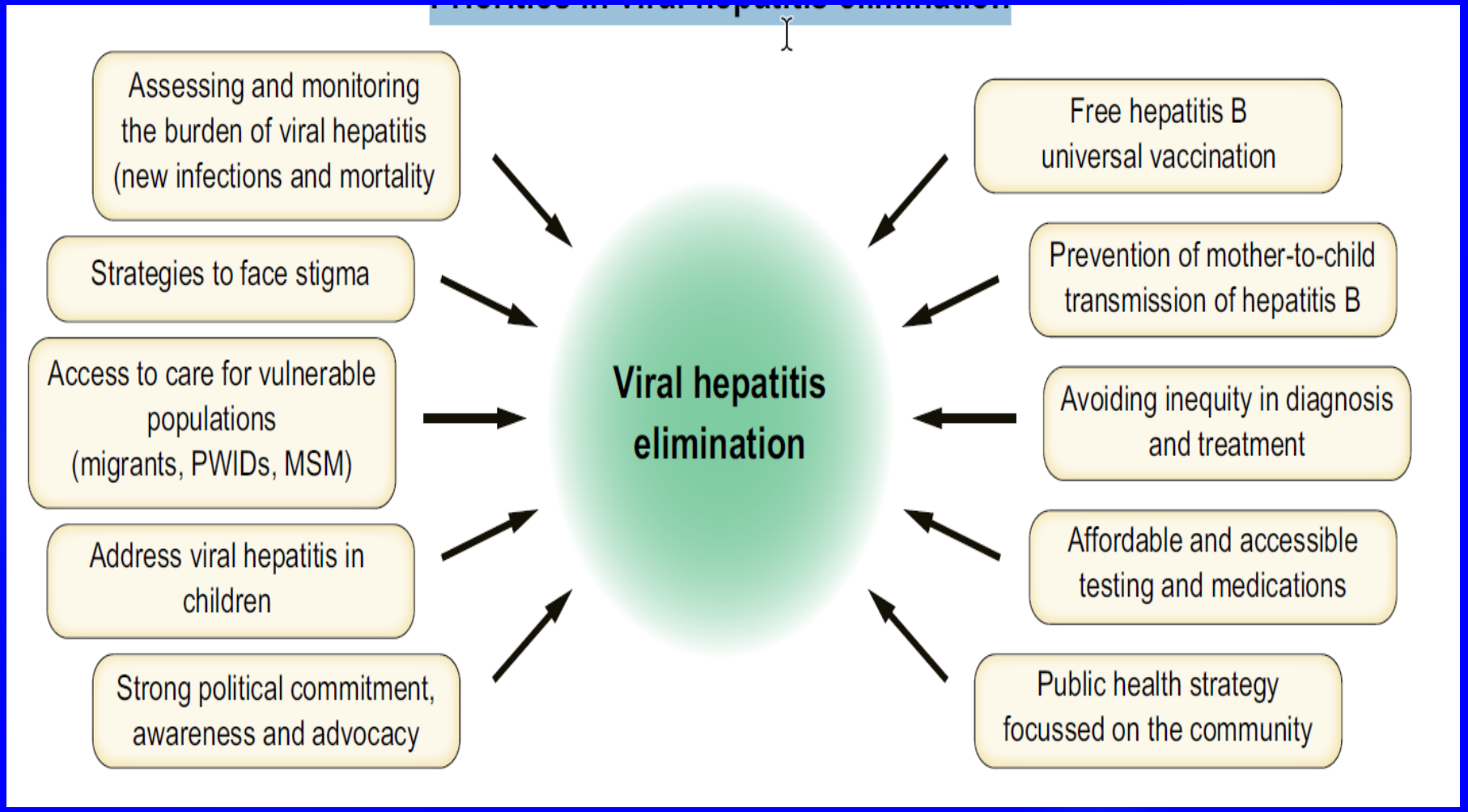
Only 18.7% of HBSAg Positive subject need anti viral therapy

Treatment Group / drugs	Aspirin 80 mg /day	Atorvastatin 20 mg /day	Tenofovir 300 mg /day	Metformine 500 mg /day (at least)
Started	646 (61.7)	598 (57.1)	163 (15.6)	195 (18.7)
Continued	334 (31.9)	130 (12.4)	32 (3.1)	44 (4.2)
None	67 (6.4)	319 (30.5)	852 (81.3)	808 (77.1)
Total	1047 (100)	1047 (100)	1047 (100)	1047 (100)

Emerging RNA interference (RNAi) therapies targeting cccDNA activity,

- The stability of HBV's genomic minichromosome (cccDNA) within hepatocytes, the persistence of integrated viral sequences capable of producing viral antigens, and the ability of the virus to evade immune control all contribute to the difficult in achieving a functional cure

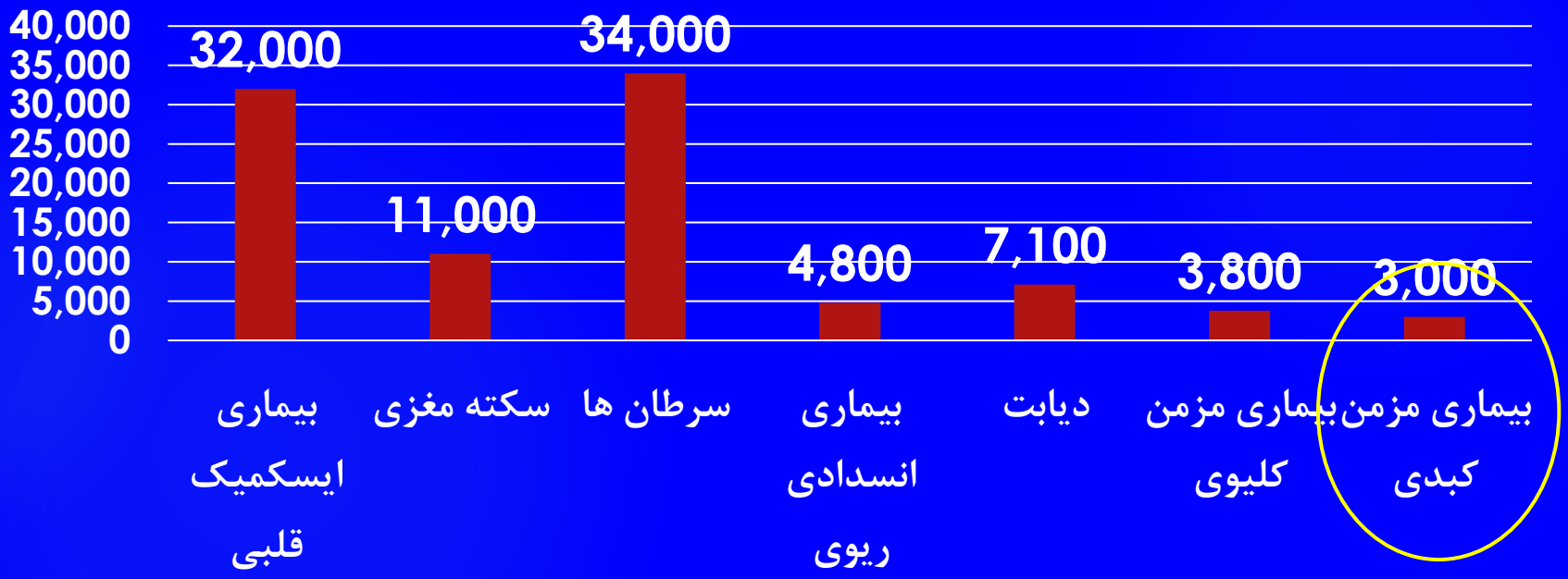
Priorities in viral hepatitis elimination



Conclusions for HBV

- Only 300,000 of 1500,000 ingested HBSAg carrier need anti viral therapy and may develop cirrhosis in next 30 years

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علل ۸۵۰۰۰ مرگ خیلی زودرس زیر ۵۰ سال در ایران



Feasibility of Eliminating Hepatitis B as a Public Health Problem Crosscutting Problems

Goal		Feasibility	Critical Factors
Ending Transmission	Perinatal	Highly feasible	• Identifying HBV-infected mothers • Consistent birth dosing with HBV vaccine
	Children	Highly feasible	• Consistent vaccination and attention to catch-up dosing
	Adults	Feasible	• No system for vaccinating adults • Undiagnosed, asymptomatic chronic infections a reservoir for infection
Reducing morbidity and mortality attributable to ongoing infection	Slowing progression to cirrhosis	Feasible	• Need for physicians trained in the management of chronic HBV infection • The threat of reactivation in chronic or resolved infection • No available treatment eliminates cccDNA or cures the disease
	Reducing deaths		

2019 National Viral Hepatitis Progress Report: HCV

	2020 Goal	2014 Baseline	2016 Result	2017 Result (2017 Target*)	Status
Hepatitis A					
Increase the percentage of children aged 19–35 months who receive ≥2 doses of hepatitis A vaccine	85.0%	57.5%	60.6%	59.7% (71.3%)	✗
Reduce the rate† of reported hepatitis A virus (HAV) infections	0.30	0.39	0.62	1.03 (0.35)	✗
Hepatitis B					
Increase the percentage of infants who receive hepatitis B vaccine within 3 days of birth	85.0%	72.4%	71.1%	73.6% (78.7%)	→
Reduce the rate† of reported acute hepatitis B virus (HBV) infections among persons aged ≥19 years	0.50	1.16	1.31	1.38 (0.83)	✗
Reduce the rate† of hepatitis B-related deaths	0.48	0.50	0.45	0.46 (0.49)	✓
Hepatitis C					
Reduce the rate† of reported acute hepatitis C virus (HCV) infections	0.25	0.73	0.98	1.04 (0.49)	✗
Reduce the rate† of hepatitis C-related deaths	4.17	5.01	4.42	4.13 (4.59)	✓

*Target for 2017 assumes a constant (linear) rate of change from the observed baseline (2014) to the 2020 goal
†Per 100,000 U.S. population

✓ Met or exceeded current annual target

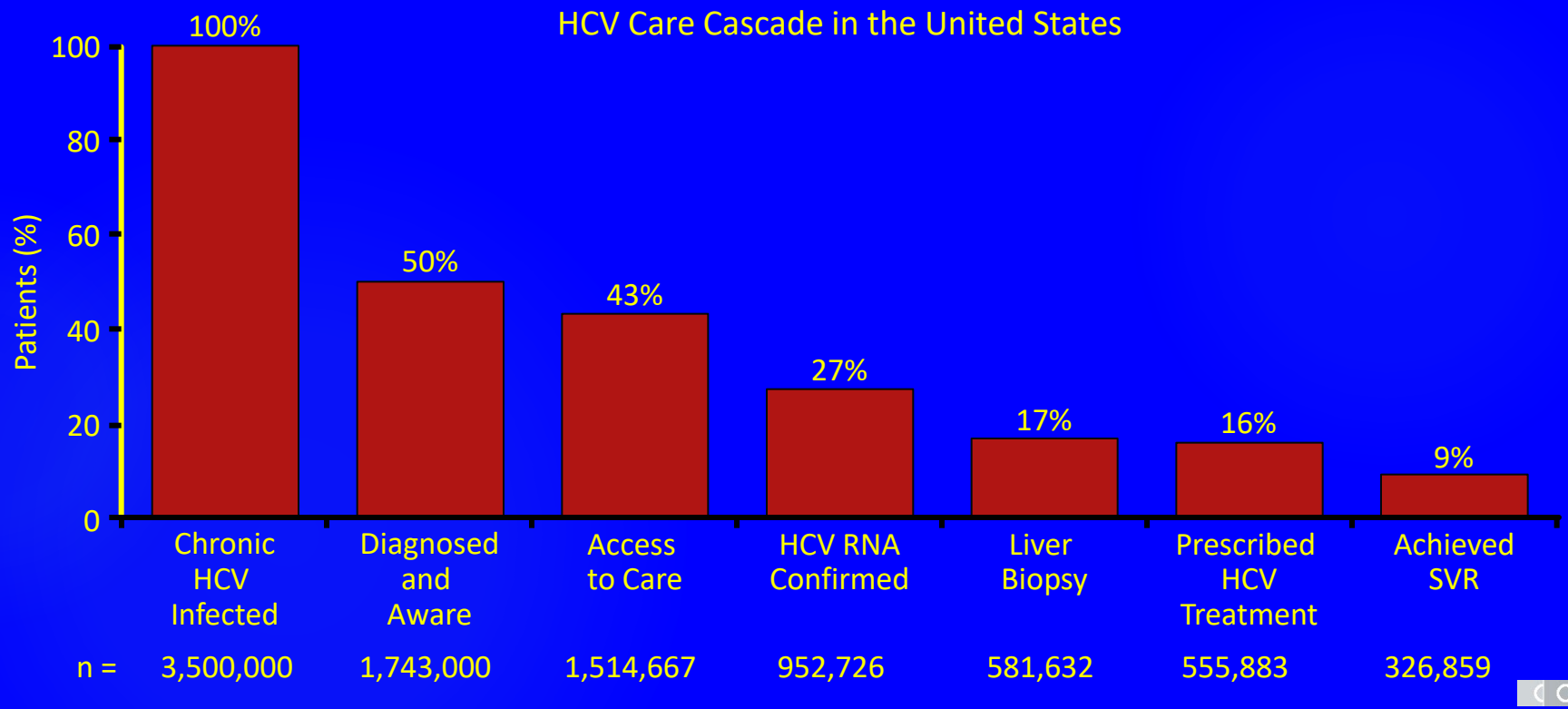
→ Moving ***toward*** annual target, but annual target was not fully met

✗ Annual target was not met and has not changed or moved ***away*** from annual target

https://www.cdc.gov/hepatitis/policy/pdfs/NationalProgressReport2019.pdf

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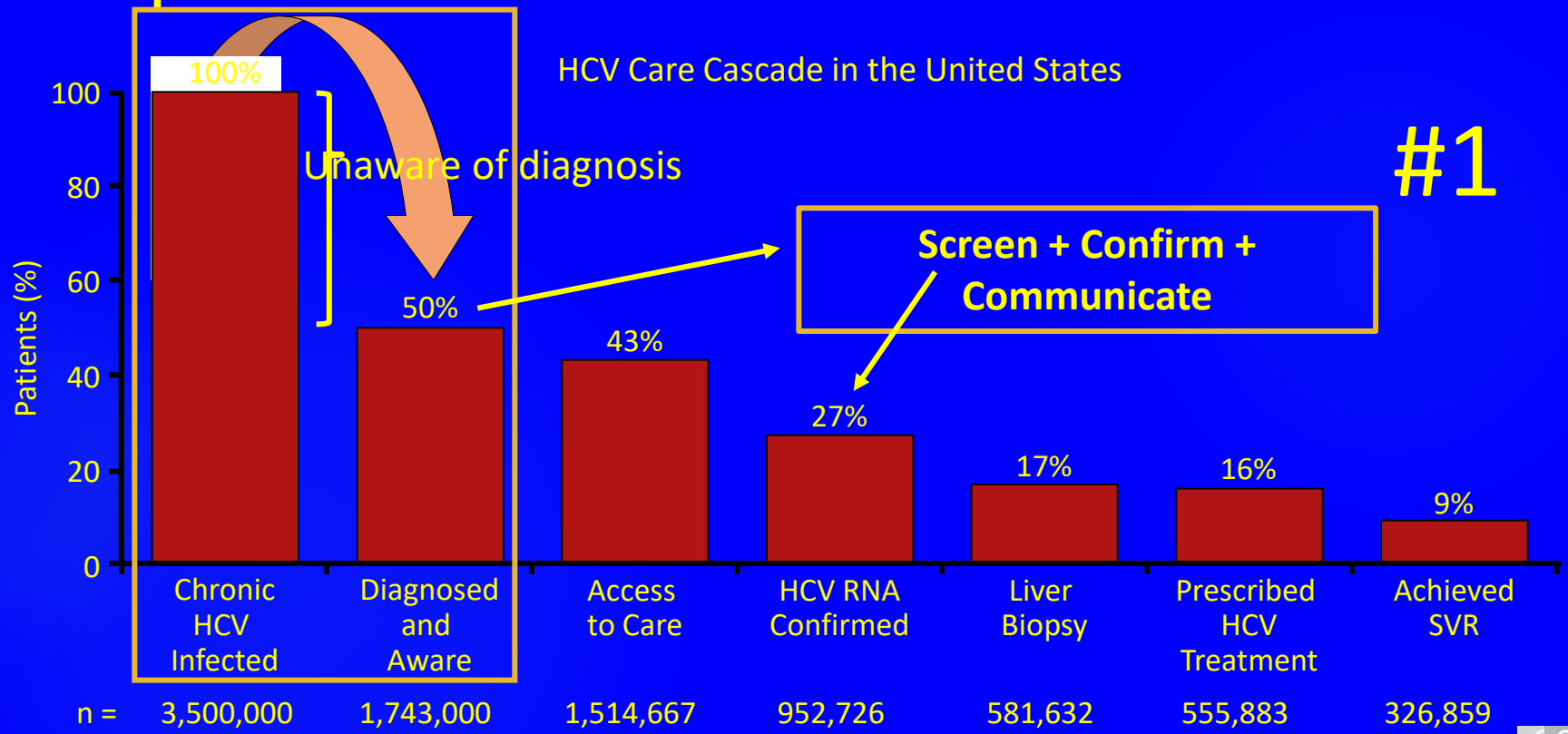
Identifying Priorities to Improve HCV Outcomes



Yehia. PLoS One. 2014;9:e101554.

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Identifying Priorities to Improve HCV Outcomes

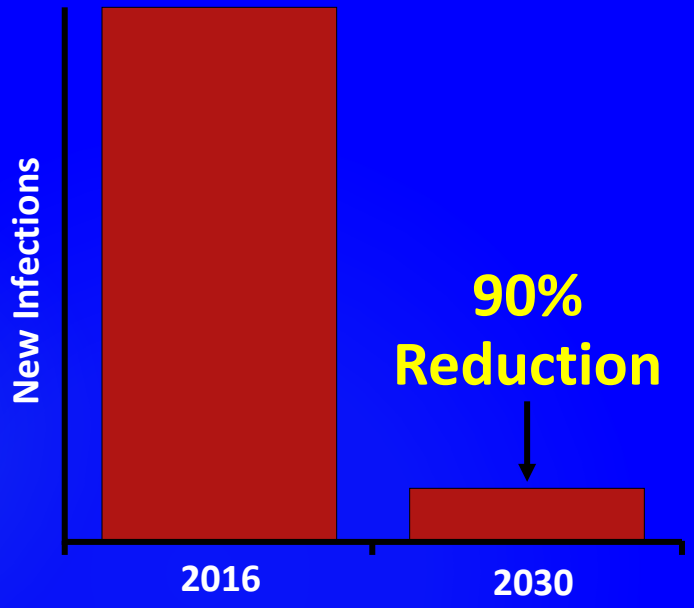


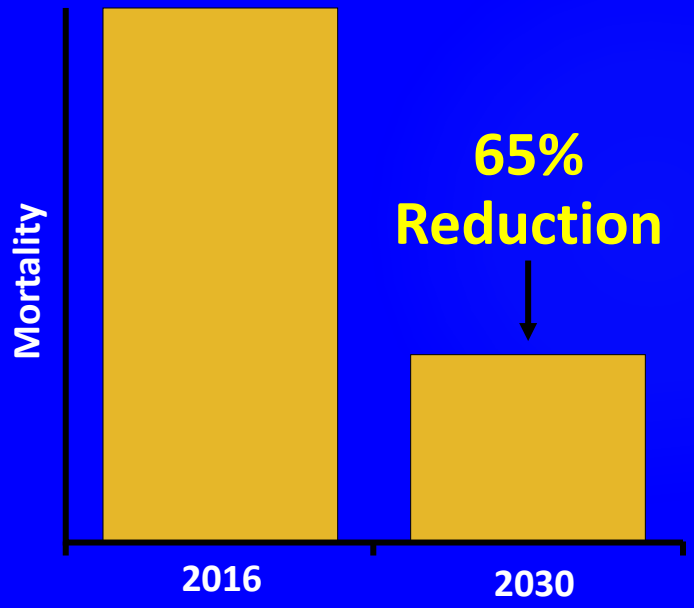
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The elimination of HCV

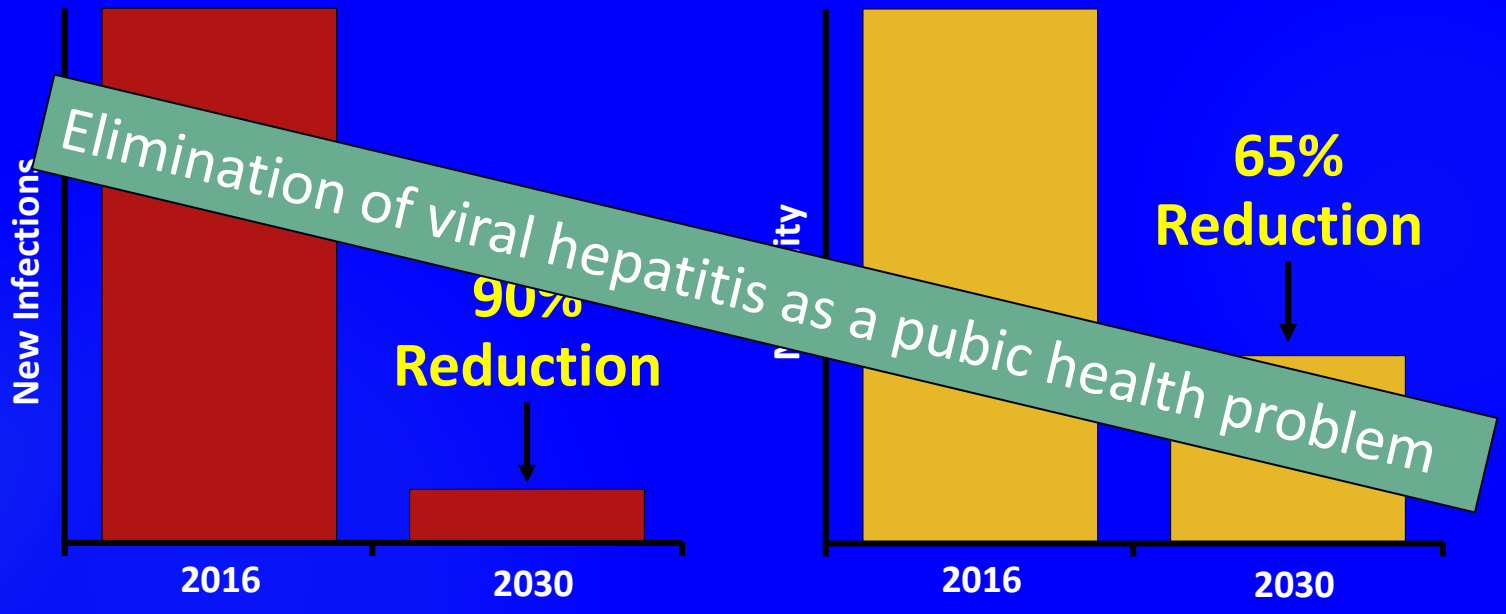
WHO HCV Elimination Targets





- Ambitious goals
- Requires National Action Plan → good data to design policy

WHO HCV Elimination Targets



- Ambitious goals
- Requires National Action Plan → good data to design policy

Population based prevalence and Spontaneous Hepatitis C Clearance

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PLoS one

The Impact of Illicit Drug Use on Spontaneous Hepatitis C Clearance: Experience from a Large Cohort Population Study

Hossein Poustchi, Saeed Esmaili, Ashraf Mohamadkhani, Aghbibi Nikmahzar, Akram Pourshams, Sadaf G. Sepanlou, Shahin Merat, Reza Malekzadeh*

Digestive Disease Research Center, Shariati Hospital, Tehran University of Medical Sciences, Tehran, Tehran, Iran

Abstract

Background and Aims: Acute hepatitis C infection usually ends in chronic infection, while in a minority of patients it is spontaneously cleared. The current population-based study is performed on a large cohort in Golestan province of Iran to examine the demographic correlates of Spontaneous Hepatitis C Clearance.

Methods: Serum samples used in this study had been stored in biorepository of Golestan Cohort Study. These samples were evaluated for anti hepatitis C Virus by third generation Enzyme-linked immunosorbent assay (ELISA). Subjects who tested positive were then invited and tested by Recombinant Immunoblot Assay (RIBA) and Ribonucleic Acid Polymerase Chain Reaction test (PCR). If tested positive for RIBA, subjects were recalled and the two tests were re-done after 6 months. Those subjects who again tested positive for RIBA but negative for PCR were marked as cases of spontaneous clearance.

Results: 49,338 serum samples were evaluated. The prevalence of Chronic Hepatitis C Virus (CHCV) infection based on PCR results was 0.31%. Among those who had acquired hepatitis C, the rate of SC was 38%. In multivariate analysis, illicit drug use both Injecting Use (OR = 3.271, 95% CI: 1.784–6.000, p-value<0.001) and Non-Injecting Use (OR = 1.901, 95% CI: 1.068–

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Seroprevalence of hepatitis C virus: the first population-based study from Iran

Shahin Merat [a], Houri Rezvan [b], Mehdi Nouraie [a,c], Elham Jafari [a], Hassan Abolghasemi [d], Amir Reza Radmard [a], Hanieh Zaer-rezaii [a], Sedigheh Amini-Kafiabad [b], Mahtab Maghsudlu [b], Akram Pourshams [a], Reza Malekzadeh [a], Saeed Esmaili [a,*]

[a] *Digestive Disease Research Center, Shariati Hospital, Tehran University of Medical Sciences, N Kargar St, Tehran 14117, Iran*
[b] *Research Center, Iran Blood Transfusion Organization, Tehran, Iran*
[c] *Howard University, Department of Internal Medicine and Center for Sickle Cell Disease, Washington, DC, USA*
[d] *Health Research Center, Baqiyatallah University of Medical Science, Tehran, Iran*

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SUMMARY

Objective: Early studies on blood donors point to a seroprevalence of approximately 0.25% for hepatitis C virus (HCV) infection in Iran. However, the true prevalence in the general population is unknown. The objective of this study was to determine the prevalence of HCV infection in the general population of Iran.

Methods: We randomly selected 6583 subjects from three provinces in Iran for inclusion in the study. Subjects were aged between 18 and 65 years. Anti-hepatitis C antibody was tested by a third-generation ELISA test. A recombinant immunoblot assay (RIBA) test was used to confirm the results. Risk factors were recorded and a multivariate analysis was performed.

Results: A total of 5684 plasma samples were tested. After confirmatory tests, we found 50 cases of HCV. The overall weighted prevalence of anti-HCV was 0.5%. The rate was significantly higher in men (1.0%) than in women (0.1%). In multivariate analysis, male sex, history of intravenous drug abuse, and imprisonment were significantly associated with anti-HCV.

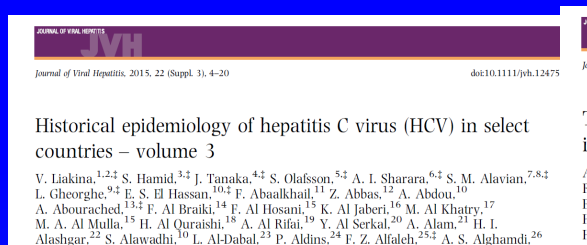
Conclusions: We found the prevalence of HCV infection in Iran to be higher than previous estimates. It appears that the rate is rising, and in the future, hepatitis C will replace hepatitis B as the most common cause of chronic viral liver disease in Iran.

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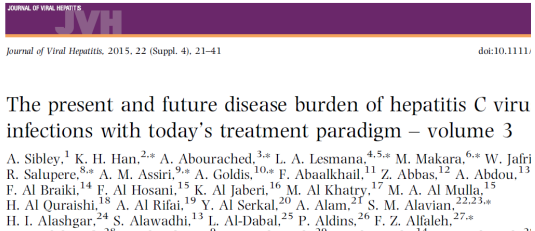
JVH

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Historical epidemiology of hepatitis C virus (HCV) in select countries – volume 3

V. Liakina,[1,2,‡] S. Hamid,[3,‡] J. Tanaka,[4,‡] S. Olafsson,[5,‡] A. I. Sharara,[6,‡] S. M. Alavian,[7,8,‡] L. Gheorghe,[9,‡] E. S. El Hassan,[10,‡] F. Abaalkhail,[11] Z. Abbas,[12] A. Abdou,[10] A. Abourached,[13,‡] F. Al Braiki,[14] F. Al Hosani,[15] K. Al Jaberi,[16] M. Al Khatry,[17] M. A. Al Mulla,[15] H. Al Quraishi,[18] A. Al Rifai,[19] Y. Al Serkal,[20] A. Alam,[21] H. I. Alashgar,[22] S. Alawadhi,[10] L. Al-Dabal,[23] P. Aldins,[24] F. Z. Alfaleh,[25,‡] A. S. Alghamdi,[26] R. Al-Hakeem,[27] A. A. Aljumah,[28] A. Almessabi,[14] A. N. Alqutub,[26] K. A. Alswat,[29] I. Altraif,[28] M. Alzaabi,[30,‡] N. Andrea,[31] A. M. Assiri,[27,‡] M. A. Babatin,[26] A. Baqir,[32] M. T. Barakat,[33] O. M. Bergmann,[34] A. R. Bizri,[35] S. Blach,[36] A. Chaudhry,[37] M. S. Choi,[38] T. Diab,[39] S. Djauzi,[40] S. El Khoury,[41] C. Estes,[36] S. Fakhry,[42] J. I. Farooqi.,[43,44] H. Fridjonsdottir,[45] R. A. Gani,[40] A. Ghafoor Khan,[46] A. Goldis,[47,‡] M. Gottfredsson,[48] S. Gregorcic,[49] B. Hajarizadeh,[50,51,‡] K. H. Han,[52,‡] I. Hasan,[40] A. Hashim,[53] G. Horvath,[54] B. Hunyady,[55,56,‡] R. Husni,[57] W. Jafri.,[58,‡] A. Jeruma,[59,60] J.G. Jonasson,[45,61,62] B. Karlsdottir,[63] D. Y. Kim,[52,‡] Y. S. Kim,[64] Z. Koutoubi,[65] L. A. Lesmana,[40,66,‡] Y. S. Lim,[67] A. Löve,[48,68] M. Maimets,[69] M. Makara,[70,‡] R. Malekzadeh,[71] M. Matičič,[49,‡] M. S. Memon,[72] S. Merat,[71] J. E. Mokhbat,[73] F. H. Mourad,[6] D. H. Muljono,[74,75] A. Nawaz,[76] N. Nugrahini,[77,‡] S. Priohutomo,[78] H. Qureshi,[79] P. Rassam,[41] H. Razavi,[36] D. Razavi-Shearer,[36] K. Razavi-Shearer,[36] B. Rozentale,[59,60] M. Sadik,[72] K. Saeed,[80] A. Salamat,[81] R. Salupere,[69,‡] F. M. Sanai,[25] A. Sanityoso Sulaiman,[40] R. A. Sayegh,[82] J. D. Schmelzer,[36] A. Sibley,[36] M. Siddiq,[83,84] A. M. Siddiqui,[85] G. Sigmundsdottir,[86] B. Sigurdardottir,[63] D. Speiciene,[1] A. Sulaiman,[40,87] M. A. Sultan,[88] M. Taha,[89] H. Tarifi,[90] G. Tayyab,[91,92] I. Tolmane,[59,60,‡] M. Ud din,[93] M. Umar,[94,95] J. Valantinas,[1,‡] J. Videčnik-Zorman,[49] C. Yaghi,[82] E. Yunihastuti,[96] M. A. Yusuf,[97] B. F. Zuberi[98] and J. Gunter[36]

[1]*Centre of Hepatology, Gastroenterology, and Dietetics, Faculty of Medicine, Vilnius University, Vilnius, Lithuania;* [2]*Department of Biomechanics, Vilnius Gediminas Technical University, Vilnius, Lithuania;* [3]*The Aga Khan University, Karachi, Pakistan;* [4]*Department of Epidemiology, Infectious Disease Control and Prevention, Hiroshima University Institute of Biomedical and Health Sciences, Hiroshima, Japan;* [5]*Division of Gastroenterology and Hepatology, Landspitali - The National University Hospital of Iceland, Reykjavik, Iceland;* [6]*Division of Gastroenterology, American University of Beirut Medical Center, Beirut, Lebanon;* [7]*Baqiatallah Research Center for Gastroenterology and Liver Diseases, Baqiatallah University of Medical Sciences, Tehran, Iran ;* [8]*Middle East Liver Diseases Centre, Tehran, Iran;* [9]*Center of Gastroenterology & Hepatology, Fundeni Clinical Institute, Bucharest, Romania;* [10]*Rashid Hospital, Dubai Health Authority, Dubai, UAE;* [11]*Department of Liver and Small Bowel Transplantation,King Faisal Specialist Hospital and Research Center, Alfaisal University,Riyadh, Saudi Arabia;* [12]*Ziauddin University, Karachi, Pakistan;* [13]*National Hepatitis Program, Ministry of Public Health, Beirut, Lebanon;* [14]*Abu Dhabi Health Services Company, Abu Dhabi, UAE;* [15]*Communicable Diseases Department, Health Authority Abu Dhabi, Abu Dhabi, UAE;* [16]*Health Regulation Division, Health Authority Abu Dhabi, Abu Dhabi, UAE;* [17]*Ras Al Khaimah Hospital, Ras Al Khaimah, UAE;* [18]*Dubai Health Authority, Dubai, UAE;* [19]*Mafraq Hospital, Abu Dhabi, UAE;* [20]*Hospitals Sector, Ministry of Health, Al-Ain, UAE;* [21]*Shaikh Zayed Hospital, Lahore, Pakistan;* [22]*Department of Medicine, King Faisal Specialist Hospital and Research Centre, Riyadh, Saudi Arabia:* [23]*Department of Pulmonary Medicine, Rashid Hospital, Dubai Health Authority, Dubai, UAE;* [24]*Infection Control Department, Pauls Stradins Clinical University Hospital, Riga, Latvia;* [25]*Liver Disease Research Center, King Saud University, Riyadh, Saudi Arabia;* [26]*Gastroenterology and Hepatology Unit, Medical Specialties Department, King Fahad Hospital, Riyadh, Saudi Arabia;* [27]*Department of Preventive Medicine, Ministry of Health, Riyadh, Saudi Arabia;* [28]*King Abdulaziz Medical City and King Saud bin Abdulaziz University for Health Sciences, Riyadh, Saudi Arabia;* [29]*Department of Medicine, King Saud University Liver Disease Research Center, College of Medicine, King Saud*



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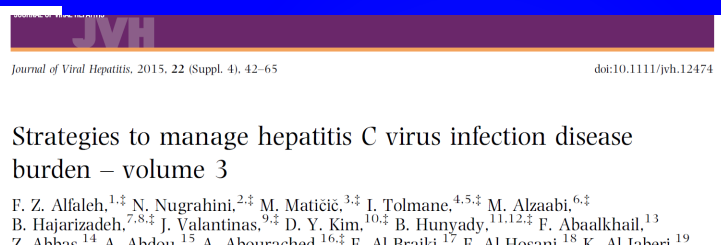
JVH

Journal of Viral Hepatitis, 2015, 22 (Suppl. 4), 21–41 doi:10.1111/

The present and future disease burden of hepatitis C viru infections with today's treatment paradigm – volume 3

A. Sibley,[1] K. H. Han,[2,*] A. Abourached,[3,*] L. A. Lesmana,[4,5,*] M. Makara,[6,*] W. Jafri R. Salupere,[8,*] A. M. Assiri,[9,*] A. Goldis,[10,*] F. Abaalkhail,[11] Z. Abbas,[12] A. Abdou,[13] F. Al Braiki,[14] F. Al Hosani,[15] K. Al Jaberi,[16] M. Al Khatry,[17] M. A. Al Mulla,[15] H. Al Quraishi,[18] A. Al Rifai,[19] Y. Al Serkal,[20] A. Alam,[21] S. M. Alavian,[22,23,*] H. I. Alashgar,[24] S. Alawadhi,[13] L. Al-Dabal,[25] P. Aldins,[26] F. Z. Alfaleh,[27,*] A. S. Alghamdi,[28] R. Al-Hakeem,[9] A. A. Aljumah,[29] A. Almessabi,[14] A. N. Alqutub,[2 K. A. Alswat,[30] I. Altraif,[29] M. Alzaabi,[31,*] N. Andrea,[32] M. A. Babatin,[28] A. Baqir,[33] M. T. Barakat,[34] O. M. Bergmann,[35] A. R. Bizri,[36] S. Blach,[1] A. Chaudhry,[37] M. S. Cl T. Diab,[39] S. Djauzi,[4] E. S. El Hassan,[13,*] S. El Khoury,[40] C. Estes,[1] S. Fakhry,[41] J. I. Farooqi,[42,43] H. Fridjonsdottir,[44] R. A. Gani,[4] A. Ghafoor Khan,[45] L. Gheorghe,[46] M. Gottfredsson,[47] S. Gregorcic,[48] J. Gunter,[1] B. Hajarizadeh,[49,50,*] S. Hamid,[51,*] I. Ha A. Hashim,[52] G. Horvath,[53] B. Hunyady,[54,55,*] R. Husni,[56] A. Jeruma,[57,58] J. G. Jonasson,[44,59,60] B. Karlsdottir,[61] D. Y. Kim,[2,*] Y. S. Kim,[62] Z. Koutoubi,[63] V. Liakina,[64,65] Y. S. Lim,[66] A. Löve,[47,67] M. Maimets,[8] R. Malekzadeh,[68] M. Matičič, M. S. Memon,[69] S. Merat,[68] J. E. Mokhbat,[70] F. H. Mourad,[71] D. H. Muljono,[72,73] A. Nawaz,[74] N. Nugrahini,[75,*] S. Olafsson,[76,*] S. Priohutomo,[77] H. Qureshi,[78] P. Rass H. Razavi,[1] D. Razavi-Shearer,[1] K. Razavi-Shearer,[1] B. Rozentale,[57,58] M. Sadik,[69] K. Saeed,[79] A. Salamat,[80] F. M. Sanai,[27] A. Sanityoso Sulaiman,[4] R. A. Sayegh,[81] A. I. Sharara,[71,*] M. Siddiq,[82,83] A. M. Siddiqui,[84] G. Sigmundsdottir,[85] B. Sigurdardo D. Speiciene,[64,*] A. Sulaiman,[4,86] M. A. Sultan,[87] M. Taha,[88] J. Tanaka,[89,*] H. Tarifi, G. Tayyab,[91,92] I. Tolmane,[57,58,*] M. Ud din,[93] M. Umar,[94,95] J. Valantinas,[64,*] J. Vide Zorman,[48] C. Yaghi,[81] E. Yunihastuti,[96] M. A. Yusuf,[97] B. F. Zuberi[98] and J. D. Schm

[1]*Center for Disease Analysis (CDA), Louisville, CO, USA;* [2]*Department of Internal Medicine, Yonsei University College of Medicine, Seoul* [3]*National Hepatitis Program, Ministry of Public Health, Beirut, Lebanon;* [4]*Division of Hepatobiliary, Department of Internal Medicine, Fa Medicine, Dr. Cipto Mangunkusumo Hospital, University of Indonesia, Jakarta, Indonesia;* [5]*Digestive Disease and GI Oncology Center, Me Hospital, Jakarta, Indonesia;* [6]*Central Outpatient Clinic, Saint Laszlo Hospital, Budapest, Hungary;* [7]*Aga Khan University, Karachi, Pakis University Hospital, University of Tartu, Tartu, Estonia;* [8]*Department of Preventive Medicine, Ministry of Health, Riyadh, Saudi Arabia; Gastroenterology, University of Medicine 'Victor Babes', Timisoara, Romania;* [11]*Department of Liver and Small Bowel Transplantation, K Specialist Hospital and Research Centre, Alfaisal University, Riyadh, Saudi Arabia;* [12]*Ziauddin University, Karachi, Pakistan;* [13]*Rashid Ho Dubai Health Authority, Dubai, UAE;* [14]*Abu Dhabi Health Services Company, Abu Dhabi, UAE;* [15]*Communicable Diseases Department, H Authority Abu Dhabi, Abu Dhabi, UAE;* [16]*Health Regulation Division, Health Authority Abu Dhabi, Abu Dhabi, UAE;* [17]*Ras Al Khaimah Ras Al Khaimah, UAE;* [18]*Dubai Health Authority, Dubai, UAE;* [19]*Mafraq Hospital, Abu Dhabi, UAE;* [20]*Hospitals Sector, Ministry of He Dhabi, UAE;* [21]*Shaikh Zayed Hospital, Lahore, Pakistan;* [22]*Baqiyatallah Research Center for Gastroenterology and Liver Diseases, Baqiya University of Medical Sciences, Tehran, Tehran, Iran;* [23]*Middle East Liver Diseases Centre, Tehran, Tehran, Iran;* [24]*Department of Medici Faisal Specialist Hospital and Research Centre, Riyadh, Saudi Arabia;* [25]*Department of Pulmonary Medicine, Rashid Hospital, Dubai Heal Authority, Dubai, UAE;* [26]*Infection Control Department, Pauls Stradins Clinical University Hospital, Riga, Latvia;* [27]*Liver Disease Researc King Saud University, Riyadh, Saudi Arabia;* [28]*Gastroenterology and Hepatology Unit, Medical Specialties Department, King Fahad Hospi Riyadh, Saudi Arabia;* [29]*King Abdulaziz Medical City and King Saud bin Abdulaziz University for Health Sciences, Riyadh, Saudi Arabia;*



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Strategies to manage hepatitis C virus infection disease burden – volume 3

F. Z. Alfaleh,[1,‡] N. Nugrahini,[2,‡] M. Matičič,[3,‡] I. Tolmane,[4,5,‡] M. Alzaabi,[6,‡] B. Hajarizadeh,[7,8,‡] J. Valantinas,[9,‡] D. Y. Kim,[10,‡] B. Hunyady,[11,12,‡] F. Abaalkhail,[13] Z. Abbas,[14] A. Abdou,[15] A. Abourached,[16,‡] F. Al Braiki,[17] F. Al Hosani,[18] K. Al Jaberi,[19] M. Al Khatry,[20] M. A. Al Mulla,[18] H. Al Quraishi,[21] A. Al Rifai,[22] Y. Al Serkal,[23] A. Alam,[24] H. I. Alashgar,[25] S. M. Alavian,[26,27,‡] S. Alawadhi,[15] L. Al-Dabal,[28] P. Aldins,[29] A. S. Alghamdi,[30] R. Al-Hakeem,[31] A. A. Aljumah,[32] A. Almessabi,[17] A. N. Alqutub,[30] K. A. Alswat,[33] I. Altraif,[32] N. Andrea,[34] A. M. Assiri,[31,‡] M. A. Babatin,[30] A. Baqir,[35] M. T. Barakat,[36] O. M. Bergmann,[37] A. R. Bizri,[38] A. Chaudhry,[39] M. S. Choi,[40] T. Diab,[41] S. Djauzi,[42] E. S. El Hassan,[15,‡] S. El Khoury,[43] C. Estes,[44] S. Fakhry,[45] J. I. Farooqi,[46,47] H. Fridjonsdottir,[48] R. A. Gani,[42] A. Ghafoor Khan,[49] L. Gheorghe,[50,‡] A. Goldis,[51,‡] M. Gottfredsson,[52] S. Gregorcic,[3] J. Gunter,[44] S. Hamid,[53,‡] K. H. Han,[10,‡] I. Hasan,[42] A. Hashim,[54] G. Horvath,[55] R. Husni,[56] W. Jafri,[57,‡] A. Jeruma,[4,5] J. G. Jonasson,[48,58,59] B. Karlsdottir,[60] Y. S. Kim,[61] Z. Koutoubi,[62] L. A. Lesmana,[42,63,‡] V. Liakina,[9,64,‡] Y. S. Lim,[65] A. Löve,[52,66] M. Maimets,[67] M. Makara,[68,‡] R. Malekzadeh,[69] M. S. Memon,[70] S. Merat,[69] J. E. Mokhbat,[71] F. H. Mourad,[72] D. H. Muljono,[73,74] A. Nawaz,[75] S. Olafsson,[76,‡] S. Priohutomo,[77] H. Qureshi,[78] P. Rassam,[43] H. Razavi,[44] D. Razavi-Shearer,[44] K. Razavi-Shearer,[44] B. Rozentale,[4,5] M. Sadik,[70] K. Saeed,[79] A. Salamat,[80] R. Salupere,[67,‡] F. M. Sanai,[1] A. Sanityoso Sulaiman,[42] R. A. Sayegh,[81] J. D. Schmelzer,[44] A. I. Sharara,[72,‡] A. Sibley,[44] M. Siddiq,[82,83] A. M. Siddiqui,[84] G. Sigmundsdottir,[85] B. Sigurdardottir,[60] D. Speiciene,[9] A. Sulaiman,[42,86] M. A. Sultan,[87] M. Taha,[88] J. Tanaka,[89,‡] H. Tarifi,[90] G. Tayyab,[91,92] M. Ud din,[93] M. Umar,[94,95] J. Videčnik-Zorman,[3] C. Yaghi,[81] E. Yunihastuti,[96] M. A. Yusuf,[97] B. F. Zuberi[98] and S. Blach[44]

[1]*Liver Disease Research Center, King Saud University, Riyadh, Saudi Arabia;* [2]*Sub-Directorate for Gastrointestinal Infection, Diarrheal Diseases, and Hepatitis, Directorate of Direct Transmitted Disease Control, Disease Control & Environmental Health, Ministry of Health, Jakarta, Indonesia;* [3]*Clinic for Infectious Diseases and Febrile Illnesses, University Medical Centre, Ljubljana, Slovenia;* [4]*Department of Hepatology, Infectology Center of Latvia, Riga, Latvia;* [5]*Department of Infectology and Dermatology, Riga Stradins University, Riga, Latvia;* [6]*Zayed Military Hospital, Abu Dhabi, UAE;* [7]*The Kirby Institute, University of New South Wales Australia, Sydney, Australia;* [8]*The Australian Research Centre in Sex, Health and Society, La Trobe University, Melbourne, Australia;* [9]*Centre of Hepatology, Gastroenterology, and Dietetics, Faculty of Medicine, Vilnius University, Vilnius, Lithuania;* [10]*Department of Internal Medicine, Yonsei University College of Medicine, Seoul, Korea;* [11]*Department of Gastroenterology, Somogy County Kaposi Mor Teaching Hospital, Kaposvar, Hungary;*

Burden of HCV in Iran

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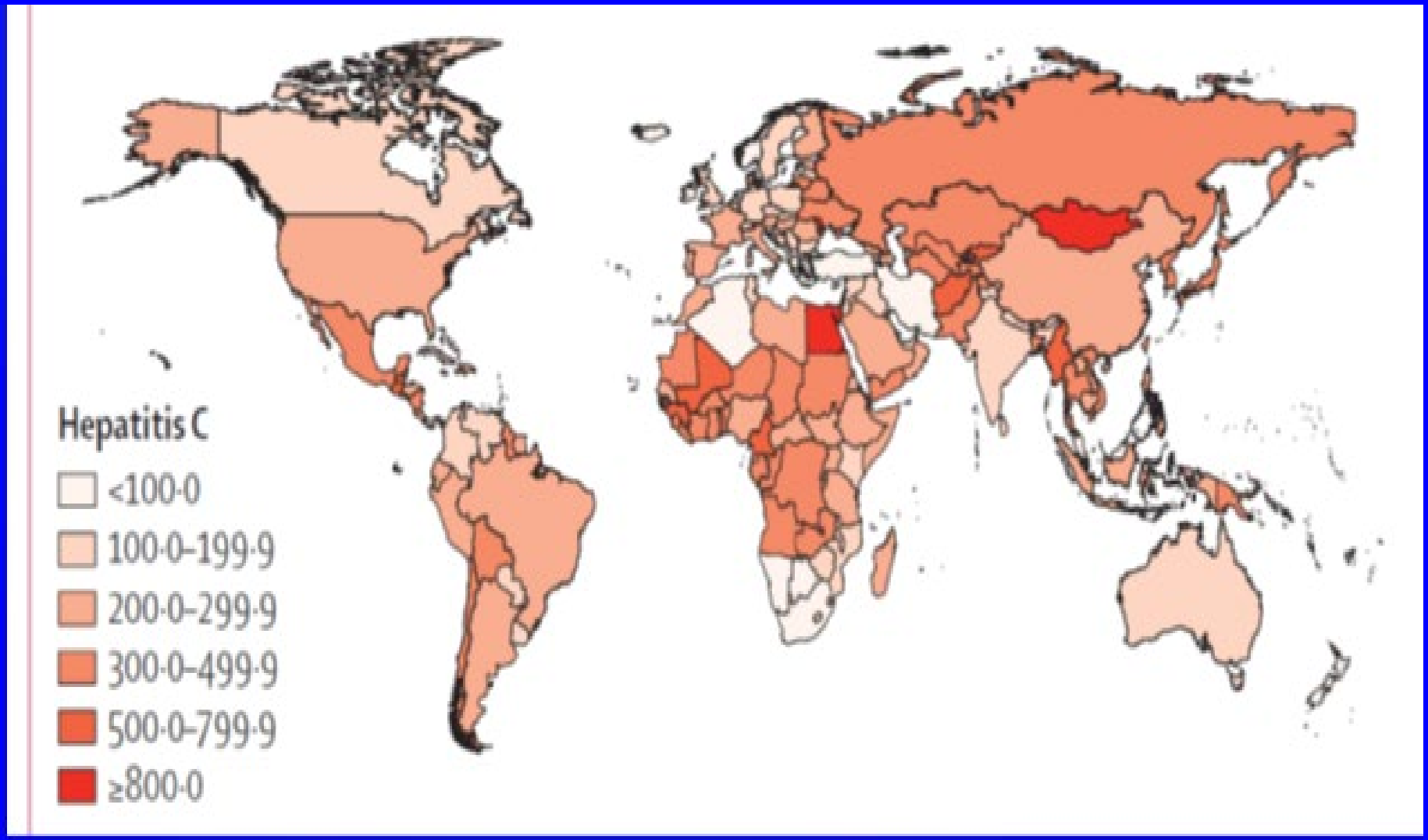
Published online 2016 June 14. **Research Article**

Liver Disease Burden of Hepatitis C Virus Infection in Iran and the Potential Impact of Various Treatment Strategies on the Disease Burden

Behzad Hajarizadeh,[1,*] Devin Razavi-Shearer,[2] Shahin Merat,[3,4] Seyed Moayed Alavian,[5,6] Reza Malekzadeh,[3,4] and Homie Razavi[2]

[1]The Kirby Institute, UNSW Australia, Sydney, Australia
[2]Center for Disease Analysis, Louisville, Colorado, USA
[3]Liver and Pancreatobiliary Diseases Research Center, Digestive Diseases Research Institute, Tehran University of Medical Sciences, Tehran, IR Iran
[4]Digestive Oncology Research Center, Digestive Disease Research Institute, Tehran University of Medical Sciences, Tehran, IR Iran
[5]Baqiatallah Research Center for Gastroenterology and Liver Diseases, Baqiatallah University of Medical Sciences, Tehran, IR Iran
[6]Middle East Liver Diseases Centre, Tehran, IR Iran

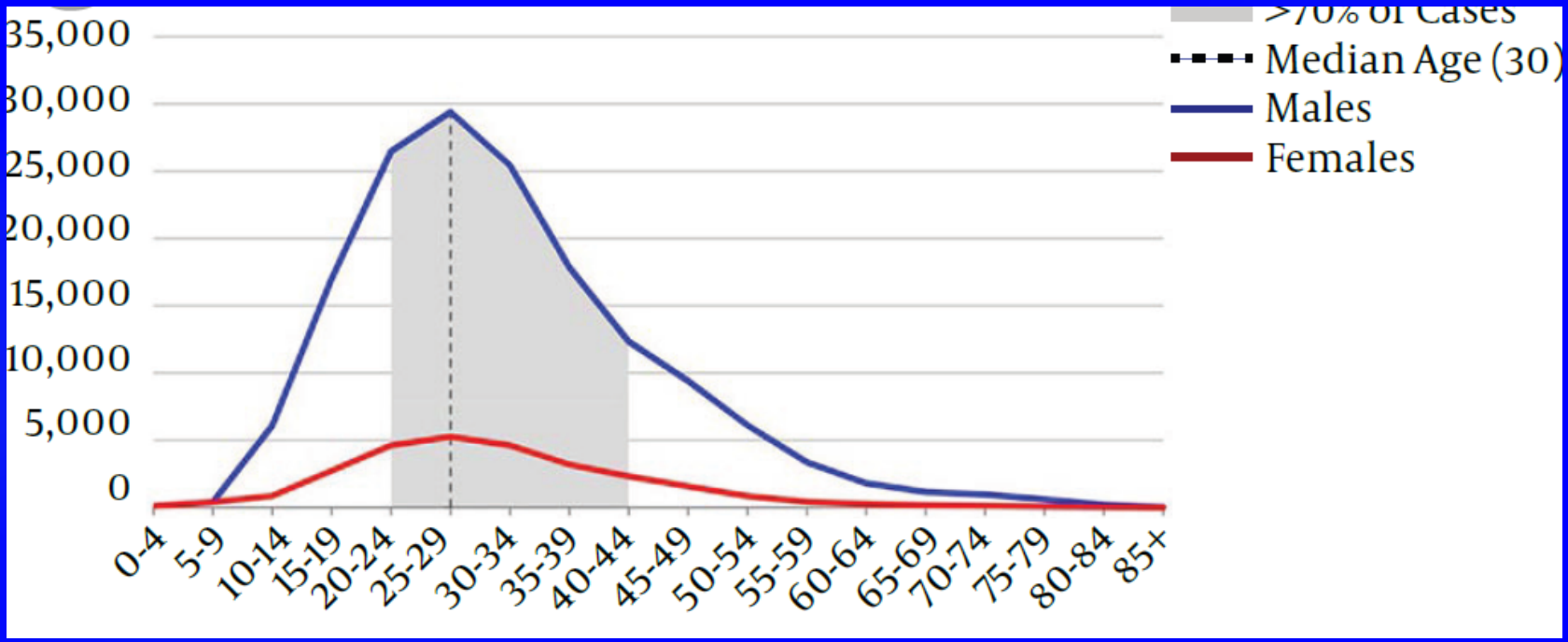
Low incidence of HCV in Iran



Conclusion Population based prevalence and Spontaneous Hepatitis C Clearance

- **Anti-HCV prevalence in Iran is estimated to be 0.4% representing 275 000 individuals in 2006.**
- **Viremic (HCV RNA +)prevalence of 0.2% (0.2–-o.3%)representing approximately 170000 viremic person in 2006.**
- **Among those who had acquired hepatitis C, the rate of Spontaneous Clearance (SC)was 38%.**
- **Illicit drug use was the only significant correlates of CHCV infection versus SC**

Age and Gender-Specific Distribution of Individuals Exposed and Living With HCV Infection



HCV Case Study In Gonbad

First Phase

- 50,045 Subjects with HCV Ab
  - ELISA

Second Phase

- HCV Ab
- Riba
- PCR
- LFTs
- Lipid Profile
- Ultrasound
- Fibroscan

Prevalence of HCV in 1385

	Number in Cohort	HCV positive	P-value
Women	28804	85 (0.29%)	<0.001
Men	21241	162 (0.76%)	
Total	50045	247 (**0.49%**)	

Prevalence of risk factors in HCV positivity

	HCV negative	HCV positive	P-value
Blood Transfusion	8.6%	16.2%	0.004
Accident	7.3%	19.4%	<0.001
War Injury	1.8%	7.7%	<0.001
Imprisonment	8.3%	38.5%	<0.001
Body Piercing	57.3%	35.2%	<0.001
Illicite Drug Use	17.7%	62.8%	<0.001
IV Drug Use	4.4%	15.6%	0.019

Prevalence of Risk Factors in Spontaneous HCV Clearance

	Spontaneous Clearance	Chronic HCV	P-value
Gender (male)	52.6%	73.7%	0.001
Imprisonment	24.2%	47.4%	<0.001
Body Piercing	46.3%	28.3%	0.004
Illicite Drug Use	41.1%	76.3%	<0.001
IV Drug Use	4.4%	15.6%	0.019

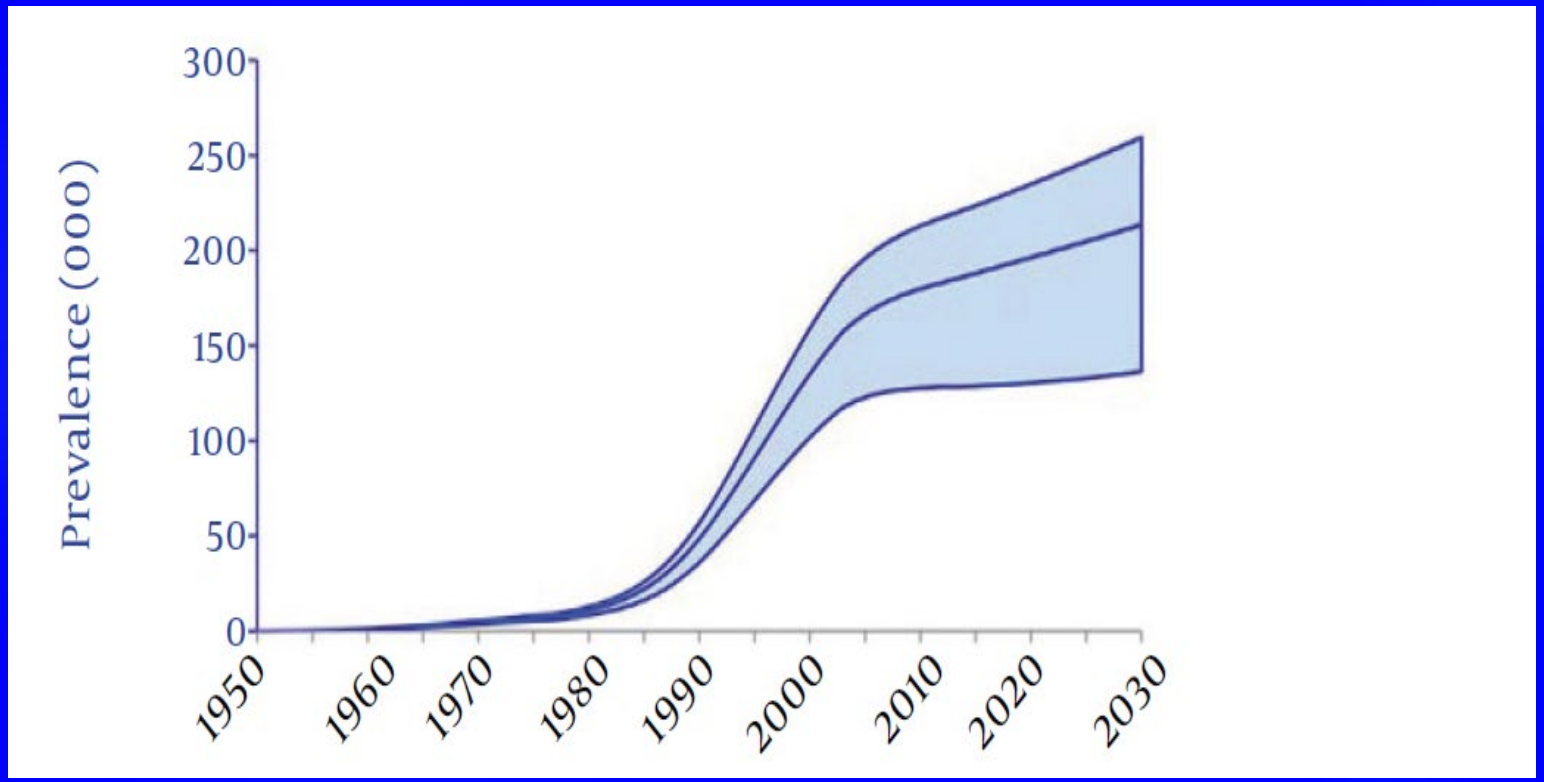
Third Phase

- Calling subjects again for treatment evaluation

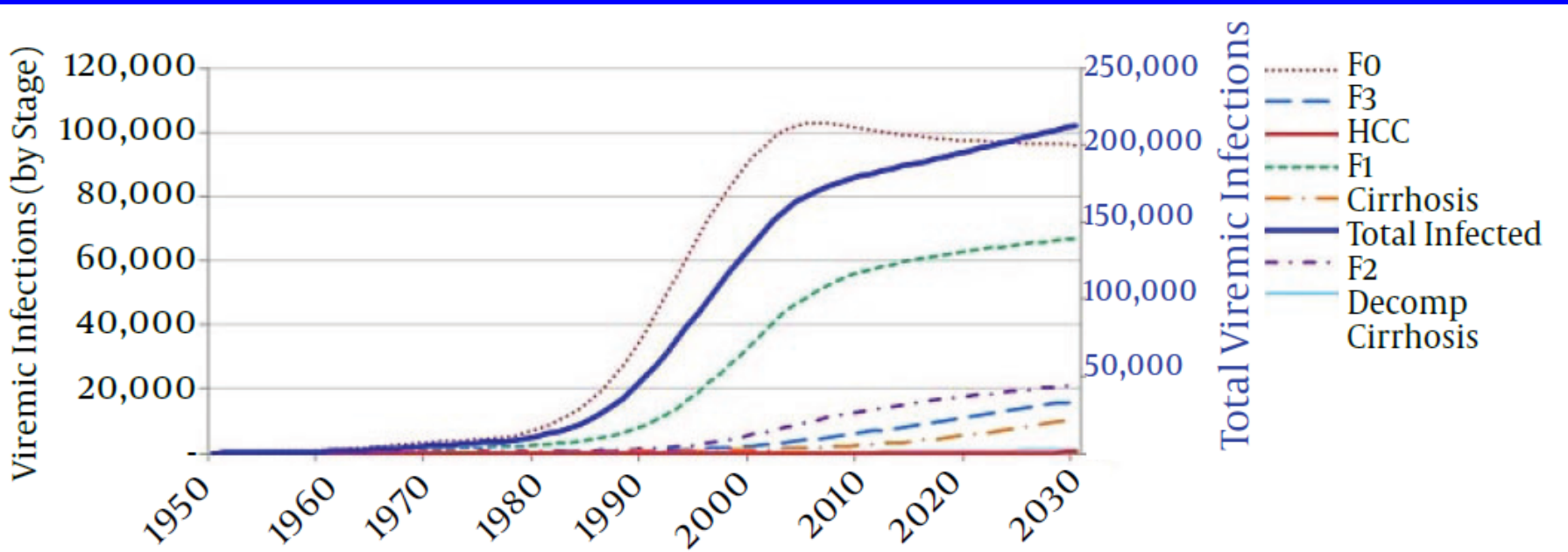
Estimated future Burden with present therapy

- In 2014, an estimated 186,500 individuals are living with HCV infection in Iran (median age: 30 years).
- By 2030, this number will increase to 213,700, while three to four folds increase is expected in the case numbers of decompensated cirrhosis (DC, n = 620),hepatocellular carcinoma (HCC, n = 510), and liver disease death (n = 400), assuming the current diagnosis/treatment settings.

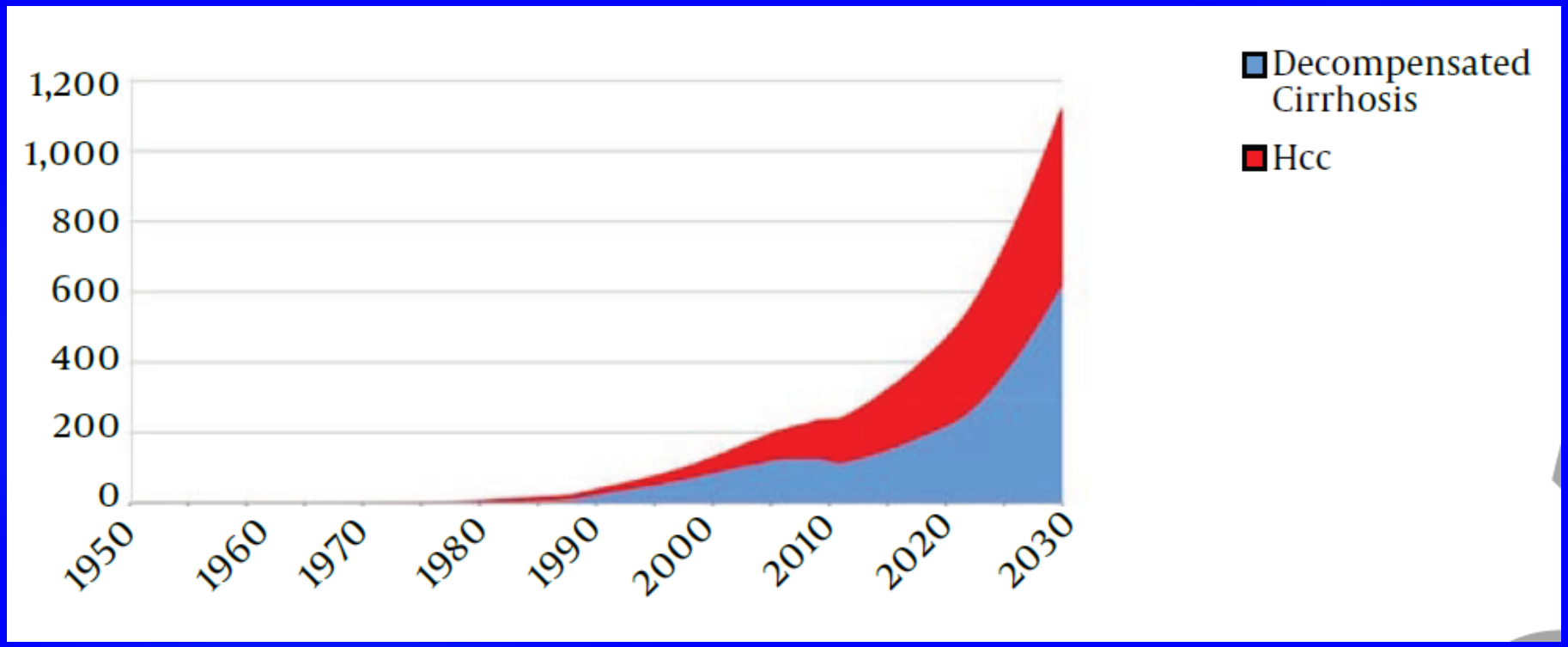
Estimated HCV Disease Burden in Iran During 1950 – 2030 Total number of individuals living with HCV infection



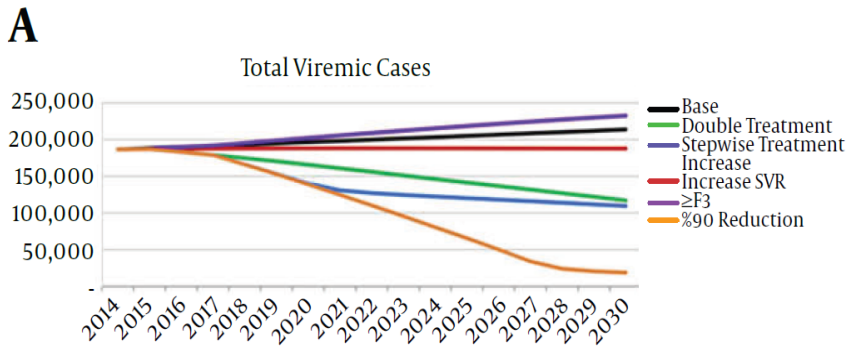
Number of individuals living with HCV infection in total and by liver fibrosis and

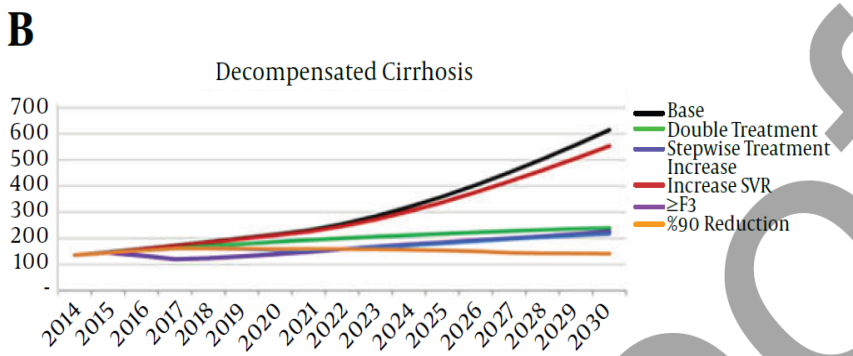


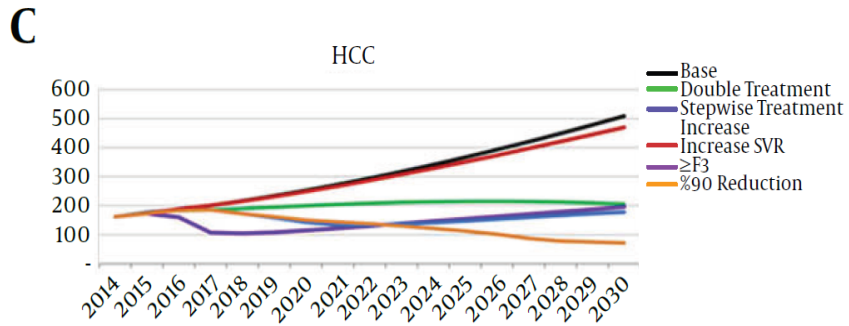
Number of individuals with HCV related decompensated cirrhosis and hepatocellular carcinoma

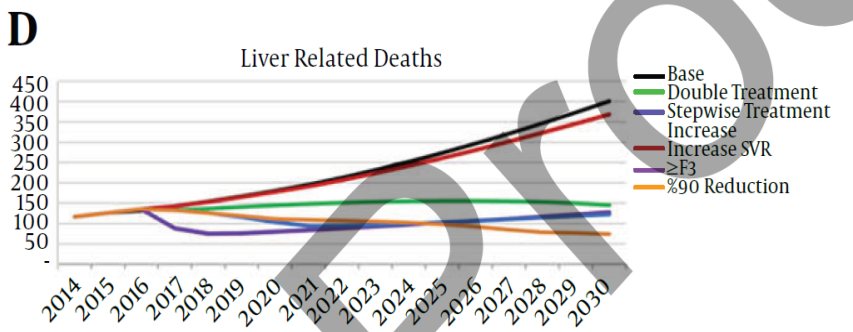


Projection of HCV Morbidity and Mortality During 2014 - 2030 by Diagnosis and Treatment Strategy









Proof

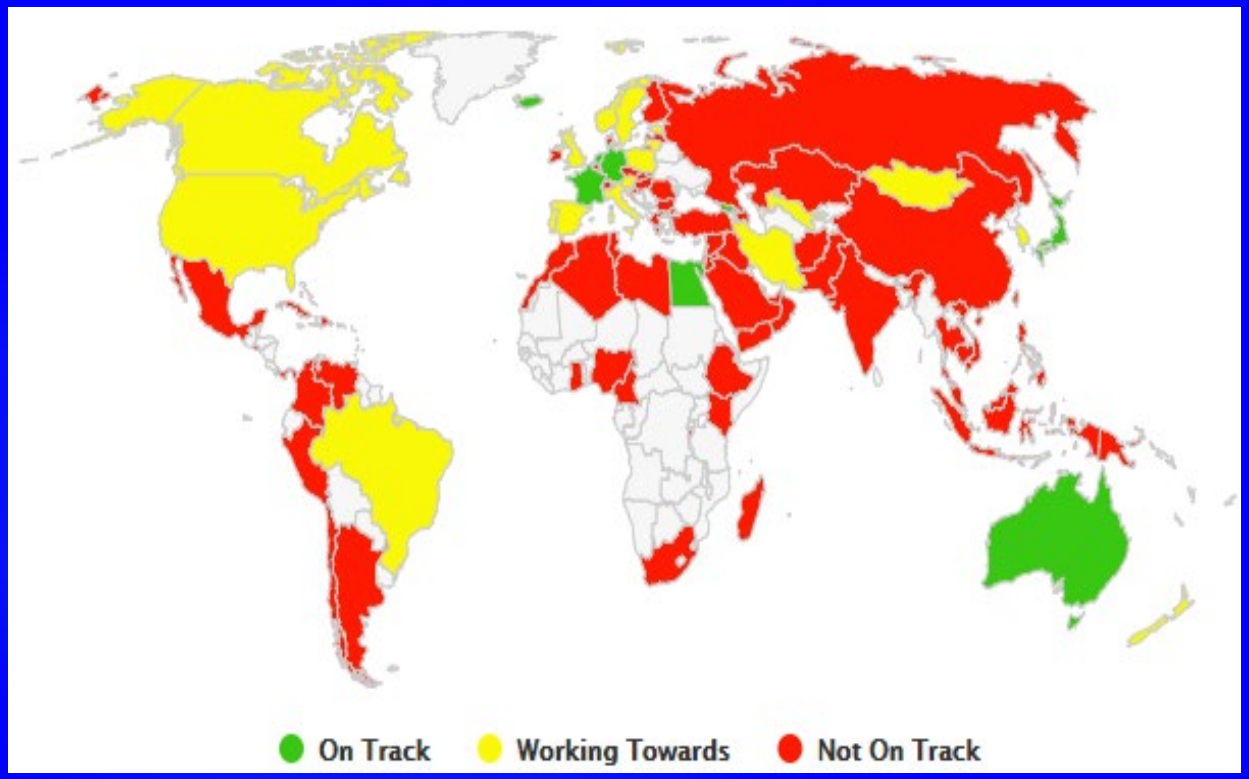
Hepatitis C

- Hepatitis C is the only subtype for which we've seen an increase in age-specific rates; combined with increases due to both population growth and changing age structures'

- DALYs for hepatitis C have more than doubled since 1990.

ایران در اتحاد جهانی علیه هپاتیت سی

در سال ۲۰۱۸، پیش بینی شد دوازده کشور به اهداف ریشه کنی سازمان بهداشت جهانی در سال ۲۰۳۰ دست خواهند یافت.



ایران جزو هفده کشوری است که در راستای دستیابی به اهداف ریشه کنی تلاش میکنند.

امکانات و امتیازات موجود

در خاورمیانه، ایران دارای یکی از پیشروترین سیاست‌های بهداشت جمعی جهت کاهش آسیب مصرف مواد است.

در سال ۲۰۱۳، بیش از ۴۰۰۰ کلینیک متادون درمانی و بیش از ۷۰۰ مرکز گذری کاهش آسیب در کشور وجود داشته است.

شبکه گسترده ترک اعتیاد و کاهش آسیب بهترین محمل جهت بهبود دسترسی به خدمات هپاتیت سی است.

تولید داروهای ژنریک هپاتیت سی در کشور قدم مهمی در راستای دستیابی به اهداف ریشه کنی جهانی است.

تعیین یک روش مقرون به صرفه برای غربالگری هپاتیت C در زندان ها

اهداف طرح:

تعیین اعتبار پرسشنامه 5 سوالی، و مقایسه دو مدل غربالگری بر اساس فاکتور خطر و غربالگری عمومی

جمعیت مورد مطالعه ⟵ ساکنین و ورودی جدید زندان گرگان

مراحل اجرا:

تست Rapid HCV Ab در تمامی زندانیان، خونگیری از رگ افراد مثبت جهت PCR، و تکمیل پرسشنامه:

- **آیا تا به حال تست تشخیص هپاتیت سی دادید؟ بله: مبتلا هستم – مبتلا نیستم – نمیدانم / خیر**
- **آیا سابقه زندان قبلی داشتید؟ بله / خیر**
- **آیا تا به حال مواد مصرف کردید؟ بله / خیر**
- **آیا تا به حال مواد تزریق کردید؟ بله / خیر**
- **هیچ وقت از وسایل مشترک تزریق استفاده کردید؟ بله / خیر**

نتایج بررسی پرسشنامه

- 90 درصد از زندانیان تا به حال تست هپاتیت C نداده یا از نتیجه تست خود ناآگاه بودند. درصد از زندانیان جدید سابقه زندان قبلی داشتند.

Residents and new inmates (n=1,892)

HCV-Ab 7% (n=131)

HCV-RNA 5% (n=87)

Risk Factors	Number	Drug use	Injecting drug use	Sharing equipment
Prison residents	1,482	1,059 *(72%)*	146 *(10%)*	73 of 135 *(54%)*
Positive HCV Ab	111	106 *(96%)*	63 *(58%)*	40 of 63 *(63%)*
New inmates	410	282 *(69%)*	28 *(7%)*	18 of 28 *(64%)*
Positive HCV Ab	20	18 *(90%)*	5 *(25%)*	3 of 5 *(60%)*
Total inmates	1,892	1,341 *(71%)*	174 *(9%)*	91 of 163 *(56%)*
Positive HCV Ab	131	124 *(95%)*	68 *(53%)*	43 of 68 *(63%)*

نتایج مطالعه

Residents and new inmates	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)
History of Drug use	95	31	9	99
History of Injection	52	94	39	96
History of Sharing	33	96	47	95
History of testing	9	11	50	95
Drug use and injection	52	31	39	99
Drug use and sharing	33	31	47	99
Injection and sharing	33	94	47	96

- حساسیت و ارزش اخباری منفی سوال سابقه استفاده از مواد مخدر در تشخیص افراد آنتی بادی مثبت **95** و **99** درصد به دست آمد.
- **تنها یک درصد** از کسانی که سابقه استفاده از مواد نداشتند از نظر آنتی بادی هپاتیت سی مثبت بودند، که نیمی از آنها عفونت مزمن داشتند.

غربالگری بر اساس سابقه استفاده از مواد با کاهش هزینه ها و تشخیص حدود 97 درصد بیماران هپاتیت C مزمن همراه است.


viral
hepatitis
2030

Cost of elimination per patient in USA and Europe

- At the time of their launch, the listed price of DAAs was between $54,000 and $96,000 per treatment course.
- However, the effective price of DAAs has come down substantially to below $24,000.
- At this price, treatment with DAAs is highly cost effective or even cost saving.

Cost of elimination per patient in Iran

- At present time the effective price of DAAs is less than 160$per treatment course.
- At this very low international price treatment with DAAs is highly cost saving in Iran.

Greatest Remaining Challenge: HCV Cascade of Care

- Diagnosis
  - Rates remain low
- After diagnosis – many may never be treated
  - Access to providers
  - Access to therapy – cost, restrictions (fibrosis, sobriety)
  - Competing concerns – opioid epidemic, substance use risks

Slide credit: clinicaloptions.com

Novel innovations (POC testing) and models of care (task shifting) are required to overcome current barriers

Summary HCV

- HCV assessment and treatment are now simple
- Assessment can be limited to fibrosis staging (still required in all patients before treatment!), HBV and HIV testing, and drug-drug interaction review
- Genotyping limited to treatment-experienced patients and those with cirrhosis
- Pangenotypic regimens for most if not all settings
- On-treatment monitoring limited to those with adherence concerns
- Post-SVR follow-up limited to HCC surveillance for those with cirrhosis and HCV RNA for those with ongoing risk exposures

Conclusions

- Screening all pregnant women for HBV and prevention of infection in new born
- Vaccinating all adult <35 who have not received HBV vaccine up to now
- Screening all subject with risk factor for HBV and treating all viremic (>100,000) HBV infected people in Iran.
- Screening all subject with risk factor for HCV and treating all viremic HCV infected people in Iran.

Thank you!

Questions?